

# SIMATIC WinCC in the Totally Integrated Automation Portal

Flexibility in all HMI applications –  
from the Basic Panel to process visualization

Brochure · April 2011



## SIMATIC HMI

Answers for industry.

**SIEMENS**

# SIMATIC WinCC in the Totally Integrated Automation Portal

## Flexibility in any HMI application – from the Basic Panel to process visualization

SIMATIC WinCC in the Totally Integrated Automation Portal (TIA Portal) is part of a new, integrated engineering concept which offers a uniform engineering environment for programming and configuration of control, visualization and drive solutions. This engineering framework is a milestone in software development and represents the consistent further development of the TIA concept. WinCC in the TIA Portal is the software for all HMI applications ranging from the simplest operation solutions with Basic Panels to SCADA applications on PC-based multi-user systems. The range of solutions is thus increased significantly compared to the predecessor product, SIMATIC WinCC flexible.

SIMATIC WinCC V7 is still available for very complex applications with Plant Intelligence solutions or redundant architectures, while WinCC Open Architecture addresses solutions with highly customer-specific adaptation requirements, including on non-Windows platforms.

### Maximum configuration efficiency

Compared to WinCC flexible, which has set the standards in engineering for years, configuration efficiency has been further increased, particularly if further TIA components such as the SIMATIC S7 Controller are part of the automation solution.

The perfect interaction with STEP 7 in the TIA Portal prevents multiple entries and guarantees consistent data management at all times. The engineering framework into which the software products are integrated standardizes all shared functions – also in their on-screen representation. User benefits range from intuitive operation through the

editors' integrated intelligence to the advantages of a shared database, which ensures highest transparency and absolute consistency.

Reusability saves engineering effort and simultaneously increases the quality of the solution. Reusability extends to acquired knowledge in using the software just as much as it does to existing engineering blocks that have been developed and tested. A comprehensive library concept makes them available for new projects, no matter whether they are single operator controls or entire visualization solutions.

### Scalability in engineering and runtime

SIMATIC WinCC is being introduced alongside two new generations of panels covering the entire range of machine-level standard applications:

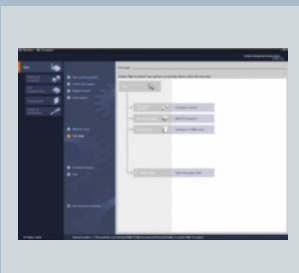
SIMATIC HMI Basic Panels and SIMATIC HMI Comfort Panels. The HMI Basic Panels are the units of choice to solve simple visualization tasks, particularly with the SIMATIC S7-1200 controller family. All Basic Panels offer the same HMI functionality and differ primarily in terms of display size and operator controls. This, of course, facilitates the scalability of the configuration.

This is equally true for the Comfort Panels. Here, too, all devices in the family offer the same impressive functionality for demanding HMI tasks on the machine level, while the choice between touch and keypad devices from 4 to 12 inches is completely independent from the HMI functionality.

Device-independent operator elements and configurations for several target devices have proved themselves even in plants where stationary operator stations are supplemented

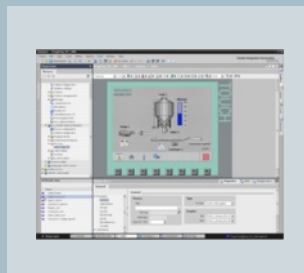
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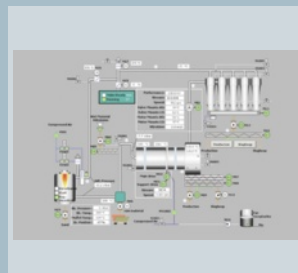
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or supported by mobile HMI. SIMATIC Mobile Panels can be seamlessly added to operation solutions, no matter whether these are visualization tasks in machinery setup and service, or HMI applications with distributed machines and plants where visual inspection is difficult. Naturally, all x77 series Panels and Multi Panels can also be configured with Simatic WinCC. And if the HMI solution must also be implemented for PC-based automation, the engineering software can be upgraded without any problems. The relevant runtime software package ensures the runtime functionality.

## Highlights

- Scalable runtime functionality, from the Basic Panel to distributed SCADA applications
- Innovative configuration interface based on the latest software technologies
- Comprehensive library concept for user-definable objects and faceplates
- Intelligent tools for graphical configuration and mass data handling

Overview of HMI devices  
The SIMATIC HMI Panels  
and Panel PCs  
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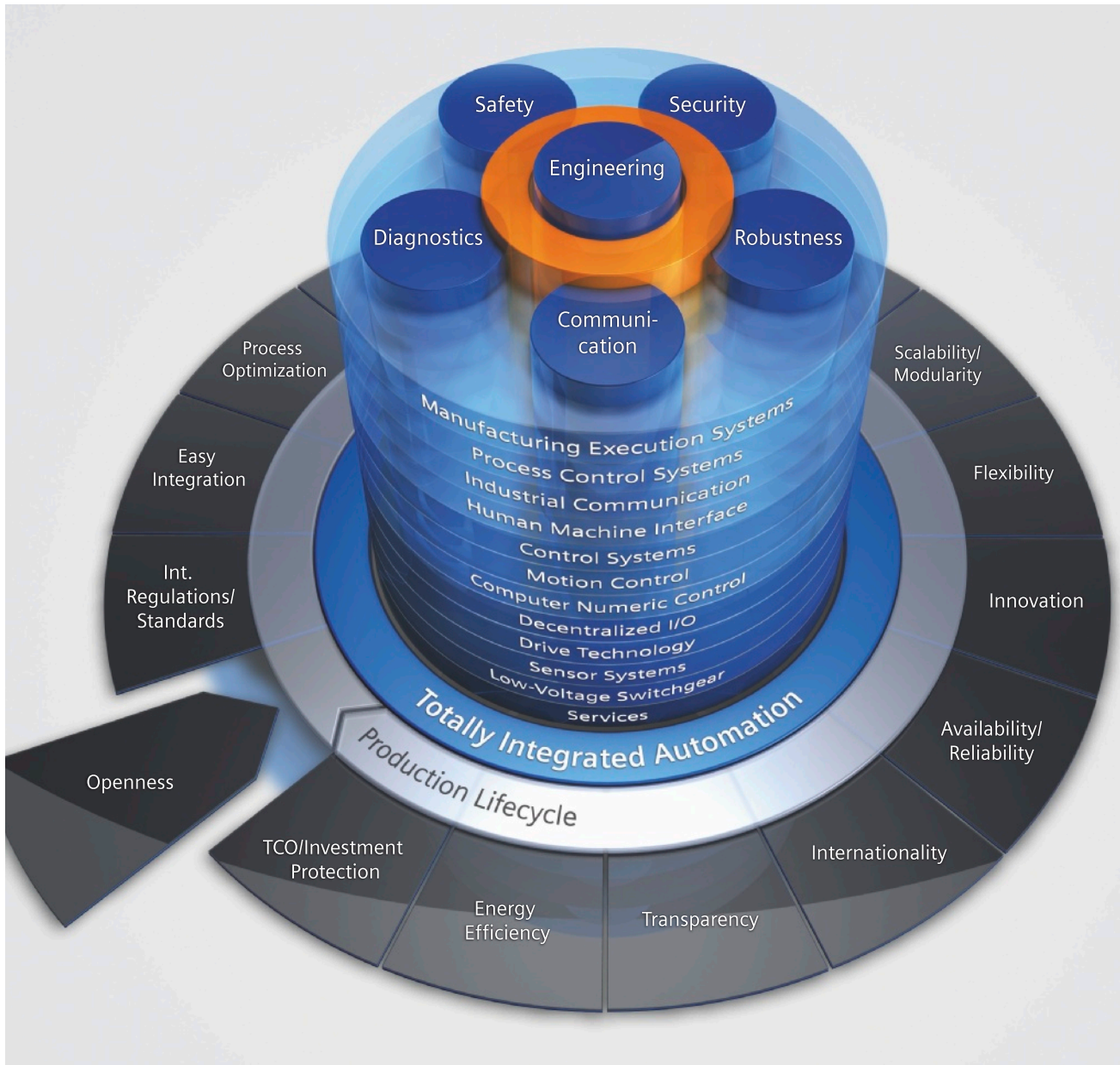


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# Totally Integrated Automation

Rely on new productivity standards  
for sustained competitive advantages



To be able to respond to the increasing international competitive pressure, it is more important than ever to consistently make full use of the potential for optimization – over the complete lifecycle of a machine or plant.

Optimized processes reduce the total cost of ownership, shorten the time to market, and improve quality. This perfect balance between quality, time, and costs is now, more than ever, the decisive success factor in industry.

Totally Integrated Automation is optimally aligned to all requirements and open for international standards and third-party systems. With its six characteristic system features, Totally Integrated Automation supports the complete lifecycle of a machine or plant. The complete system architecture offers holistic solutions for every automation segment on the basis of a comprehensive range of products.

### **SIMATIC: more efficient and systematic automation**

SIMATIC, a core component of Totally Integrated Automation, includes a variety of standardized, flexible, and scalable products – such as the products for process visualization with SIMATIC WinCC presented in this brochure.

SIMATIC is currently considered to be the global number one in automation. One of the decisive reasons for this is that SIMATIC exhibits the six system features of Totally Integrated Automation:

- Engineering
- Communication
- Diagnostics
- Safety
- Security
- Robustness

In addition, SIMATIC features two additional system features:

- Technology
- High availability

You can find more about the system features and the resulting advantages in the following chapter “System features”.



# System features

Engineering		<p><b>Maximum engineering efficiency – in all phases of the lifecycle of the machine and plant</b></p> <p>With SIMATIC you rely on an integrated engineering environment. Efficient software supports you over the complete lifecycle of your machine or plant – from the planning and design stages through configuring and programming as far as commissioning, operation and upgrading. With its integration capability and harmonized interfaces, SIMATIC software supports a high degree of data consistency – throughout the entire engineering process.</p> <p>Siemens has redefined engineering with its Totally Integrated Automation Portal (TIA Portal). The new TIA Portal engineering framework combines the SIMATIC STEP 7, SIMATIC WinCC and SINAMICS StartDrive automation software tools in a unique development environment.</p>
Communications		<p><b>Maximum data transparency on all automation levels – based on proven standards</b></p> <p>SIMATIC creates the foundations for unlimited integration in communication – and thus for maximum transparency on all levels, from the field and control level to the operations management level all the way up to the corporate management level. SIMATIC relies on international, cross-vendor standards which can be combined flexibly: PROFINET, the leading Industrial Ethernet standard and PROFIBUS, the global No. 1 fieldbus.</p>
Diagnostics		<p><b>Minimization of downtimes – through efficient diagnostic concepts</b></p> <p>All SIMATIC products feature integrated diagnostic functions with which a fault can be identified and eliminated to provide increased system availability.</p> <p>Even with larger plants, the Maintenance Station provides you with a uniform view of the maintenance-relevant information of all automation components.</p>
Safety		<p><b>Protection of personnel and machines – within the framework of an integrated complete system</b></p> <p>SIMATIC Safety Integrated offers TÜV-certified products, which facilitate compliance with relevant standards: IEC 62061 up to SIL 3, EN ISO 13849-1 up to PL e, as well as EN 954-1. Due to the integration of safety technology in standard technology, only one controller, one I/O, one engineering, and one bus system are required. Thus the system advantages and comprehensive functionality of SIMATIC are also available for fail-safe applications.</p>

### Data security in the networked world – through harmonized, scalable security systems

Due to the increased use of Ethernet connections penetrating the field level, security issues are gaining in importance in industry. For comprehensive protection of a plant, a variety of different measures must be implemented. These range from the company organization and its guidelines regarding protective measures for PC and control systems through to protection of automation cells by segmenting the network. Siemens follows the cell protection concept and, with the modules of the SCALANCE series and the Security modules, offers components for building up protected cells.



Security

### Maximum industrial suitability – through increased robustness

Each standard product from the SIMATIC range is characterized by the highest quality and robustness and is perfect for use in industrial environments. Specific system tests ensure the planned and required quality. SIMATIC components meet all relevant international standards and are certified accordingly. Temperature and shock resistance are defined in the SIMATIC quality guidelines, as are vibration resistance or electromagnetic compatibility. For demanding to extreme rated conditions, special versions such as SIPLUS extreme or special versions of SIMATIC ET200 are available. These include an increased degree of protection, extended temperature ranges, and exceptional environmental stress.



Robustness

### More possibilities, less complexity – through integrated technology functionality

Counting and measuring, cam control, closed-loop control, or motion control: You can integrate technological tasks in many different combinations and with various degrees of complexity without a system changeover into the world of SIMATIC – easily, conveniently, consistently. Parameter assignment and programming are implemented in the familiar STEP 7 environment.



Technology

### Maximum availability – with integrated high availability concepts

Siemens offers a comprehensive high availability concept to ensure high availability for the entire plant: from the field level to the control level all the way up to the management level. For example, field-tested controllers ensure high availability through bumpless switching with automatic event synchronization.



High availability



# Totally Integrated Automation Portal Software

An integrated engineering framework for all automation tasks

The new TIA Portal engineering framework combines all of the automation software tools in one development environment. It is a milestone in software development – the first automation software in industry with "One Engineering Environment" – one software project for all automation tasks.

## Intuitive, efficient, proven

With its intuitive user interface, its efficient navigation and proven technology, the TIA Portal provides innovative highlights in several areas at the same time. From the development, installation and commissioning to the servicing and expansion of automation systems, the framework saves engineering time and costs.

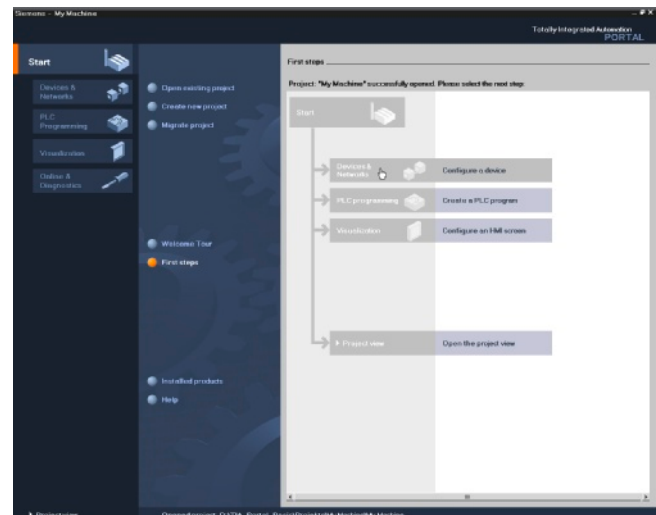
The design of the software editors in the TIA Portal is based on a shared layout and shared navigation concept. The configuration of the hardware, logic programming, parameterization of a frequency converter, or the design of an HMI screen – each environment has the same editor design, which is specifically designed for intuitive use to save time and costs. Functions, properties, and libraries are automatically displayed in their most intuitive view depending on the desired activity.

It is very easy to switch between the editors with "Intelligent Drag & Drop", "Autocompletion for tags", and many other advanced features. They allow the user to engineer a complete automation system, rather than just individual parts of the system.

## Framework architecture in an appealing design

The TIA Portal provides advanced software architecture, the design of which is based on a simple navigation scheme. Its well-conceived ergonomics ensures the greatest possible efficiency and time savings. All editors are clearly arranged and easily accessible. The user always has a complete overview of the project, without having to click through complicated menus or structures.

At the start of a project, the user can choose between the task-oriented portal view with its simplified user prompting or the project view, which provides quick access to the relevant tools. The portal view intuitively guides the user through each engineering step. The TIA Portal helps both new and experienced users to work as productively as possible, whether a controller is to be programmed, an HMI screen is to be created, or network connections are to be configured.

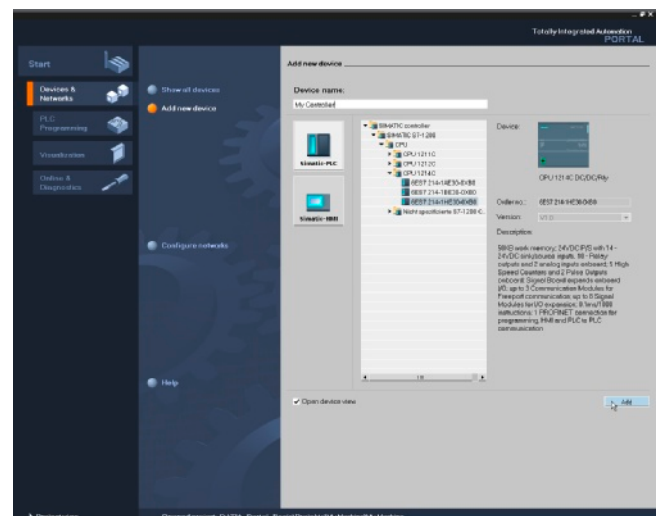


Task-oriented portal view of the Totally Integrated Automation Portal

## High performance capability with shared services

The strength of the TIA Portal is that all of the automation components can be handled in the same way and easily connected to one another.

Shared services such as uniform download, integrated cross-references, and powerful online functions are centrally managed within the framework and can be easily accessed by any editor. Intelligent filters facilitate the work when selecting objects or when switching editors. Links and cross-references eliminate the need for lengthy searches for information or menus. The "Favorites"-function allows direct access to frequently used objects and commands.



Creating a device in the portal view

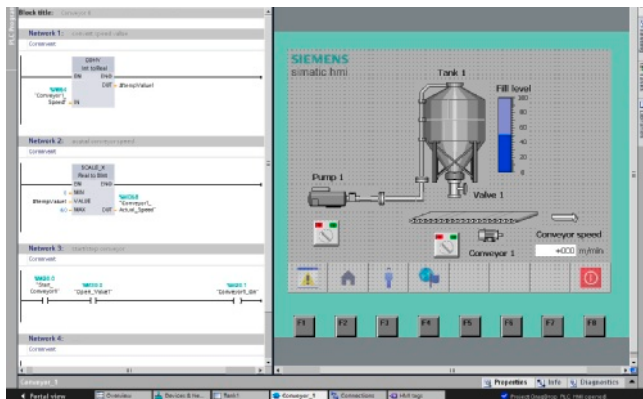


## Interoperability, reusability, and data consistency

In the world of automation systems, engineering tasks can be both simple and highly complex. Programming powerful algorithms is often time-consuming. To repeat them, however, should be easy and quick. An ideal engineering software must ensure interoperability. The results must be reusable in order to save time and ensure the highest project quality.

For engineers, it is a daily practice to simultaneously use different tools in the creation of integrated automation systems. With TIA Portal, it is possible for the first time to access all engineering tools from one user interface. The TIA Portal is a powerful, graphic engineering framework, which functions as an individual program with a uniform user interface.

The data can easily be transferred between the various editors for configuring different parts of the system using drag & drop. The connections are automatically made in the background. This facilitates the work and allows less time to be spent on engineering the automation system and more time to be dedicated to the actual application.

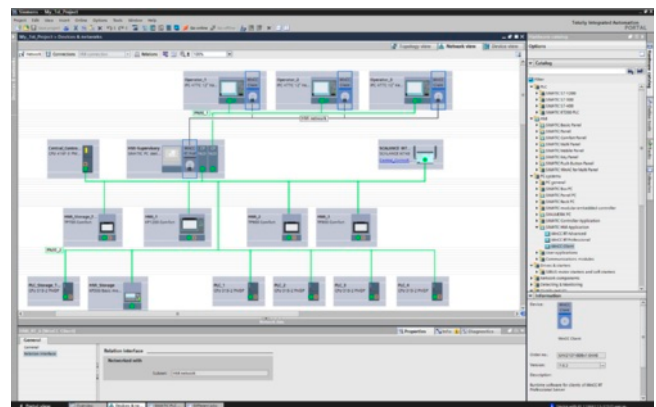


Importing PLC tags into WinCC

The library concept of the TIA Portal is not limited to the supplied program blocks or faceplates. With the TIA Portal, the user can create his own libraries of many various parts of the engineering objects, which can be easily reused.

This allows, for example, complete configurations of various machines and plants to be centrally saved on one server. Fully developed components, tried and tested project data and projects from earlier versions can be reused at any time. Established engineering quality is transferred from the first tested program to all future projects.

With the TIA Portal, the management of tags is a quickly mastered task. A tag only has to be defined once and then it is directly available to all of the editors. The result: maximum data consistency and transparency throughout the entire project. The error rate drops and the quality of the automation project increases. Thanks to the data consistency in the TIA Portal, tags can be accessed easily from any editor. Of course, the TIA Portal ensures that changes to tags are immediately recognized in the entire project.



Network view of the automation components

# SIMATIC WinCC in the TIA Portal – Scalable HMI

## SIMATIC WinCC Engineering Software

The WinCC Engineering Software includes innovative engineering tools for the end-to-end configuration of all SIMATIC HMI devices and is available in a number of versions differentiated by price and performance. They are based on each other and are optimally tailored to the individual classes of operator panel. The larger software package always includes the configuration options of the smaller package. As of WinCC Comfort, it is possible to upgrade to the larger packages by means of PowerPacks.

The following licenses are available:

- WinCC Basic for the configuration of SIMATIC HMI Basic Panels (cannot be upgraded)
- WinCC Comfort for configuring the new Comfort Panels, Mobile Panels, x70 panels, and Multi Panels
- WinCC Advanced for the configuration of PC-based HMI single-user solutions
- WinCC Professional for process visualization and SCADA applications (available in three variants with 512, 4096 or maximum number of PowerTags<sup>1)</sup>)

## SIMATIC WinCC Runtime Software

The runtime software is included in the SIMATIC HMI devices and offers different HMI functionalities and quantity structures depending on the hardware configuration of the device. For PC platforms, there are independent WinCC Runtime variants.

WinCC Runtime Software is available as:

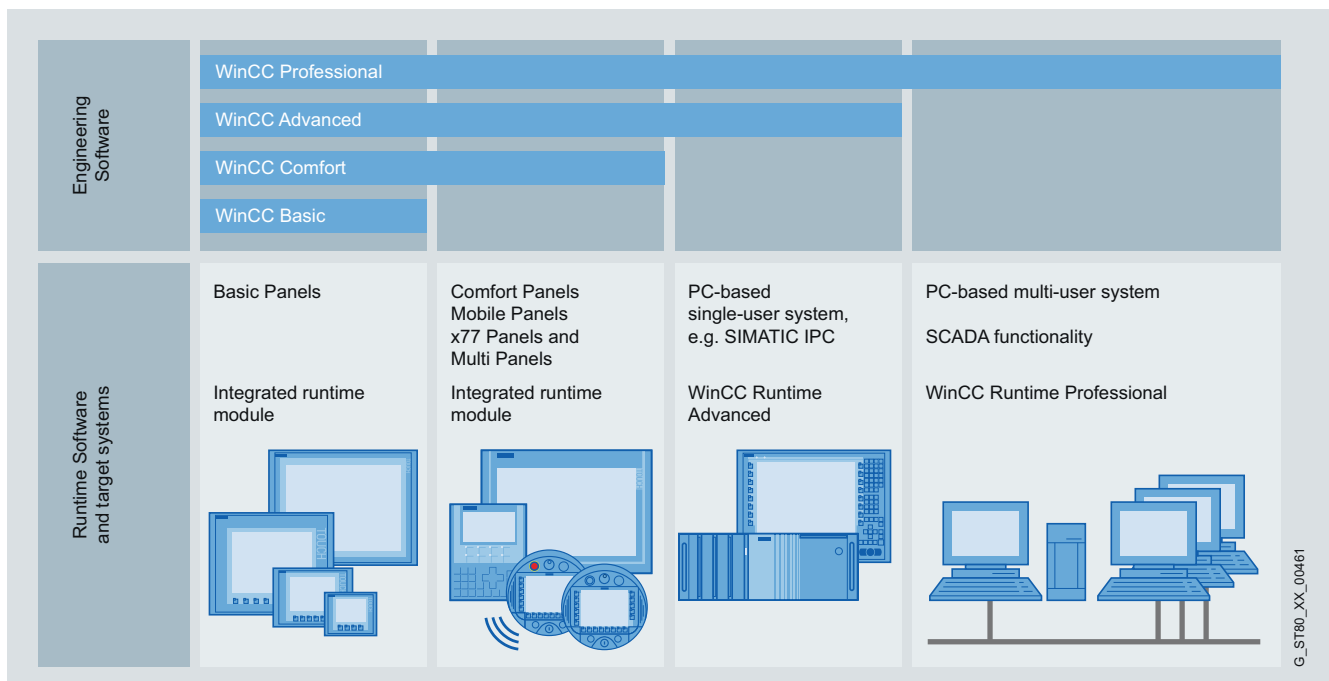
- WinCC Runtime Advanced for PC-based HMI single-user solutions with 128, 512, 2K, or 4K PowerTags<sup>1)</sup>
- WinCC Runtime Professional for Multi-User SCADA applications with 128, 512, 2K, 4K, 8K, and 64K PowerTags<sup>1)</sup>

Tags without a process connection, constant limit values of tags as well as up to 4000 alarms are provided as an additional system feature.

### PowerPacks

PowerPacks give the user the option to adapt both the engineering software and the runtime packages to increasing requirements at any time. With PowerPacks the user can upgrade from WinCC Comfort to WinCC Advanced or WinCC Professional, or the number of configurable PowerTags<sup>1)</sup> can be further increased for WinCC Professional. PowerPacks for WinCC Runtime Advanced or WinCC Runtime Professional allow the user to increase the number of usable PowerTags<sup>1)</sup> of the Runtime software.

<sup>1)</sup> Only process tags that are connected to the controller or other data sources via a WinCC communication channel are designated as PowerTags. Up to 32 alarms and up to 256 user-definable analog alarms can be derived from one PowerTag. Moreover, internal tags without process linking are available for free as additional system performance.



SIMATIC WinCC in the TIA Portal – Engineering software and target systems

## Options

Functional or industry-specific expansions of the runtime software are available in the form of WinCC options. Some options are already integrated as standard functions in the HMI devices of various performance classes. Others can only run in combination with the corresponding Runtime basic software.

## Software updates

With the Software Update Service (SUS), all released versions of your SIMATIC software are automatically delivered directly to you – i.e. all upgrades and service packs. Thus it is ensured that your software is always up-to-date.

Hardware support packages for the configuration of new SIMATIC HMI devices, as well as service packs, can be downloaded free of charge from the Internet.

The Software Update Service:

- Saves logistics costs  
Once it is ordered, the Software Update Service is automatically renewed every year.
- Reduces costs  
The service pays for itself after the first update as it costs less than an individually ordered update.
- Provides an overview of costs  
Software expenditures can be accounted for early in the budgeting process and they are easier to write off.

Purchase conditions

The Software Update Service is simply ordered like a product. An SUS is required for each installed software license. The SUS is valid for 12 months from the date of order and is automatically extended by a further year. It can be canceled three months prior to expiration. A prerequisite is the purchase of the current software version.

## System requirements

### WinCC (TIA Portal) – Engineering software

Supported operating systems	Windows XP Professional SP3, Windows 7 Professional/Enterprise/Ultimate (32 bit); additionally with WinCC Basic: Windows XP Home SP3, Windows 7 Home Premium (32 bit); additionally with WinCC Professional: Windows Server 2003 Release 2 Standard Edition SP2, Windows Server 2008 Standard Edition SP2 (32 bit)			
	WinCC Basic	WinCC Compact	WinCC Advanced	WinCC Professional
<b>Processor / RAM</b> – minimum – recommended	Pentium 4, 1.7 GHz / 1 GB Core2 Duo, 2.2 GHz / 2 GB	Pentium 4, 1.7 GHz / 1 GB Core2 Duo, 2.2 GHz / 2 GB	Pentium M, 1.6 GHz / 1 GB Core2 Duo, 2.2 GHz / 2 GB	Pentium M, 1.6 GHz / 2 GB Core2 Duo, 2.2 GHz / 2 GB
<b>Screen resolution</b> – minimum – recommended	1024 x 768 pixels 1400 x 1050 pixels	1024 x 768 pixels 1400 x 1050 pixels	1024 x 768 pixels 1400 x 1050 pixels	1024 x 768 pixels 1400 x 1050 pixels

### WinCC (TIA Portal) – Runtime software

Supported operating systems	Windows XP Professional SP3, Windows Embedded Standard 2009, Windows 7 Professional/Enterprise/Ultimate (32 bit), Windows Embedded Standard 7 (32 bit), Windows Server 2003 Release 2 Standard Edition SP2, Windows Server 2008 Standard Edition SP2 (32 bit)			
	with Windows XP	with Windows 7	with Windows Server 2003	with Windows Server 2008
<b>WinCC Runtime Advanced</b> – minimum – recommended	Pentium II, 300 MHz / 128 MB Pentium III, 500 MHz / 512 MB	Pentium III, 1 GHz / 1 GB Pentium 4, 2.5 GHz / 2 GB	– –	– –
<b>WinCC Runtime Professional Single-user system</b> – minimum – recommended	Pentium III, 1 GHz / 1 GB Pentium 4, 2.5 GHz / 2 GB	Pentium 4, 2.5 GHz / 2 GB Pentium 4, 3.5 GHz or Dual Core systems / 2 GB	Pentium III, 1 GHz / 1 GB Pentium 4, 3 GHz / 2 GB	Pentium 4, 2.5 GHz / 2 GB Pentium 4, 3 GHz or Dual / Multi Core systems / 2 GB
<b>WinCC Runtime Professional Multi-user system</b> – minimum – recommended	– –	– –	Pentium III, 1 GHz / 1 GB Pentium 4, 3 GHz / 2 GB	Pentium III, 1 GHz / 2 GB Pentium 4, 3 GHz or Dual / Multi Core systems / 2 GB
<b>WinCC Runtime Professional Client</b> – minimum – recommended	Pentium III, 800 MHz / 512 MB Pentium 4, 2 GHz / 1 GB	Pentium 4, 2.5 GHz / 1 GB Pentium 4, 3 GHz / 2 GB	– –	– –

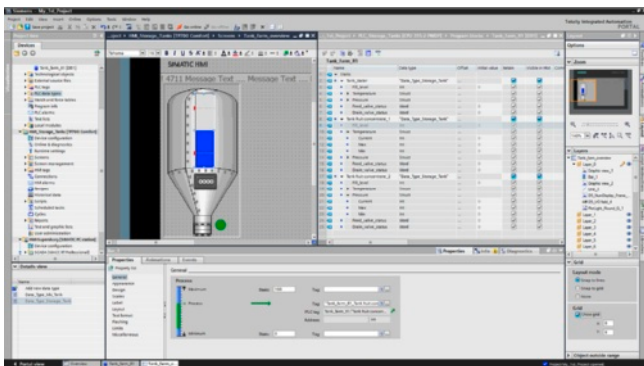
# SIMATIC WinCC in the TIA Portal – HMI Engineering redefined

## Perfect interaction in the engineering framework

For the first time, the TIA Portal combines the engineering systems for the diverse automation tasks. The shared framework, uniform interface, and the same type of configuration of comparable automation tasks ensures a short familiarization period with a high recognition value.

### System-supported configuration without limits

For decades, the development of automation software was aimed at more functionality and more efficiency. Engineering software was developed to the point where it became a highly specialized, tailored tool for a given task. Only with the increasing importance of software ergonomics did software developers begin to look beyond their own tool and begin to include the approaches of other developers with regard to user interfaces in their considerations. The look and feel of the software products also became more uniform under the influence of office software. In this development, the TIA Portal represents the next logical step: from similar to shared, from related to integrated. An operating philosophy and a data model without loss of functionality. An example: By simply dragging and dropping PowerTags from one block to a WinCC screen, you allow process values to be entered from the HMI. The system generates all of the necessary settings, such as the connection, HMI tag and screen object for you. Whether you have selected an individual tag or are using a multiple selection plays no role in this. You can also access PLC tags directly from WinCC screens during the configuration. A user-friendly selection window allows you to select the corresponding object. The entire TIA Portal provides selection windows for configuration, which eliminates error-prone, manual and especially multiple entries of the object names.



Drag & Drop of tags

### On-the-fly data consistency

One problem of traditional engineering systems is guaranteeing consistent data management. Every engineering tool only guarantees data consistency within its own system. Even if an attempt is made to standardize the interfaces, the configuring engineer is mainly responsible for the availability and consistency of the data, with all of the accompanying disadvantages such as additional work expenditure and increased susceptibility to errors. The TIA Portal is based on shared data management: Any changes to application data which are made at any point in a project are automatically and immediately repeated at all of the other points of use. The various editors of the TIA Portal do not have to be opened for this.

### Cross-reference list and display of the screen properties

For service or plant personnel, it is often difficult to get acquainted with a project and to analyze the individual project specifics. The ideal tools in this case are a cross-reference list with the (filtered) tabular listing of all of the tags, screens and functions defined in the project and the central display of the screen properties. The different views show where the object is used or what other objects are used by the selected object. There are no program limits for cross-reference lists either, which means that even linked PLC tags of a screen object are displayed in the respective blocks. In this way, the TIA Portal creates transparency in the project and facilitates the change configuration even after a long period of time.

### Ready-to-use diagnostics

The timely knowledge of faulted or faulty modules and devices is essential for avoiding long downtimes. Therefore, constant monitoring of the plant is of the utmost importance. The TIA Portal provides support with its ready-to-use diagnostic mechanisms. No additional comprehensive configurations of the diagnostics are necessary. Activating the devices for the system diagnostics generates alarms derived from the configured plant layout in the "Devices and Networks" editor. These can be displayed in the HMI. In addition, WinCC provides a diagnostics viewer for the Comfort Panels, which can automatically display the information and alarms.



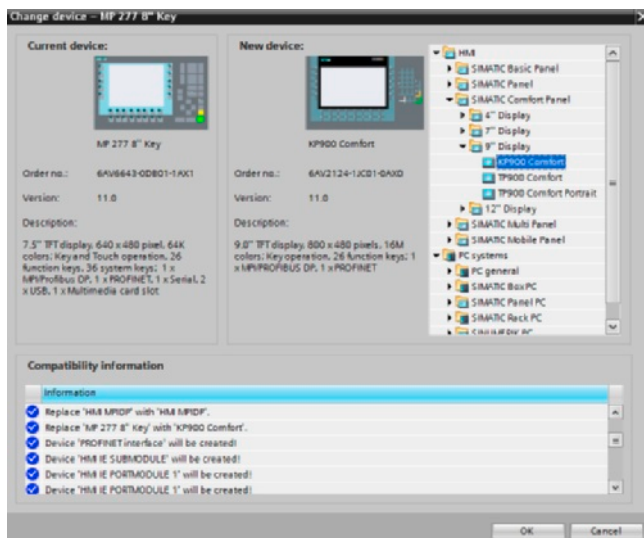
## Intelligent tools for efficient configuration

In the life cycle of an automation solution, engineering costs make up as much as 50% of the total costs. If you want to significantly lower costs, you will need simple and efficient tools for configuring – and intuitive operator prompting. SIMATIC WinCC provides both.

### Configuration without dead ends

Time-saving configuration means: delegating tasks. SIMATIC WinCC supports the project engineer with wizards for routine tasks. One example is the device wizard: The most important settings can be configured right when the device is being created. User-defined settings can be saved and imported directly when creating another device. There is no need for redefining. This allows you to ensure that all of the devices of a production line have the same basic configuration and are identical in appearance.

Often a comparable WinCC project already exists and a great deal of it can be imported. Even if it has been designed for other target devices, this does not mean that the configuration must be started from the beginning, because the configuration is freely scalable. In the machine-level area, the target HMI device can be easily switched via the device switch-over. The system provides detailed information about any functions that might be different and detailed specifications for adapting the configurations. Thanks to the uniform engineering system, from the panel to the SCADA, it is also possible to import data for WinCC Runtime Professional. System expansions and thus project adaptations can be carried out with a minimum of outlay.

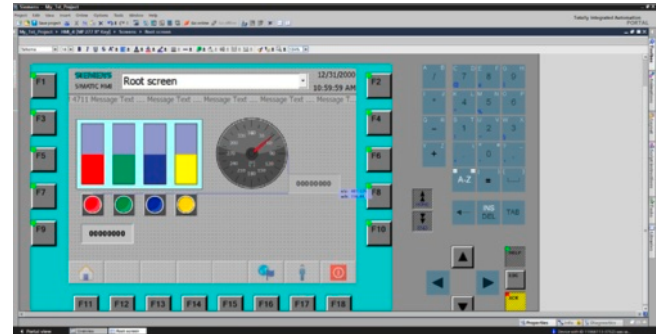


Switching over the target HMI device

### Configuration with helpful details

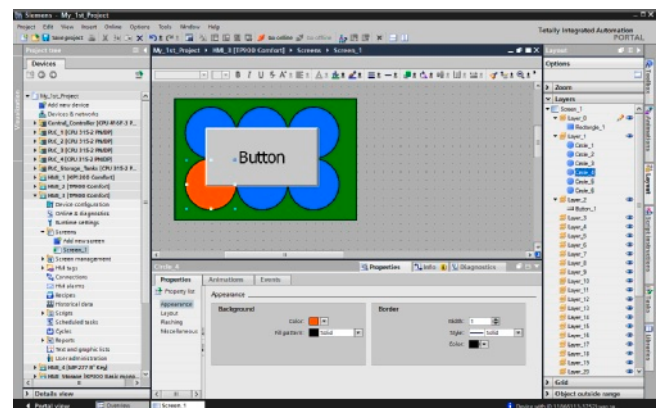
Engineering time is expensive and yet it is often wasted on time-consuming detailed work. User-friendly functions, like the familiar ones from special graphics software, effectively support and speed up the creation of precise, visually appeal-

ing HMI screens. The graphics editor allows, for example, the alignment and positioning of screen objects by means of adjustable grids, snaplines that can be hidden or shown, functions such as horizontal and vertical centering, or the even distribution and alignment with adjacent objects. There are no more time-consuming manual pixel corrections.



Working with snaplines

The WinCC "Screens" editor supports configuration in 32 screen layers. For complex screens involving several overlaid objects, individual levels can be hidden to provide a clearer overview. To this end, all layers with the screen objects they contain are clearly displayed in the "Layout" task card. The editor gives you the capability of conveniently moving the objects between the layers at a central point. The layer assignments in the object's properties are updated automatically. Of course, this also applies to grouped objects. Individual objects can be conveniently removed from the group, added, detached, and moved by means of dragging and dropping.



Configuring in layers

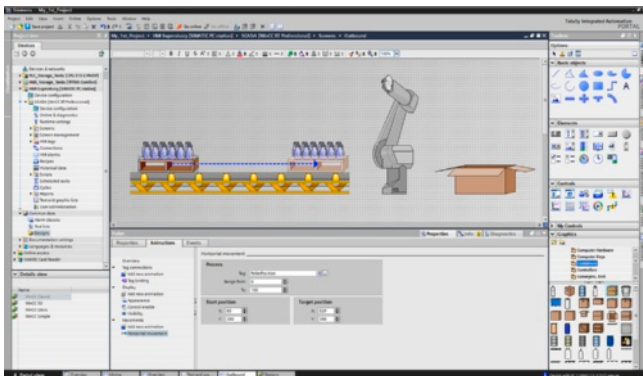
The grouping of any screen objects facilitates working with many individual elements.

All properties of grouped objects are displayed at the group and can be changed there without ungrouping the group.

# Intelligent tools for efficient configuration

## Dynamic configuring

It has long been known that animations and dynamic objects are not a gimmick, but rather they are an effective means of improving the operating ergonomics. The speed with which operators react to almost self-explanatory visual stimuli, such as color changes or the fading in/out of objects, is considerably faster than any interpretation of a text message and it greatly reduces the risk of misinterpretation. A side-effect which must not be underestimated: The translation costs for multi-language configurations are reduced with each image. The increasing quality and resolution of the displays on HMI devices and improved performance result in new capabilities of integrating more complex animations. WinCC accomplishes the creation of dynamic objects in minimal time. No programming knowledge is required. For many standard tasks in Runtime, pre-defined functions can be easily selected by means of drag and drop. If the requirements are very individualized, dynamization can also be implemented on the basis of integrated VB scripts.



Configuring an animated graphic

## Configuring with tables

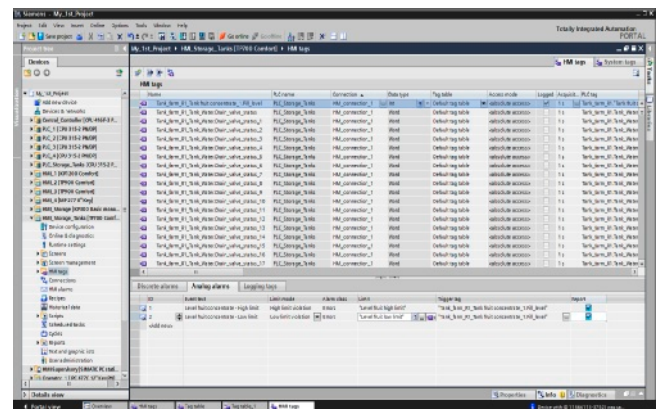
Automation tasks can generally be grouped into different focal points, for which there are special input screens. Editors for creating screens, the alarm system, the tag management, the blocks, the device configuration, etc.

At many points in the TIA Portal, there are table-based editors, which give the user a quick and simple overview. The immediate mastering of editors, even at first glance, thanks to their uniform appearance, the simultaneous changing of many objects, and even the simple copying of properties inevitably increase the efficiency.

Well-known office functions are available in the TIA Portal for conveniently and quickly configuring mass data.

An example: You can intelligently create hundreds of tags with only one movement of the mouse. Either the properties are retained, object names are adapted, or addresses are increased automatically.

In doing this, each editor supports the implementation of an individual special task, e.g. the alarm editor for configuring alarms. Cross-relationships between the individual editors are often difficult to track. As a result of this, an object-oriented approach was chosen for the WinCC tag editor. In addition to the configuration of the tags, a determination can also be made as to whether this tag should initiate an alarm and the logging of it. This not only helps the first time you create a project, but it also helps later by providing a quick overview of existing configurations.



Configuring alarms directly on the tags

## Configuring with libraries and faceplates

The use of building blocks and libraries are work techniques that have been around as long as the copy function itself. The benefits of these techniques, such as time savings, reusability and guaranteed quality are obvious. In actuality, the benefits depend directly on how comprehensive and consistent the library idea is implemented in a library concept. For example, can the user only save and retrieve objects of a specific complexity in libraries? Can the library elements be protected from unauthorized access? Can libraries be integrated in projects or can they be deliberately created to be cross-project by design? How high is the adaptation effort required for the integration of library elements in a project? The benefits of reusability can only be fully utilized if a library concept combines a very high degree of flexibility with practicality and user-friendliness. The library concept of the TIA Portal ideally meets these requirements.

### Libraries – versions and objects

The libraries can be used to the same extent when creating a control program and when configuring the HMI application. The library can be structured in a user-specific way, according to the requirements of the project. Libraries can contain all types of configuration objects, from simple HMI basic elements and entire screens to completely configured HMI devices. An object that is stored in the library only has to be configured once. Subsequently, it can be reused as often as necessary.

Libraries are available in two versions.

- Objects that are frequently needed in the current task are stored locally in the project library. The project library is characterized by the fact that it belongs to the project and is opened, closed, but also saved along with it.
- Objects that are used across projects can be managed in global libraries. Global libraries can be saved on a file server, for example, and then be utilized by several users.

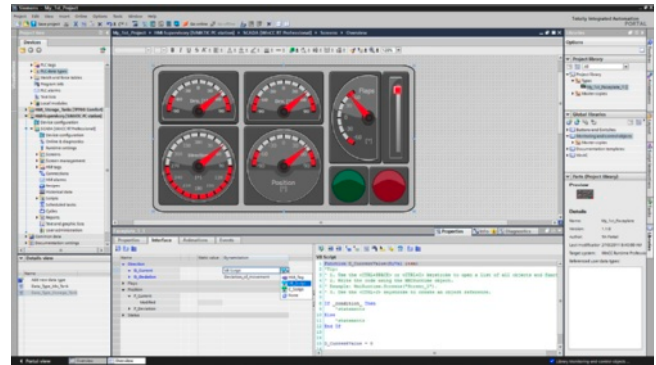
Libraries contain two basic types of objects:

- Types are objects that can be centrally modified
- Copy templates are simple copies of configuration objects

If types are modified, all occurrences of this type in a project are automatically updated by the library management system if the user approves the update. Types are either user-defined data types (HmiUDT) or faceplates. User-defined data types can be used to describe the data of a complex automation object (e.g. motor with status and control values) as a unit. As an interface to a faceplate they reduce the wiring overhead, because, as a result, only one structured tag of the same data type can be assigned to the interface of the block.

### Faceplates

Faceplates are created as a group of display and operating objects, so that they can then be used like other screen objects from a library. A faceplate integrates itself into a project via its interface. Only the user-defined properties that are important for the block to function during runtime are set at this interface. The user then only has to deal with this concentrated interface in order to define the dynamic properties of the block and the screen objects it contains. The central modification capability also improves the error correction at this point or the subsequent expansion of previously used instances of the faceplate.



Configuration of a complex faceplate in WinCC

WinCC already provides a large number of scalable and dynamizable objects in standard HMI libraries:

- "Buttons and Switches" provides a large selection of pre-configured switches and buttons.
- "Monitoring and Control objects" contains more complex operating and display objects in several designs, including the associated control lamps, buttons and switches.
- Finally, the "HMI Symbol Library" contains a number of technological and industry-specific objects such as pipes, motors, valves, etc. for displaying machines and plants.

## Engineering – Multilingual, expandable, and future-proof

### Individual expansions by means of scripting

Normally, screens, links and dynamic processes are configured via simple and user-friendly dialogs. For individual, flexible expansions, VBScript provides a powerful and easy to learn script language based on Visual Basic.

A user-friendly editor and code templates also facilitate the programming. The IntelliSense function permits high-speed programming of the accesses to runtime objects and a simple creation of control sequences in the script. Debugging is possible in the simulator during the engineering and, if required, also at runtime.

For WinCC Runtime Professional, there is also the option of integrating ANSI-C scripts. The scripts themselves have access to the properties and methods of all WinCC graphic objects, to ActiveX Controls and to the object model of applications from other manufacturers.

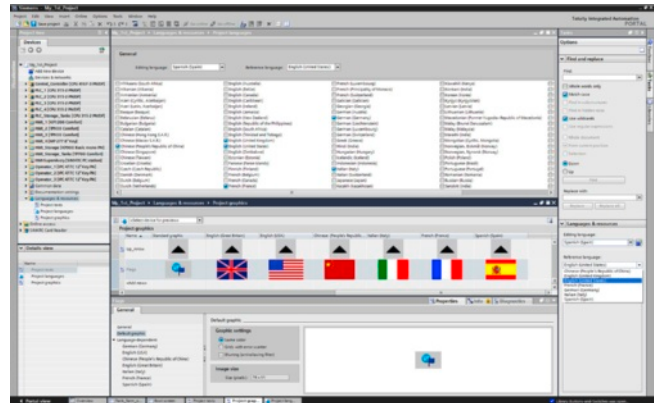
This allows the dynamic behavior of objects to be controlled, and it also allows a connection between WinCC and applications from other manufacturers to be established easily (e.g. Microsoft Excel and Microsoft SQL databases).

### Multi-language project support

Machine manufacturers normally supply customers from around the world. The localizability of user interfaces has long been an indispensable feature in terms of global competition. At the same time, the customers of machine manufacturers and plant constructors are becoming increasingly multinational in their structure, but for reasons of productivity and quality assurance they insist on the global standardization of production processes in their plants. The service personnel of a machine manufacturer provide support to plants in several countries and the capability of being able to switch over to a familiar interface language supports both the teleservicing and on-site service. Finally, it is no longer unusual that the operators of a plant have varying degrees of proficiency in various languages, which makes it a good idea in terms of operational safety to have the capability of switching over to the respective mother tongue. All of these are reasons for deciding on HMI software that is not limited in terms of language diversity.

WinCC supports up to 32 languages for creating multi-lingual configurations, up to 32 of which can be selected during operation depending on the target system. Asian and Cyrillic character sets are also supported.

In engineering, selectable views allow multi-lingual text entry directly in the context of the configuration objects (e.g. operating screens or alarms). Language-dependent texts can also be accessed centrally. The central project text editor allows access to all of the texts and thus provides the capability of conveniently and quickly translating the texts in the engineering system. All language versions of an HMI application can be implemented in a project. Changes to the project are immediately updated in all of the created language versions.



Defining the project languages

An import and export interface with the open XLSX format (also supported by Microsoft EXCEL) allows the project texts to also be further processed in Unicode outside of the engineering system using external tools, e.g. for translation by a service provider. This is of particular interest, for example, if a global machine builder would like to have his WinCC project translated into Asian pictographic languages (e.g. Chinese, Taiwanese, Korean, Japanese) for export.

Country-specific features, however, are not only available for texts. There are many instances when it is also necessary to adapt graphics to country-specific conditions, which might, for example, rule out the use of certain colors or which take regionally established operating symbols into consideration. For this reason, the central graphic collection of the system also supports the management of multi-language graphics.



## Investment security as configuration data can be migrated

Implemented solutions and configurations and applications that have been created using a great deal of expertise and effort are among the most valuable possessions of machine manufacturers and plant constructors or system integrators. Investment security therefore means that any innovation in the engineering software, however far-reaching and revolutionary it may be, must never lead to customers no longer being able to use their engineering efforts. SIMATIC software has always been developed in such a way that a migration is ensured to the greatest possible extent with the lowest possible outlay.

### Migration of projects of the WinCC family

With WinCC (TIA Portal) it is possible to migrate WinCC flexible projects that exist in the WinCC flexible 2008 SP2 version.

After the migration, the engineering data is available in WinCC. It is also possible to import the Runtime data such as logs and alarms during the migration. In this way, the history of a running system is not lost after a migration.

For projects that have been created using WinCC V7, there will be a converter in a future version of WinCC (TIA Portal).

### Importing/exporting of mass data

Data such as HMI tags, alarms, and text lists whose configuration data is already defined can easily be imported into TIA Portal projects. HMI configuration data can be easily created via this.

HMI tags and alarms can also be exported. The Open Office XML, which is provided by various applications, is used as a format for import/export.

### Importing/exporting of texts

Texts that were stored in the shared text library of a project can also be exported. This is helpful for translating them independently of the engineering software. The format of the exported data is also Open Office XML, an open standard. When exporting the texts, the point of usage and, for example, the name of the corresponding screen or alarm is also exported, so that the text can be translated in context.

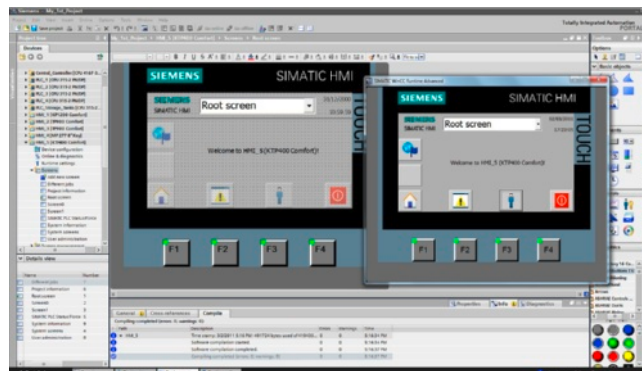
After the translation, the XML file can be re-imported into the TIA Portal project and the translated texts are available in the configuration data.

## Runtime simulation

Simulation systems provide effective support with the development of programs and the actual application.

A simulated test environment including controller and process reduces, for example, commissioning times and thus costs. Depending on the progress of the project, the functionality to be tested, and the degree of integration, three kinds of simulation are available:

- **HMI tag simulation with tag table**  
The testing of the configuration without a connected controller or without a running process via the tag simulator cost-effectively checks an HMI project for inner consistency. In the simulator, the configured tags are simulated; for example, do the configured color changes agree with the value pattern of a tag? The configured tags can be manipulated, activated and deactivated in the course of simulation. The simulator provides various kinds of simulations for this (sine, random, increment, etc.).
- **HMI project simulation with simulated controller (PLCSIM)**  
For testing the interaction of a WinCC configuration with the PLC, the project can be tested on the engineering PC in combination with a simulated controller (PLCSIM). The PowerTags are directly provided with the values of the simulated PLC program.
- **HMI project simulation with a connected, real controller**  
The simulation of a WinCC configuration in communication with a real controller provides the greatest degree of integration and accuracy. In this case, the WinCC simulation connects directly to the PLC in the plant via PROFIBUS, Ethernet, or PROFINET. The PowerTags are directly provided with the values of the real process in the plant.



Simulation of the Runtime system

# SIMATIC WinCC Runtime – More transparency for production

The runtime functionality is determined by the features of the HMI device used, such as available memory capacity or the number of function keys and can be extended by means of options. Some options are only available for panels above a specific class, while others are integrated.

## All HMI functions on board

Industry-standard HMI functions are part of the basic equipment of the system:

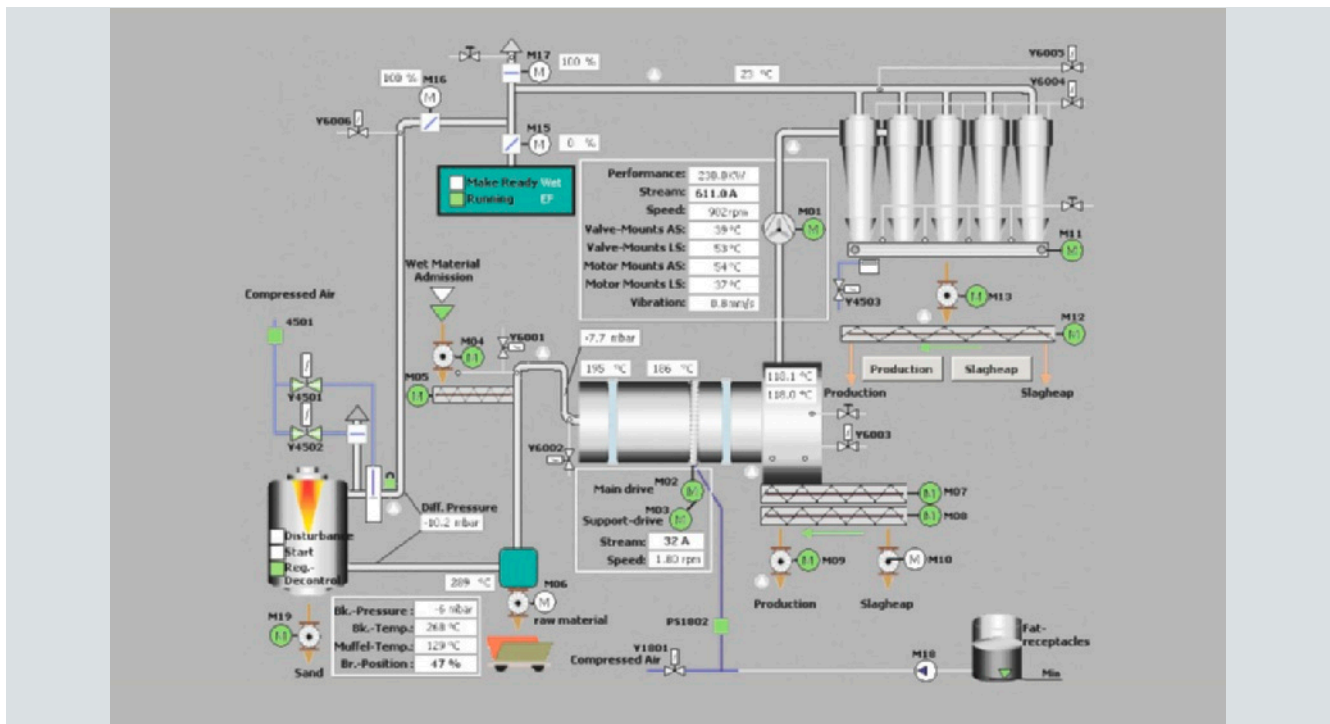
- Fully graphical visualization of the process sequences and statuses, including dynamizable graphics, bar graphs, and gauges
- Operating the machine or plant via an individually configurable operator interface, e.g. with buttons, switches, and sliders
- Reporting and acknowledging of events
- Logging of measured values and alarms
- Reporting of current process data and recorded log data
- User administration including their access rights

## Universally scalable

For PC platforms, SIMATIC WinCC Runtime Advanced and SIMATIC WinCC Runtime Professional are available as independent products.

- SIMATIC WinCC Runtime Advanced covers the applications with PC-based operating and monitoring solutions for single-user systems in the vicinity of machines
- SIMATIC WinCC Runtime Professional is the PC-based process visualization or SCADA system for visualizing and operating processes, production sequences, machines and plants in all industries

To be able to meet growing requirements, the visualization must be expandable at any time without causing technology incompatibilities or requiring completely new configurations. Investment protection is a top priority. WinCC provides the required integrated scalability, from the small single-user solution with panels to the client/server solution with a central Microsoft SQL server for data archiving and web operator stations. With the corresponding options, the respective Runtime basic system can be scaled. For example, distributed operator stations at the machine level with WinCC Sm@rtServer, or Client/Server and cross-site web client architectures with the options for WinCC Runtime Professional.



Runtime operating screen of a more complex application in the wood processing industry

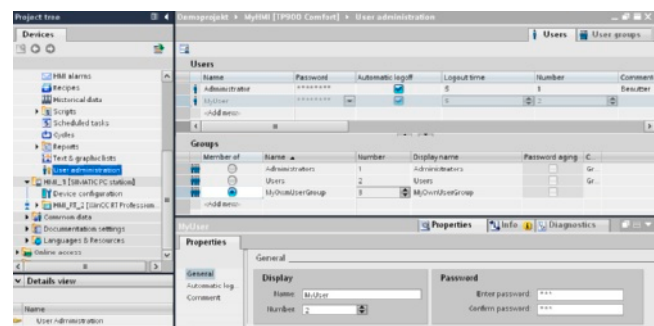
## User administration and access protection

Not all of the functions of a machine or plant may be carried out by every user. Many tasks require special qualifications or are restricted by the process to special user groups. Carrying them out requires rights that are assigned to special user groups and users. WinCC supports the user in creating and managing user groups and users and in assigning the required rights in engineering and during runtime.

The separation of authorizations and users allows efficient user administration with reduced engineering effort. In the engineering system, user groups are defined which group together the configured authorizations in a task-oriented way. For example, the user group "Production planning" can change recipe data records, set system parameters, and log process values. The necessary authorizations are assigned to the corresponding objects in the project.

The actual user can then be accepted in the user administration with a user name or user ID and password even during operation and then be assigned to a user group without any further changes to the configuration. In this way, the unambiguous identification of the users – e.g. for Audit Trails – can be managed with minimal engineering effort.

All local operator stations are included in the user administration, as well as the standard and WebNavigator or DataMonitor clients for a SCADA system on the basis of WinCC Runtime Professional. If system-wide user administration is required, the SIMATIC Logon central user administration system can be activated as of Comfort or Multi Panels. In this case, SIMATIC Logon takes over the user administration from the local operating systems in cooperation with Windows. If communication to the central component SIMATIC Logon is interrupted, the users are then only checked locally on the HMI system. Depending on the target system, SIMATIC Logon can be installed on the HMI system itself or on another remote PC in the network or a domain controller. When SIMATIC Logon is used, the use of a chip card reader for user authentication is also supported.



Configuration of access rights

The integration with SIMATIC Logon provides functions to all usable target systems such as formulation rules for passwords, password aging, automatic logout after a pre-defined time and lock-out after several incorrect entries of the password and therefore provides maximum operating security. For Comfort Panels, Multi Panels and WinCC Runtime Advanced, comparable functions are already included in the local HMI user administration system. Both solutions therefore fulfill the requirements according to FDA 21 CFR Part 11.

# Alarms, reports and communication

## Alarms and messages

The alarm system immediately indicates events and states on the HMI device which have occurred in the system or in the process. Alarm events can be logged on a printer or saved in the alarm log for further processing and evaluation.

WinCC makes a distinction between:

- User-defined alarms that indicate process states or record and log process data from the PLC on the HMI device
- Pre-defined system alarms that indicate specific system states of the HMI device or the PLC

User-defined alarms can be created in WinCC in three ways:

- Discrete alarms
- Analog alarms
- Alarms directly from the controller via the message frame procedure

WinCC distinguishes between various acknowledgment mechanisms, so that not only the operator, but also the PLC can acknowledge alarms. "Fault", "Operation" and "System" are predefined alarm classes with specific properties. User-defined alarm classes can be used to define acknowledgement functions and the individual visualization of alarm events.

User-configurable alarm views for displaying the alarms on the screen can be linked to alarm filters, which specifically restrict the current alarms to be displayed during operation. The filter acts on the user text in the alarm and can be a fixed character string or can be set dynamically by means of a tag.

### Expanded functionality with WinCC Runtime Professional

Alarms can occur via the derivation of the individual bits of a PowerTag (max. 32), as a result of a chronological message frame directly from the automation system, as a result of analog alarms due to any number of limit value violations, or due to an operation. In doing so, hysteresis values can be set and ranges can be monitored easily.

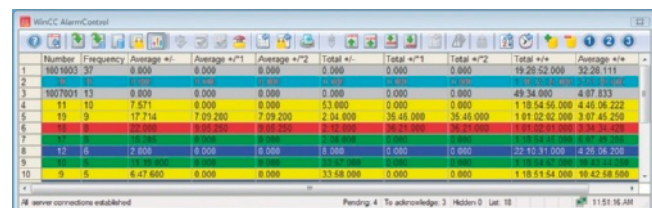
Since the alarm structure is freely definable, it can be tailored to the special requirements of a plant. Dividing the structure into as many as 10 different text blocks (plant ID, fault location, text, etc.) leads to greater clarity of the information and allows targeted analyses to be initiated in connection with the filtering or sorting function. Differentiation of as many as 16 alarm classes permits the separate preparation of alarms, warnings, faults and errors for several areas of the plant. Within an alarm class (e.g. warning), up to 16 priorities can also be differentiated.

Based on the contents of the individual alarm blocks, filtering, selecting and sorting is possible in the screen, e.g. chronologically, according to priorities or fault location. Then the contents can be exported directly as a CSV file or printed out as a

report. A freely definable toolbar function also provides a high degree of flexibility. In this way, for example, your own project-specific functions can be integrated. To maintain a clear overview of a large number of incoming alarms, the operator can suppress unimportant operational messages on the screen display by means of Alarm Hiding. The alarms continue to be logged in the background.

The Microsoft SQL Server is used for logging of alarms. This ensures gap-free recording of all events. Alarms are logged when alarm events occur.

In the alarm sequence report, the alarms can be (selectively) chronologically documented. In the alarm log report, specific views of the logged alarms can be generated.



Number	Frequency	Average v1	Average v1*	Average v1**	Total v1	Total v1*	Total v1**	Total v1*	Average v1*	
1	1601800	0.000	0.000	0.000	0.000	0.000	0.000	19.295.52.000	32.24.111	
2										
3	1007001	13	0.000	0.000	0.000	0.000	0.000	49.34.000	4.07.033	
4	11	10	7.511	0.000	0.000	53.000	0.000	1.19.54.55.000	4.45.06.222	
5	15	5	17.714	7.09.290	7.09.290	2.04.000	35.45.000	35.45.000	1.01.02.02.000	3.07.45.255
6	16	8	22.000	0.00.000	0.00.000	30.21.000	30.21.000	1.01.00.00.000	3.34.31.020	
7	17	9	7.000	0.000	0.000	0.000	0.000	1.01.00.00.000	3.34.31.020	
8	12	14	1.000	1.000	1.000	1.000	1.000	1.01.00.00.000	1.01.00.00.000	
9	13	12	0.000	0.000	0.000	0.000	0.000	1.01.00.00.000	1.01.00.00.000	
10	5	5	6.47.000	0.000	0.000	33.48.000	0.000	1.18.51.64.000	10.42.68.500	

Alarm hit list for alarms that have come in

### Reporting and logging system

The integrated WinCC report system prints data acquired during the runtime in configurable and page-based layouts by means of various types of reports, ranging from alarm sequence reports, system alarm and operator input reports, to user reports. The reports can be saved as a file and displayed as preview on the screen. Of course, these logs can also be configured in multiple languages.

The report output can also be started time-controlled or event-driven or by operator input. The printer can be selected online via a printer selection dialog. The contents of a report can be determined dynamically during runtime.

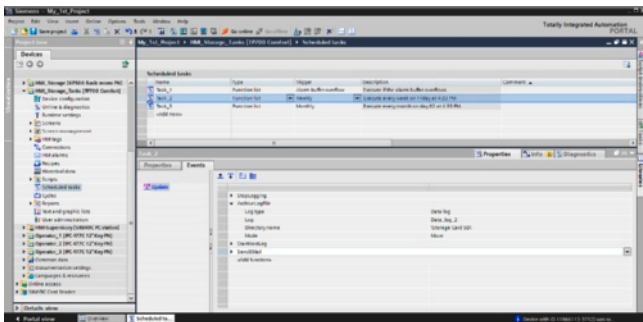
WinCC reports can contain data from the database and external data in CSV format as a table or trend. Data from other applications can be integrated as tables or graphics via customer-specifically developed Report Providers.



## Task scheduler

Various activities must be carried out in an HMI system regardless of a current operation. This includes, for example, the printing out of a report at the end of a shift or the regular export of log data. These activities must be initiated in the background, regardless of whether alarms are currently queuing up or an operator is monitoring the current status of the machine or plant or is in the process of entering new setpoints in the operating system. Other activities must be carried out dependent upon global events in the operating system, e.g. if special log-off functions are to be carried out prior to stopping Runtime. WinCC supports the configuration of these activities with the task scheduler. All central tasks that are time-controlled or must be carried out dependent upon global events in the operating system can be configured in the scheduler. During the configuration, a determination can be made as to whether a system function or a user-defined function, e.g. via script, is initiated and what kind of initiator is involved. The supported events that can initiate such a function and the executable functions are dependent upon the configured target system. For example, status information can be forwarded via the controller for a simple HMI device when the alarm buffer threatens to overflow, whereas for WinCC Runtime Professional a monitoring function is regularly initiated in order to check a system status.

Special time-triggered print jobs with the associated parameters can also be initiated as special tasks via the scheduler in WinCC Runtime Professional.



Configuration of time-triggered tasks

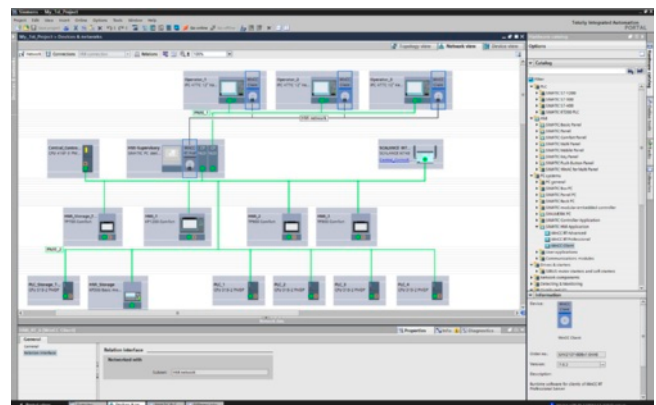
## Process communication

Drivers for the different system links to Siemens controller series and automation systems and to controllers from many other vendors are included in the scope of delivery of WinCC. In particular, the operator systems support PROFINET, the innovative standard for industrial communication from the field level to the control level. Time-critical entries via direct keys or handwheel can be done in real-time via PROFINET IO. PROFINET is based on Industrial Ethernet and uses the TCP/IP standard for parameterization, configuration, and diagnostics. Real-time communication for the transmission of user/process data is performed on the same cable. Distributed field devices (IO Devices, e.g. HMI devices) can be integrated into Industrial Ethernet either directly or via "IO Controllers".

For cross-manufacturer communication, e.g. for integrating automation components of various manufacturers in an automation concept, WinCC supports OPC (OLE for Process Control). An advantage for the user consists of saving development costs thanks to the communication between automation systems on the basis of a homogeneous, uniform protocol. OPC clients are available for WinCC Runtime Advanced (OPC DA - Data Access) and for WinCC Runtime Professional (OPC DA and OPC XML DA - Data Access). Any servers that support the corresponding communication standards can be used as data sources. In particular, these are one's own HMI devices and PC-based Runtime systems. All of the OPC servers listed here are already included in the standard scope of delivery.

- OPC XML DA (Data Access)  
for Comfort Panels, MultiPanels, and Mobile Panels 277 and higher
- OPC DA (Data Access)  
for WinCC Runtime Advanced and WinCC Runtime Professional
- OPC A&E (Alarms and Events)  
for WinCC Runtime Professional
- OPC HDA (Historical Data Access)  
for WinCC Runtime Professional

The communication is configured in the "Devices and Networks" editor of the TIA Portal. The communication links between individual stations is configured graphically and very vividly in the network view.



Configuration of the communication connections in the "Devices and Networks" editor

# Options for SIMATIC WinCC in the TIA Portal

## Tailor-made runtime functionality

The SIMATIC Panels and PC-based HMI solutions with WinCC Runtime Advanced and WinCC Runtime Professional contain all of the important functions for operating and monitoring machines or plants. For an expanded task range, the functionality can be supplemented by means of additional options.

In addition to the Runtime options, WinCC Runtime Advanced and WinCC Runtime Professional can be expanded by means of customer-specific controls. The WinCC Control Development option is required for the development of the controls.

Option	Included in Panel Runtime	Optionally available for panels	For WinCC Runtime Advanced	For WinCC Runtime Professional
WinCC Logging	●	–	●	● <sup>1)</sup>
WinCC Recipes	●	–	●	●
WinCC Audit	–	●	●	–
SIMATIC Logon	–	●	●	– <sup>2)</sup>
WinCC Sm@rt Server	–	●	●	–
WinCC Client	–	–	–	●
WinCC Server	–	–	–	●
WinCC WebNavigator	–	–	–	●
WinCC DataMonitor	–	–	–	●

## WinCC Logging<sup>3)</sup> – Logging of process values and alarms

### Benefits

- Early detection of danger and fault conditions
- Avoidance of downtimes by means of predictive diagnostics
- Increase in product quality and productivity due to regular evaluation of log

Logging process data and alarms with WinCC Logging supports the acquisition and processing of process data from an industrial plant or machine. An evaluation of the logged process data then provides information on the operating status during the industrial process (production, processing, process etc.).

Process sequences can be documented, the capacity utilization or the production quality can be monitored or recurring fault conditions can be logged.

The following log variants are available:

- Short term archive
- Segmented short term archive
- Short term archive with level-dependent system alarm<sup>4)</sup>
- Short term archive which executes system functions when it is full<sup>4)</sup>

### Trend views

A configurable trend view can be used to display and analyze logged process values when configuring the screens. Reading of the values is facilitated by a read line.

### Licenses

The following licenses are available:

- SIMATIC WinCC Logging for Runtime Advanced
- SIMATIC WinCC Logging for Runtime Professional 1500 LoggingTags<sup>5)</sup>
- SIMATIC WinCC Logging for Runtime Professional 5000 LoggingTags<sup>5)</sup>

<sup>1)</sup> 500 Logging Tags are a component of WinCC Runtime Professional

<sup>2)</sup> The functions of SIMATIC Logon are a component of WinCC Runtime Professional

<sup>3)</sup> Included in the delivery kit of SIMATIC Panels, optionally for WinCC Runtime Advanced and WinCC Runtime Professional

<sup>4)</sup> Not for WinCC Runtime Professional

<sup>5)</sup> Licenses may be added, the total number of Logging Tags increases by the respective number

# WinCC Recipes<sup>1)</sup> – Administration of data records in recipes

## Benefits

- Simple transmission of recipes to the controller
- Clear tabular display of the data elements
- Display in technological contexts across several process pictures
- Export/import of data records for further processing with other tools (e.g. MS Excel)

Recipes are a collection of data that belongs together, e.g. machine parameter settings or production data. A recipe has a fixed data structure. The recipe structure is defined during configuration. A recipe contains recipe data records. These differ in terms of their values, but not their structure.

For SIMATIC Panels and WinCC Runtime Advanced, recipes are saved on the HMI device or on an external storage medium. For WinCC Runtime Professional, they are saved in an SQL database.

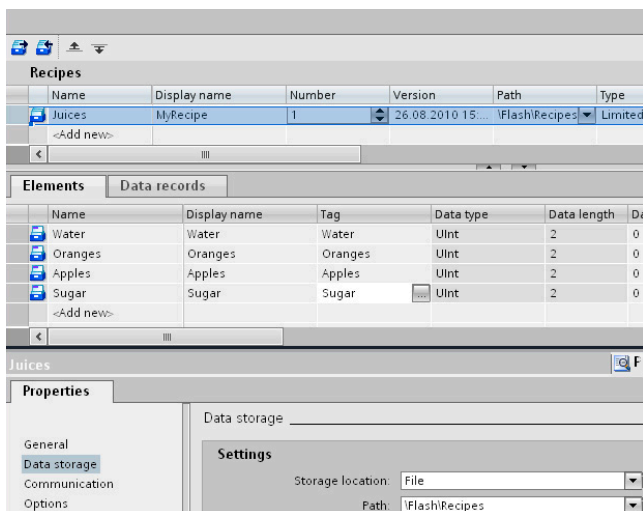
The various data records for the recipes can be created as early as the engineering phase of the project. This means that they are available directly after the transfer of the configuration in Runtime. This data can function as the initial basis for an optimization during runtime or it even can be the result of such a process. During operation, the data records can be conveniently created, deleted, or modified across different views. In addition, recipe data can be imported into or exported from Runtime.

Configurable screen objects are used for displaying and managing the data at runtime. If necessary, the individual data record elements can also be displayed directly as standard input/output fields across several process pictures. In this way, the data in technological views can be presented clearly to the operator.

## Using recipes

Recipes can be used in the following situations:

- Manual production  
The desired recipe data is selected and displayed on the HMI device. The data can be modified and saved on the HMI device as needed. The recipe data is then transferred to the controller.
- Automatic production  
The control program initiates the transfer of the recipe data between the PLC and HMI device. The transfer can also be started from the HMI device. Production is thus implemented adapted. It is not essential to display or modify the data.
- Teach-In mode  
Production data is optimized manually on the system, e.g. axis positions or filling volumes. The values thus determined are transferred to the HMI device and saved in a recipe data record. You can then transfer the saved recipe data back to the controller at a later date.



Configuration of recipes

In addition to the option of using recipe data exported from the HMI device on other HMI devices, it can also be re-imported into engineering. This data can then either be logged with the project or reused for other projects.

<sup>1)</sup> Included in the delivery kit of the SIMATIC Panels - optionally for WinCC Runtime Advanced and WinCC Runtime Professional

# WinCC Audit<sup>1)</sup> – Traceability and simple validation

## Benefits

- Operator actions are traceable
- Conforming to the GMP requirements for the pharmaceuticals industry (e.g. the Food and Drug Administration)
- Reduced engineering and validation overhead
- Ideally suitable for machine manufacturers that must meet high quality requirements (e.g. in the supply of machines and plant components for applications requiring validation)

For high quality requirements with regard to the products to be manufactured and the production processes, the traceability of operator actions is becoming increasingly important in all sectors. WinCC with its WinCC Audit option offers a high level of support for this purpose.

WinCC Audit covers essential requirements outlined by GMP (Good Manufacturing Practice) and the FDA (Food and Drug Administration) in accordance with 21 CFR Part 11.

WinCC Audit facilitates the construction of machines for industries with applications that require validation, because important functions for fulfilling these requirements are already provided by default and, in this way, individual machines or plant units can be qualified in advance at the supplier's end. At the same time, Audit Trails are also suitable for tracking production processes for increasing product quality, as stipulated, for example, in EC Directive 178/2002 for the food and beverages sector.

## Recording of operator actions in Audit Trails

In process operation, all GMP-relevant changes to tags and any operator actions are recorded as Audit Trails in a CSV file. Such operator actions can be, for example, the input of process values, the starting of recipes, or an alarm acknowledgment, but also alarms from the user administration, such as the logging on or off of a user. This shows exactly who operated what and when – with minimal configuration overhead. In addition, a checksum procedure is used to check that the data in the Audit Trail has not been manipulated. The Audit Trails can also contain Asian texts, which can be printed directly from the panel.

## Logging and reporting

Depending on the requirement, WinCC Audit allows the logging and reporting to be done locally, i.e. in the HMI device, or centrally in distributed systems, e.g. in a PC in a local control room. This supports solutions for the long-term archiving and restoration of the data.

No	DateTime	EventType	EventName	ProjectGUID	ObjValue	NewObjValue	ObjName	ApplName	
16	2009-02-03 12:57:05.280	SMDI	msg_vestition...	CT_DemoSec...	42	23	H02Zachin	aud01	
17	2009-02-03 12:51:54.930		17500143	527003370423...	CT_DemoSec...	1	0	H02Zachin	aud01
16	2009-02-03 12:51:30.977		17500143	527003370423...	CT_DemoSec...	0	1	H02Zachin	aud01
15	2009-02-03 12:51:34.640		17500143	527003370423...	CT_DemoSec...	0	1	H02Zachin	aud01
14	2009-02-03 12:51:33.090		17500143	527003370423...	CT_DemoSec...	0	1	H02Zachin	aud01
13	2009-02-03 12:51:52.280	LOGON	LOGON	aud01	NAJ	NAJ	H02Zachin	aud01	
12	2009-02-03 12:50:41.457	Data Manager	Project Mode	CT_DemoSec...	NAJ	NAJ	H02Zachin	IMP_001	
11	2009-02-03 12:50:27.487	UPGRADE	1	CT_DemoSec...	Feb. 2 2009 1...	Feb. 3 2009 1...	H02Zachin	NAJ	

Audit Trail displayed with the Audit Viewer

<sup>1)</sup> Optional for SIMATIC Panels and WinCC Runtime Advanced



## WinCC Sm@rtServer<sup>1)</sup> – Telecontrol of local stations via the Intranet/Internet

### Benefits

- Distributed operator stations for controlling large machines that are spread out over a large area
- Flexible solution for access to operator stations from any location
- Global access by the service and maintenance personnel to machine/plants

The WinCC Sm@rtServer option permits the remote operator control and monitoring of SIMATIC HMI systems via Industrial Ethernet or via the Intranet/Internet.

An on-site operating station can basically be accessed in two different ways.

### Display and operation of screens via the Sm@rtClient concept

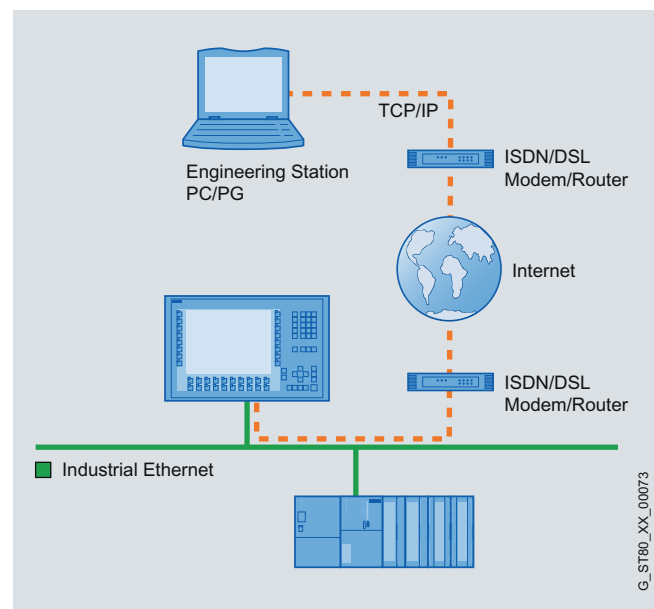
Within the scope of the Sm@rtClient concept, a station can make its screens accessible to another station. It then assumes the function of a Sm@rtServer, while the other station assumes that of the Sm@rtClient. The server function can be activated quite simply with a mouse-click when making the device settings. The screen can be displayed on the Sm@rtClient by means of a Sm@rtClient display in "View only" mode, but a full-fledged, coordinated operator console can be set up as well. "Coordinated operation" implies that at any one time only one station has the right of operation, i.e. either the operator station with Sm@rtServer function or that with the Sm@rtClient function. Depending on the basic hardware, a Sm@rtServer can supply up to five clients simultaneously with updated process pictures (for PCs; for panels it is a maximum of three clients). One channel should always be reserved for service purposes.

### Distributed operator stations

The operation of large, physically distributed machines and plants becomes easier, because distributed operator stations can be configured by means of the Sm@rtClient concept, so that the operator can control and monitor from various locations – while only needing to configure one time. Changes to the configuration therefore only have to be performed once on the Sm@rtServer. The operator can see the same display on every operator station, although only one station can be operated at any one time (coordinated operation).

### Remote control via Internet Explorer

For remote operating and monitoring of SIMATIC Panels or WinCC Runtime Advanced, a standard browser, which gives the user direct access to the HMI device on-site via the standard HTML pages of the operating stations, is sufficient. If the Sm@rtClient viewer is used instead of a browser, it not only displays the selected screen, but also the layout of the on-site device, for example, the membrane front of a keypad device. With this tool, the HMI device can then be operated as if the user were on site, except that the keys are not really actuated, but operated by clicking the mouse.



Remote control of a local station

<sup>1)</sup> Optional for SIMATIC Panels and WinCC Runtime Advanced

# WinCC Client<sup>1)</sup>/ WinCC Server<sup>1)</sup> – Setup of a multi-user SCADA system

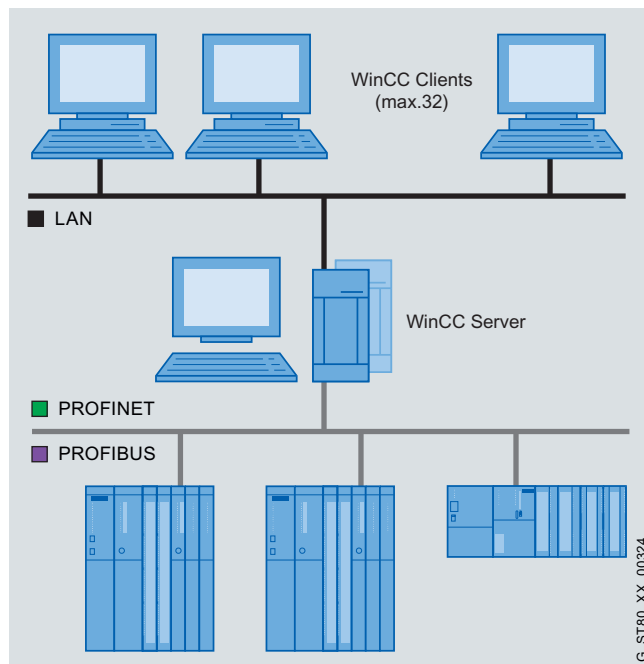
## Benefits

- Integrated scalability from the single-user system to the client/server solution
- Cost-effective solution for SCADA applications of medium complexity
- Low-overhead configuration of a distributed operating station

With the help of the options WinCC Server and WinCC Client, several operating and monitoring stations can be operated in a coordinated manner in the network with linked automation systems. In such a client/server architecture, one server can supply up to 32 connected clients with process and log data, alarms, screens, and reports. The prerequisite is a network connection (TCP/IP) between the computer (server) and the connected clients.

## Field of application

A multi-user system with a server is used whenever the same process is to be monitored at several operating stations. The result of an operator action at one operating station, e.g. the changing of a value, is immediately available to all of the other operating stations. Multi-user systems are typically found at small and mid-sized plants in which distribution of data to several servers is not absolutely required.



Multi-user system with up to 32 clients on one server

## Configuration and task distribution

WinCC clients display the data from exactly one WinCC server with a process connection. The WinCC server supplies the connected WinCC clients with the configuration, process and log data, alarms, screens, and reports.

All WinCC data is stored in the integrated Microsoft SQL Server database on the WinCC server. The WinCC clients access the WinCC configuration data on the WinCC server.

By assigning access rights, it is specified which functions or plant sections are available to a user on which operator control stations. The configured operator authorizations are user-related, not computer-related. An assigned operating authorization is therefore valid for all operating stations with the same login.

The client-server technology makes it possible to easily separate WinCC clients from the WinCC server: The project is created centrally on the engineering station and loaded onto the WinCC server with a process connection.

The WinCC server automatically takes over the supplying of the WinCC clients with a Runtime environment, screens, process values, alarms, log data, and reports. The coupling to the automation system, the communication and coordination of the clients, and all of the archiving is done via the server.

The WinCC clients only need one configuration. In the "Devices and Networks" editor of the TIA Portal, the clients are linked to the server via drag & drop. Then the start screen, the Runtime language, toolbars, navigation keys, and window properties are assigned for each client. If necessary, specific key combinations can be blocked.

Process specifications or alarm acknowledgments on one operator station are consistently available to the other operator stations.

## Licenses

The following licenses are required for setting up a multi-user system:

- In addition to the WinCC Runtime Professional license, there is also a WinCC Server license on the server
- A WinCC Client license on each client.

<sup>1)</sup> Optional for WinCC Runtime Professional

# WinCC WebNavigator<sup>1)</sup> – Operator control and monitoring via Internet

## Benefits

- Operator control and monitoring over long distances with up to 50 operator stations simultaneously
- Fast update rates due to event-driven communication
- Optimally tailored clients for operating and monitoring, analysis, service and diagnostics
- Increased security and availability due to separation of WinCC and web server
- Granting access rights using plant-wide user administration
- High Internet security standards

The WinCC WebNavigator provides the capability of operating and monitoring a plant via the Internet or the company-internal intranet or LAN without the need for changes to the WinCC project. This results in the capability to display, operate and access logs just as for on-site operator stations. This includes that the displayed process screens can contain Visual Basic or C scripts for dynamic sequences, that the operator interface can be switched between several languages and that the operator stations on the web are integrated into the user administration of the plant on-site.

## New application areas

In addition to the typical use in WANs (Wide Area Networks), the WinCC WebNavigator can also be used for applications that must be implemented at minimal cost. These include applications that have a pronounced distributed structure (e.g. water/wastewater) or in which access to process information is only sporadic (building management). In addition to this, web clients can also be used as normal operator stations on the LAN.

## Web server and clients

For a web solution, the WebNavigator is installed on a WinCC single-user system or server and a WebNavigator client is set up on any Windows PC.

This allows a running WinCC project to be operated and monitored via the own Internet client, Microsoft Internet Explorer, or via Terminal Services, without the need for a WinCC basic system on the computer.

A web client that is connected to the web server can access the projects of all (up to 12) WinCC servers in a plant from anywhere in the world. The projects can be displayed simultaneously in different tabs, e.g. via the multi-tabbing functionality of Microsoft Internet Explorer (Version 7 or higher).

## A security concept made to order

The separation of WinCC servers and web servers already ensures greater security and availability, and this can be even further enhanced by means of independent web servers on two independent SCADA clients. The operator stations on the web are included in the user administration of the plant on-site. Different authorization levels govern who has which access rights.

The operator can either just view the plant (just monitor) or partially/fully operate it, depending on the configuration of his access rights. Every login and logout can be traced by means of a system alarm.

## Thin client solutions

Via thin client solutions with Microsoft Terminal Services, simple PCs under a Windows operating system (e.g. Windows 9x/ME), rugged on-site devices (e.g. SIMATIC Thin Client), and mobile clients (PDA – Personal Digital Assistant) under Windows CE can also be connected. Such solutions have few hardware requirements, because the clients only provide the screen display, while the application itself, i.e. the WebNavigator client, runs on the terminal server under Windows. Up to 25 thin clients can be connected to one terminal server.

In contrast to typical WebNavigator installations, the thin clients are generally located on the same LAN as the server.

## Licensing as required

The WebNavigator client software can be installed as many times as required without the need for a license. A corresponding (server-based) license is required in order to use the WebNavigator server. Licenses are available for simultaneous access to the Web Server by 3, 10, 25, 50, 100 or 150 clients. PowerPacks are available for upgrading the number of simultaneously active clients. In addition, the diagnostics clients licensing is ideal for system integrators who are responsible for maintenance and service of widely distributed plants. WinCC WebNavigator diagnostics clients have, regardless of the number of current accesses, guaranteed access to all web servers with the WinCC WebNavigator license or the cost-effective WinCC WebNavigator diagnostics server license.

<sup>1)</sup> Optional for WinCC Runtime Professional

# WinCC DataMonitor<sup>1)</sup> – Display and evaluation of process states and data

## Benefits

- Display and analysis of current process states and historical data on office PCs, e.g. using the MS Internet Explorer or MS Excel
- No additional configuration overhead, because screens from the WinCC project are used directly
- Evaluation via centrally administered templates for detailed analyses of the company processes, e.g. reports, statistics
- Creating event-controlled or time-controlled reports
- Information from the process can be individually compiled online during runtime (information portal) and distributed to different recipients via e-mail
- User administration with user groups and individual access rights, reading, writing, and creating of WebCenter pages

The WinCC DataMonitor is used for displaying (view only), analyzing, evaluating and distributing current process states, historical data and alarms from the process database. With the DataMonitor, WinCC process data can be made available to all function levels of a company via the web. Powerful tools for displaying and evaluating current process states and historical data (measured values, alarms, user data) from the process database allow the efficient monitoring and analysis of production and reports to be created and distributed to the people concerned. For displaying, a DataMonitor client can be installed on any office PC. The data provider, a WinCC WebNavigator or a WinCC DataMonitor server can be installed on any WinCC single-user system, server or client. Specific functions of the DataMonitor client can be implemented without installation. Tools for the full scope of functions can then be downloaded from a download area.

## The DataMonitor and its tools

For visualization and evaluation, WinCC DataMonitor provides a range of Internet-capable tools, which support all of the popular security mechanisms such as login/password, firewalls, encryption, etc.:

- Process Screens  
The Process Screens function is used exclusively for monitoring and navigating using WinCC process screens with Microsoft Internet Explorer as the "View Only Client".
- Trends & Alarms  
Trends & Alarms is a tool for displaying and analyzing logged WinCC process values and alarms as trends or in tabular form via predefined web pages.

- Excel Workbooks  
The Excel Workbooks are a logging tool for displaying alarms and current or logged process values in an Excel table for analysis and display via the web or as a print template for reports.
- Published Reports  
Published Reports automatically create print jobs from WinCC reports and prepared Excel Workbooks, which are initiated in either a time-controlled manner (e.g. at the end of a shift) or in an event-controlled manner (e.g. when a WinCC tag is changed) and are distributed by e-mail, if applicable.
- WebCenter  
The WebCenter is the central information portal for access to WinCC data via the Intranet or Internet. On a WebCenter site, the user can configure his own screen views from the WebParts and save them.
- User administration  
Administration of DataMonitor users in user groups with individual rights for reading, writing and creating WebCenter sites.



Information portal WebCenter of the WinCC DataMonitor

## Licensing as required

The licensing is server-based, which means that it is done on an existing WebNavigator or on an additional DataMonitor server. Depending on the license selected, the DataMonitor software package for the DataMonitor server contains 1, 3, 10, 25 or 50 client licenses. The number of client licenses describes the maximum number of simultaneously active clients. Any number of clients can be connected. PowerPacks are available for upgrading the number of simultaneously active clients.

<sup>1)</sup> Optional for WinCC Runtime Professional



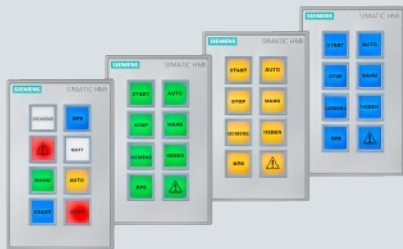
# Technical specifications

WinCC Runtime Advanced	
<b>Tags</b>	
Number of tags in the project	6 144
Number of PowerTags	128 ... 4 096
Number of elements per array	1 600
Number of local tags	2 048
<b>Alarms</b>	
Number of alarm classes	32
Number of discrete alarms	4 000
Number of analog alarms	500
Length of an alarm in characters	80
Number of process values per alarm	8
Size of the alarm buffer	1 024
Number of queued alarm events	500
<b>Screens</b>	
Number of screens	500
Number of fields per screen	400
Number of tags per screen	400
Number of complex objects per screen <sup>1)</sup>	40
<b>Recipes</b>	
Number of recipes	999
Number of elements per recipe <sup>2)</sup>	2 000
User data length in KB per data record	256
Number of data records per recipe	5 000
<b>Logs</b>	
Number of logs	100
Number of entries per log (including all log segments) <sup>3)</sup>	500 000
Number of log segments	400
Cyclical trigger for tag logging	
Number of tags that can be logged per log	6 144
Number of trends	800
<b>Text lists and graphics lists</b>	
Number of graphic lists	500
Number of text lists	500
Number of entries per text or graphic list	3 500
Number of graphic objects	2 000
Number of text elements	30 000
Number of scripts	200
Number of characters in a help text	320
Number of runtime languages	32
<b>User administration</b>	
Number of user groups	50
Number of user rights	32
Number of users	100
<sup>1)</sup> Complex objects are: Bars, sliders, symbol library, clock, and all objects from the Controls area	
<sup>2)</sup> Each element used in arrays represents a recipe element	
<sup>3)</sup> The number of entries for all sequence logs is valid for the "segmented circular log" logging method. The product derived from the number of circular logs times the number of data records in this log may not be exceeded	

WinCC Runtime Professional	
<b>Alarms</b>	
Configurable alarms per server/single-user station	150 000
PowerTags per alarm line	10
User text blocks per alarm line	10
Alarm classes (incl. system alarm classes)	18
Alarm types	16
Alarm priorities	17
Alarms per alarm log	No limit <sup>1)</sup>
Alarms per short-term log list	1 000
Alarms per long-term log list	1 000
Alarms per alarm display	5 000 <sup>2)</sup>
<b>Screens</b>	
Objects per screen <sup>3)</sup>	No limit <sup>1)</sup>
Levels per screen	32
Screens per project	No limit <sup>1)</sup>
Instances of fixed faceplates in a process picture	31 instances of the same picture type
Screen size in pixels	10 000 x 10 000
Nesting levels of screen objects	20
Number of colors	Dependent on graphics card
<b>Recipes</b>	
Number of recipes	No limit <sup>1)</sup>
Number of recipe elements	500
Number of recipe data records	3 000
Number of views	No limit <sup>1)</sup>
<b>Logs</b>	
Trend views per screen	25
Trends per trend view	80
Tables per screen	25
Columns per table	12
Values per table	30 000
Logs per single-user station/server	100
Logging tags per single-user station/server	80 000
<b>Reports</b>	
Configurable reports	No limit <sup>1)</sup>
Report lines per detailed page	66
Tags per report <sup>4)</sup>	300
Simultaneously running alarm sequence reports per server/client	1
Simultaneously running alarm log reports	3
<b>Configurations – Quantity structure in a multi-user system</b>	
WinCC clients in a system	32
Web clients in a system	50
<sup>1)</sup> Limited by system resources	
<sup>2)</sup> On single-user station or server or on clients per server	
<sup>3)</sup> The number and complexity of the objects affect the performance	
<sup>4)</sup> The number of tags per report is dependent on the performance of the process communication	

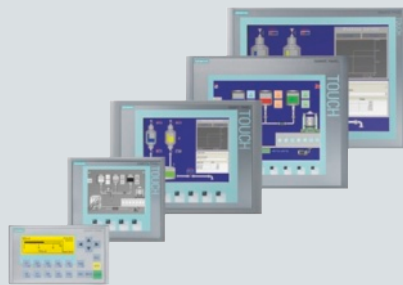
# Overview of SIMATIC HMI devices

## SIMATIC HMI Key Panels



SIMATIC HMI Key Panels and Push Button Panels can be used for creating conventional operator panels according to the principle of "plug and control": They are ready for installation and preassembled. In this way, time-consuming individual assembly and wiring, as required for conventional control panels, is not necessary. This reduces the time required for wiring by up to 90% compared to conventional wiring. The tried and tested Push Button Panels are connected to the controller via PROFIBUS DP or MPI. The new Key Panels were developed for PROFINET environments.

## SIMATIC HMI Basic Panels



SIMATIC HMI Basic Panels are the low-cost entry-level series for operator control and monitoring of compact machines and plants. The series comprises simply key devices (KP), versions with touch screen (TP), and devices with touch screen and additional tactile keys (KTP) for display sizes from 3 to 15 inches. Regardless of the display size, all Basic Panels provide the same functions: The alarm system, recipe management, trend curve functionality, trend and logs, and language selection can be used with any device. Basic Panels are the ideal HMI components for the SIMATIC S7-1200 controller system. The WinCC Basic configuration software is already a component of the STEP 7 Basic engineering software for the S7-1200.

## SIMATIC HMI Comfort Panels



The SIMATIC HMI Comfort Panels are high-end HMI devices for demanding HMI tasks in PROFIBUS and PROFINET environments. All of the devices have the same impressive functionality, regardless of the device size that is selected. Thanks to the choice between 4", 7", 9" and 12" displays, the option of operating via touch or keys, and the capability of operating all of the Touch Panels in both landscape and portrait format, they fit practically any machine. All of the Comfort Panels offer high-resolution displays with 16 million colors, a wide reading angle, and a dimming range from 0 to 100%. In addition, all of the devices can be used in Class 2 hazardous areas. One of the numerous innovations compared to previous SIMATIC Panels is the capability of coordinating and centrally shutting down the device displays via PROFinergy during break times in order to reduce energy consumption.

## SIMATIC Mobile Panels



Regardless of the industry or application, if mobility is required for on-site control and monitoring of machines and plants, mobile HMI devices offer some crucial advantages: The machine operators or commissioning engineers are able to work exactly where they have the best view of the workpiece or process. The range of Mobile Panel products includes devices with 6", 8" or 10" screen sizes, connected to PROFIBUS or PROFINET by cable or via Industrial WLAN in standard or fail-safe design.

## SIMATIC Panels and Multi Panels



With panels from the 070, 170 and 270 series and Multi Panels from the 170, 270 and 370 series, SIMATIC HMI has long provided a finely graduated range of devices for nearly every type of operating and monitoring task in the sub-PC segment. HMI devices with diverse performance and functionality, with touch or keypad operation, and displays ranging from 3 to 19 inches have proven their worth in harsh industrial environments thanks to their ruggedness and quality. These tried and tested families of devices not only remain in the portfolio, they can also be optionally configured with WinCC in the TIA Portal or with WinCC flexible as was done in the past.

## SIMATIC Thin Clients



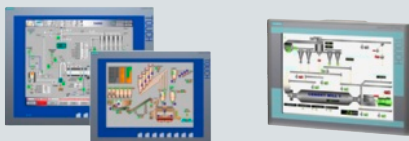
SIMATIC Thin Clients offer a very cost-efficient way to run a very user-friendly operator station on site at the machine. Typical applications include a second operator station in association with another SIMATIC Panel or industrial PC at distributed or large machines or remote terminals with client/server architectures. The 10" or 15" operator terminals with touch functionality are suitable for operating with a host (e.g. SIMATIC Comfort Panel, Multi Panel, Panel PC, or Server) via WinCC Sm@rt Server or Microsoft RDP.

## SIMATIC PCs and Flat Panel monitors



PC-based automation with SIMATIC industrial PCs provides the right platforms for the most demanding HMI applications. For compact, on-site solutions, a broad range of Panel PCs are available in different performance classes with different sizes of fronts and touch or keypad operation. Remote solutions in combination with SIMATIC Box or Rack PCs on the machine or in the control cabinet can be implemented with industry-standard SIMATIC Flat Panel monitors. Flat Panel monitors are also available in several sizes as pure display units or with touch or keypad operation.

## HMI devices for special requirements



The HMI device portfolio is rounded out by Panels, Panel PCs, or monitors for special requirements. A series of HMI devices with stainless steel fronts are available, especially for the food and beverages industry, which correspond to the specific requirements and standards. For use in hazardous areas, a Panel PC and Thin Client have been designed which meet the explosion protection guidelines without further encapsulation. Fully enclosed devices with IP 65 protection are recommended for mounting on support arms or pedestals. This means they can be used independently of control cabinets or consoles.

## Get more information

SIMATIC WinCC on the TIA Portal homepage:  
[www.siemens.com/simatic-wincc-tia-portal](http://www.siemens.com/simatic-wincc-tia-portal)

Totally Integrated Automation Portal homepage:  
[www.siemens.com/tia-portal](http://www.siemens.com/tia-portal)

SIMATIC system properties:  
[www.siemens.com/simatic-properties](http://www.siemens.com/simatic-properties)

SIMATIC Guide manuals:  
[www.siemens.com/simatic-docu](http://www.siemens.com/simatic-docu)

Information material to download:  
[www.siemens.com/simatic/printmaterial](http://www.siemens.com/simatic/printmaterial)

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