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## **Freelance Distributed Control System**

System description



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**Freelance takes the next step into the future. Freelance provides significant improvements in all areas: scalability, usability, connectivity, compatibility, security and digitalization.**

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# Freelance

## The distributed control system



Freelance is a full-fledged distributed control system that combines the advantages of both worlds – DCS and PLC. It offers the small footprint of a PLC, together with the full functionality of a DCS. The integrated environment simplifies engineering, commissioning, maintenance and fieldbus management. The intuitive operator interface enables easy operation and diagnosis of the entire system.



After thousands of installations spanning more than 100 countries, ABB continues to introduce innovations in its Freelance distributed control system (DCS). With the latest AC 900F controller, Freelance provides more power, speed and functionality than ever before. Key features are increased performance, on-board interfaces and the support of SD cards for AC 700F and AC 900F controllers. This allows one to load applications or firmware into the controller without the need of a computer.

Freelance is ABB's user-friendly, cost-effective and robust solution ideal for nearly all process industries, with the following benefits:

- **Easy to use:** It is easy to install, learn, engineer, commission, back-up, maintain and expand.
- **Reliable:** It is a proven system with high reliability and availability providing redundancy options supporting solutions without any single point of failure.
- **Future-proof:** Future-proof new technologies are continuously introduced to Freelance to meet the demands of a rapidly changing, digitalized industrial world.
- **Value for your money:** Investment goes a long way because of its small footprint and ability to run on any standard computer. Together with its ease of use, this results in savings in installation, engineering, commissioning and life cycle costs.

The Freelance distributed process control system is a safe investment for the future, based on the concept, Process automation made easy!

# System architecture

## Engineering and operation

### Freelance Engineering includes:

Sequential Function Chart	Structured Text	Instruction List	Function Block Diagram
Ladder Diagram	Project database	Project tree	Display process states
Configuration of fieldbus	Freely configurable graphic displays	Hardware structure	Cross referencing

Freelance provides both, operator level and process level. The operator level contains the functions for operation, process monitoring, archives and logs, trends and alarms. Open- and closed-loop control functions are processed in the controllers which communicate with actuators and sensors in the field.

#### Freelance Engineering

With Freelance, all engineering work is performed with one single tool, Freelance Engineering, which works hand in hand with the visualization and operation tool Freelance Operations. Usually, portable equipment such as laptops, which allow configuration both in the office and on site, is used.

#### Benefits at a glance:

- Compatible with former versions
- Intuitive auto router in Function Block Diagram (FBD) editor
- Both project tree and editors can be viewed simultaneously for easier navigation
- Direct copy paste between several editors
- Optimized for efficient engineering, fewer clicks with auto-accept
- Direct import/export to Microsoft® Excel®
- Excel-like filter and sort functions in variable/tag list
- Graphical project preview for easier distinction of project
- Direct access to user documentation

More details about Freelance Engineering see page 32.

## Freelance Operations includes:

Time scheduler display <sup>1</sup>	Overview display <sup>1</sup>	Report	Information
Access control	Group display of faceplates <sup>1</sup>	SFC display <sup>1</sup>	Trend display and archiving <sup>1</sup>
Operator hint list <sup>1</sup>	Alarm and message list <sup>1</sup>	System and device diagnostics <sup>1</sup>	Formulation and batch

<sup>1</sup>Pre-engineered and ready-to-use displays

### Freelance Operations

Freelance Operations configuration is fully integrated in Freelance Engineering. Optional batch and information packages are also easy to integrate. Freelance Operations meets all standard process control requirements with regard to operation and observation at an attractive price. Amongst other things, Freelance Operations offers the following visualization features:

- Clearly structured faceplates for operator interventions which can also be combined as required in group displays
- Trend displays including historical data and long-term archiving
- Alarm pages for specific plant areas, sequence control
- Displays, shift logs, event logs and data archiving

- Standardized system display for system hardware diagnostics
- Free graphic displays that besides standard graphic elements are also supported by bitmaps and a 3D macro library
- Multi monitor operation
- Control aspect for interlocking displays
- A Freelance Operations Lite License is available at an attractive price, useful for smaller applications

More details about Freelance Operation see page 28.

# System architecture

## Overview

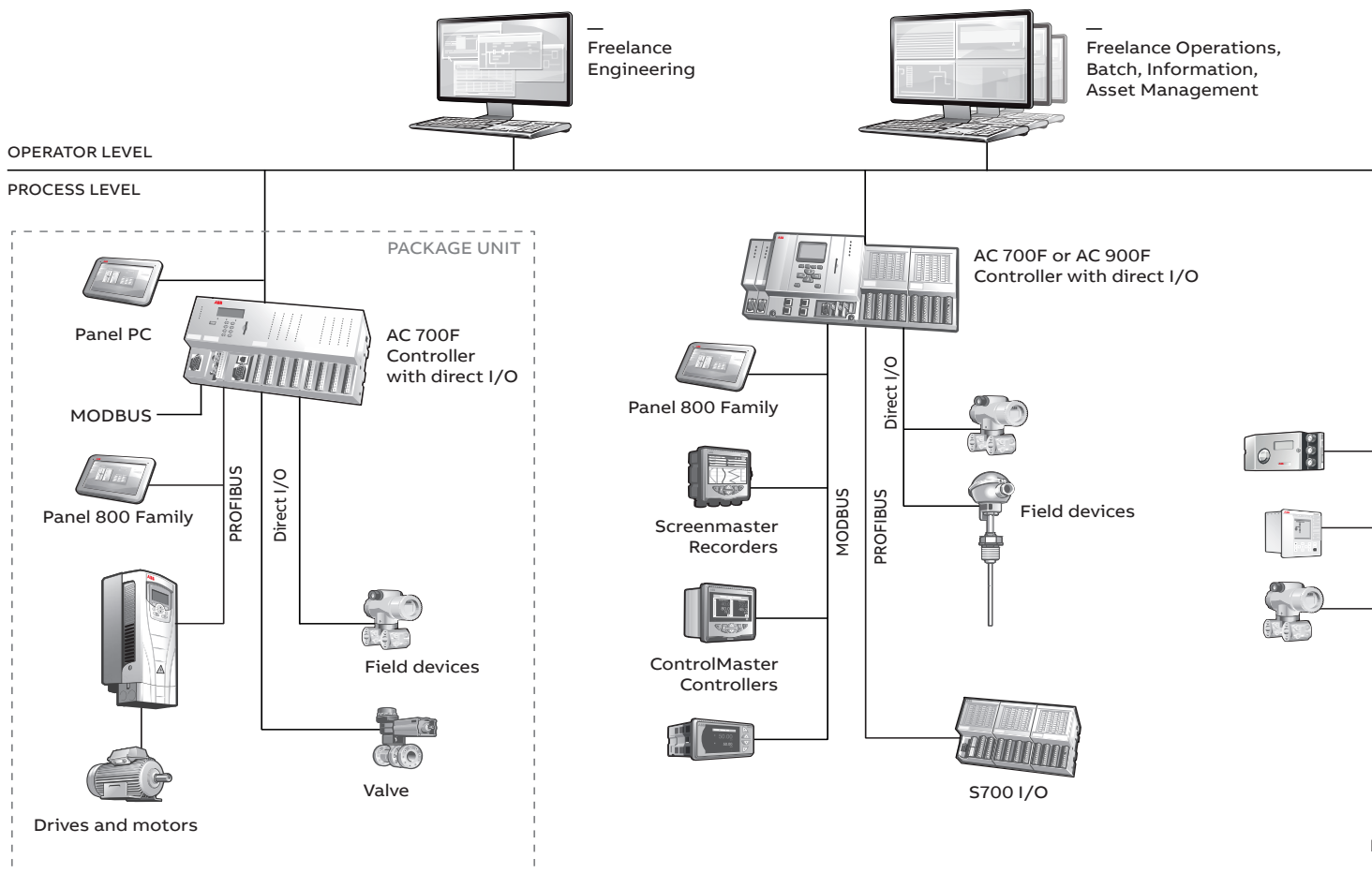
A Freelance system can consist of one or combination of several AC 700F and/or AC 900F controllers. It can be connected to field devices through fieldbuses, direct and remote I/Os.

With the AC 900F controllers, you have the option of configuring your entire system in redundancy.

As shown in the architecture drawing below, Freelance can go from a typical OEM offering with an AC 700F controller, a Panel 800 and around

50-100 I/Os. The AC 700F can have up to eight direct I/O modules connected to it or have remote I/Os connected via PROFIBUS. Modbus RTU and TCP are also supported.

The Freelance Lite offering can typically have an AC 700F or AC 900F controller and will be in the 250 to 400 I/O range with possibly a combination license and a few operator stations. This can ramp up to the Freelance Standard and Premium offerings with the AC 900F, with or without redundancy.

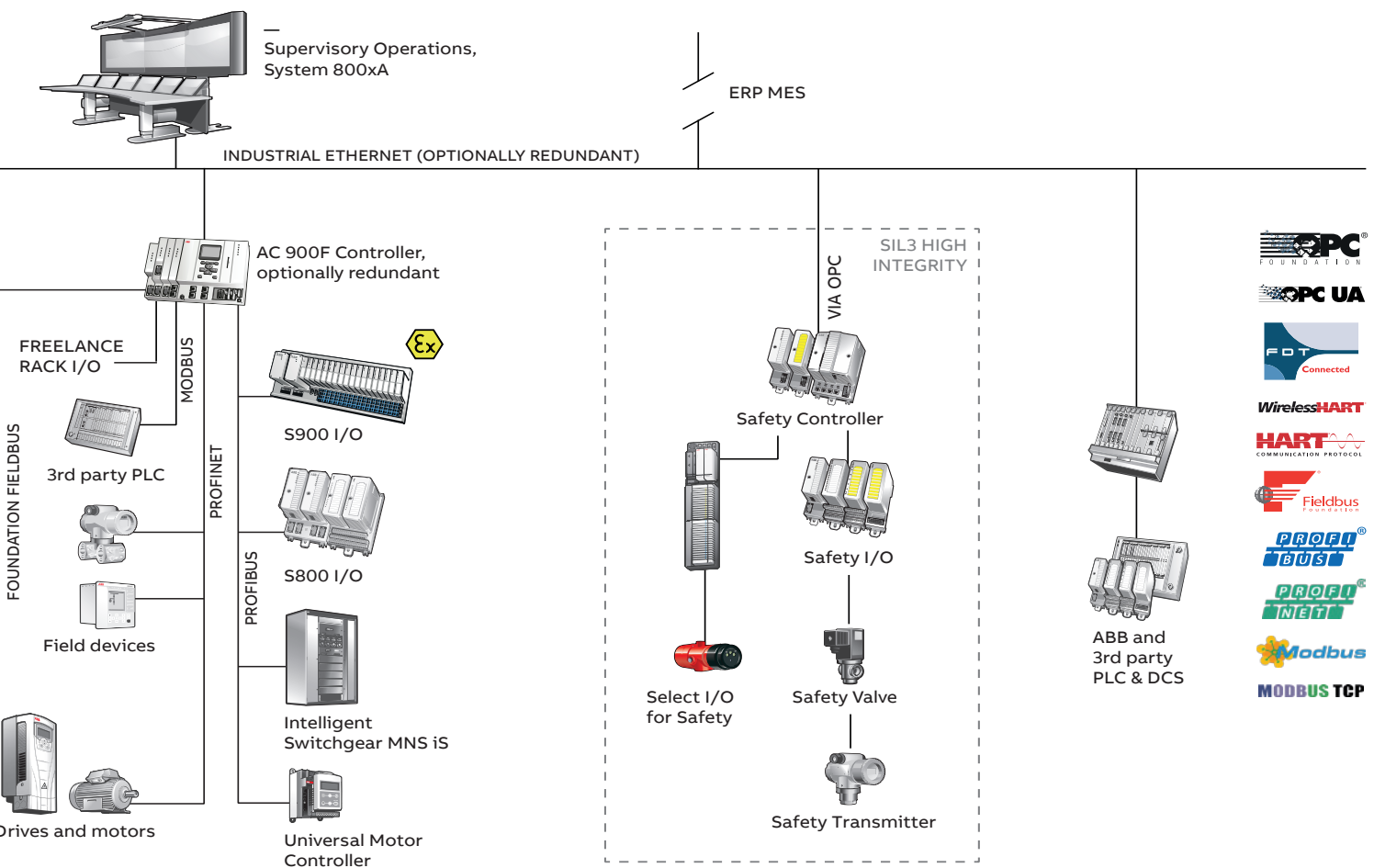


Freelance can go up to thousands of I/Os. Connections include FOUNDATION Fieldbus, PROFIBUS, PROFINET and HART as well. There is also the possibility to connect to supervisory control stations running on ABB's 800xA system.

Freelance comes with three different types of controllers, AC 700F and its latest Freelance controller – the AC 900F. This controller truly extends the hardware portfolio of Freelance distributed control system. All three controller

types can be used side by side within a project and can easily communicate with each other via the Ethernet based control network.

With all controllers, fieldbus-compliant components such as remote I/O, field devices and network components can be used. ABB also offers equipment for standard and hazardous area applications and Safety.



# System architecture



## System communication

The operator and the process level communicate via the control network, which is based on Standard Ethernet. You can choose between various transmission media such as twisted pair or fiber optic cable. The system components use a specific protocol called DMS, which is an enhanced MMS (Machine Message Specification) protocol. This protocol can be utilized by 3rd party network subscribers using the application interface DMS-API. This is a “C” programming interface for MS Windows to enable programmers to create tailored solutions. A more standardized and generic approach to connect to the system is provided by the Freelance OPC server to access real-time process values (DA) and alarms/ events (AE) from the Freelance System.

A Freelance system in theory can have up to 100 controllers and 100 operator stations. However - the majority of the systems are in the range of 1 to 5 controllers/ operator stations. Each controller can communicate to a total of 10 Freelance operator stations, OPC- or trend servers. If the number of those exceeds 10, the system allows to segment the data communication accordingly per simply setting some check marks.

Note: a Freelance operator station or the Freelance OPC-server can “talk” to more than 10 controllers. So, if the number of controllers exceed 10, there is no further action required.

## Integration of 3<sup>rd</sup> party PLCs

Integration of 3<sup>rd</sup> party PLCs like Safety PLCs or package units can easily be achieved by using the new OPC based “PLC Integration” functionality of Freelance. This not only provides the ability read or write data, but also to create faceplates based on existing Freelance ones to interact with those units and to integrate the alarms into the Freelance alarm management.

## Other enhancements

In addition to the standard Freelance operator station, 800xA Operations may also be used. Of course other options such as batch management, enhanced information management and asset management are also available.

## Asset Management

If you want to keep your production plant up and running in the long term, you need information about the availability and degree of wear and tear of your equipment. All of the information necessary for this is available; integrated and included in the basic software package of the Freelance control system. As a result, several customers have been able to avoid making investments that appeared essential but were in fact unnecessary. Freelance allows the use of modern asset management methods for more efficient maintenance and optimization – helping for instance to make optimum use of plant capacity.

# The controllers

## AC 900F and AC 700F

The process level is the domain of controllers. Together with the engineering tool, their functions and modularity define the ease of use, scalability and performance of a DCS. Freelance comes with three different types of controllers: AC 900F and AC 700F.

A Freelance system can consist of one or combination of several AC 900F, AC 800F and/or AC 700F controllers. It can be extended with fieldbuses, field devices and remote I/Os. With AC 900F and AC 800F you have the option of configuring your system optionally redundant (controller and line redundancy).

### AC 900F

AC 900F comes with four built-in Ethernet ports supporting Modbus TCP or 60870-5-104 telecontrol protocol. Up to two pluggable PROFIBUS master modules support optional redundancy available on the PM 901F/PM902F. Up to four pluggable PROFIBUS master modules support optional redundancy in PM 904F. S700 I/O modules (as many as 10) can be connected directly to the controller. Apart from its highly sophisticated automation functions, the AC 900F modular controller offers expanded flexibility via a pluggable SD card. It is available in a plus, standard and lite version. The plus and standard version supports around 1,500 I/Os per controller. The lite version is optimized for smaller applications supporting up to 400 I/Os.

### AC 700F

AC 700F comes along with a very small footprint and is particularly suitable for small applications consisting of very few to several hundred I/O signals. Applications can easily be distributed to several controllers. AC 700F can also be extended with PROFIBUS Remote I/O units. In addition, field devices can be connected to AC 700F. Thanks to the flexibility of Ethernet and its small footprint, AC 700F can also be placed in junction boxes in non-hazardous areas out in the field as competitive, intelligent Ethernet I/O.

All three controller types can be used side by side within a project and can easily communicate with each other via the Ethernet based control network. The Engineering is performed with one engineering tool, Freelance Engineering. All function blocks and pre-engineered functions are available for all three controllers in the same way.

AC 900F



AC 700F



# The controllers

## AC 900F



**The AC 900F controller truly extends the hardware portfolio of Freelance distributed control system. Apart from its highly sophisticated automation functions, the AC 900F modular controller offers expanded flexibility via a pluggable SD card, more Ethernet ports, redundancy options for high availability and powers for around 1,500 I/Os when using the Plus and Standard CPU (PM 904F and PM 902F) or up to 400 I/Os when using the Lite CPU (PM 901F).**

Key features of the AC 900F are increased performance, on-board interfaces and the support of SD cards. Especially the new optional display for AC 900F allows to load applications or firmware into the controller without the need of a terminal program on a computer.

Benefits at a glance:

- More power than any previous generation Freelance controller
- More connectivity with serial ports and Ethernet ports
- Built-in SD card support
- New Ethernet based protocols – Modbus TCP and IEC 60870-5-104
- G3 compliant as standard
- Built-in power supply
- Optional LCD providing enhanced security through controller lock
- Small footprint
- Optional redundancy

### Mechanical design

Thanks to its four holes in the rear, the CPU modules PM 904F (Plus), PM 902F (Standard) and PM 901F (Lite) allow easy wall-mounting. DIN rail mounting

is even faster and easier by just placing the component on top of the DIN rail and pushing it down to lock it in place.

### Technical data

The AC 900F controller consists of a CPU module which is the main component. According to the application and requirements, further modules can be added to the controller. These modules are fieldbus interface modules and I/O modules. The AC 900F consists of:

- CPU module PM 904F, PM 902F or PM 901F with
  - four Ethernet interfaces for PM 904F and PM 902F or three Ethernet interfaces for PM 901F
  - one diagnostic interface
  - two serial interfaces
  - display unit (optional)
- Up to ten S700 I/O modules directly attached on terminal units
- A maximum of two fieldbus interface modules for PM 902F and PM 901F
- Up to four (4) fieldbus interfaces for PM 904F

The AC 900F controller can be arranged in a single or redundant manner. The controller supports remote I/Os, transmitters, actuators, drives and other devices, for example through PROFIBUS and other fieldbus protocols. At present, the following field busses are available for the AC 900F controller:

- PROFIBUS DP V0/V1
- Modbus RTU and Modbus TCP
- Telecontrol and Telecontrol TCP
- CAN Bus for connection of Freelance Rack I/O
- FOUNDATION Fieldbus
- PROFINET (minimum Freelance 2024)

Input/output modules are used as direct I/O and remote I/O in accordance with the type and quantity of process signals.

The hardware configuration of AC 900F is based on a hardware function block concept similar to the configuration like AC 700F. AC 900F can be equipped with a maximum of two PROFIBUS modules for PM 902F and PM 901F.

The PM904F can handle up to four PROFIBUS modules. You have the option to run these controllers in redundancy. Modular plug-in I/O modules are used in accordance with the type and quantity of process signals. With AC 900F con-

trollers, fieldbus compliant components such as remote I/O, field devices, and network components can be used. ABB offers equipment for applications covering standard and hazardous areas.

#### **What's new? PROFINET support for the AC 900F controller**

With its real-time communication capabilities, Freelance is now capable to fully integrate the leading Ethernet protocol for communication between devices and industrial automation systems. It ensures reliable data transmission, supports flexible network topologies, and provides device configuration and diagnostics.

Freelance 2024 now supports PROFINET communication on AC 900F controller with the multipurpose Ethernet Communication Interface. This CI 940F module has a 100BaseT Ethernet interface that can run with the PROFINET protocol. It supports S1 and S2 redundancy and up to 128 PROFINET devices. In combination with controller redundancy, this CI (communication Interface) is also redundant and ensures highest availability.

#### **Overview of new AC 900F Interface - PM 904F**

It has four (4) built-in and free configurable Ethernet ports supporting System bus redundancy, Modbus TCP/IP, Send & Receive UDP or TCP and IEC 60870-5-104 Telecontrol protocol.

- Two (2) serial ports supporting Modbus RTU/ASCII or IEC 60870-5-101 Telecontrol protocol.
- Four (4) slots for Communication Interfaces: PROFIBUS master modules providing integrated line redundancy.
- CAN bus modules for connection to Freelance Rack I/O.

Direct connection to S700 I/O modules (up to 10). The S700 I/O series provides high density configurable modules that support a mix of inputs and outputs and even analog and digital I/Os in one module for a small footprint.

#### **Freelance Engineering**

With focus on Engineering Efficiency we improved all filtering and sorting functionality. Also the auto routing capabilities in the Function Block Diagram editor has been improved. With this new version it is possible to backup / restore the whole project application file including all operator graphic displays, logic pro-

grams, and even field device parameters directly via SD card within the controller (AC 700F and AC 900F).

#### **Multi Monitor support**

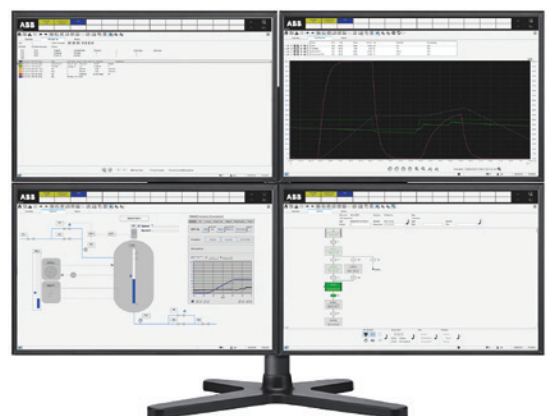
Freelance Operations expands its multi monitor support. With Freelance 2019 up to four (4) monitors can be connected to a single operator workplace. The available display types per monitor, as well as the arrangements of the monitors, are easily configured and fulfill the typical requirements on occupational safety and operator effectiveness.

#### **Freelance Operations**

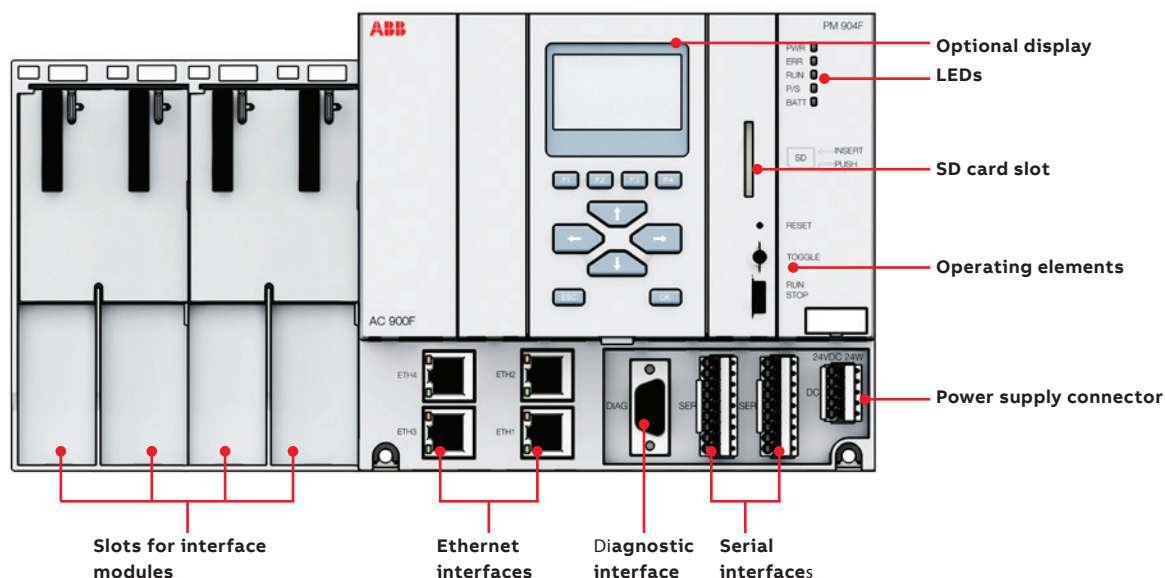
Freelance Operations received various improvements in terms of the User Interface and User Experience. The new Freelance Operations leans on the High Performance HMI style while making sure that experienced users from former Freelance versions still feel confident.

#### **Benefits of the new version at a glance**

- Enhanced scalability: New PM 904F expands the AC 900F controller family in the upper range.
- Improved usability: Freelance 2019 provides significant increase of efficiency for Operations and Engineering.
- More connectivity: Four (4) communication Interfaces in new AC 900F with PM 904F.
- Enhanced Security: New Extended User Management based on Windows User accounts.
- As a matter of course, Freelance Version 2019 still supports Freelance hardware from its first version.
- Multi monitor support from 2019 version, up to 4 monitors on one PC.
- Compatibility: Freelance 2019 runs on Windows 10 and Windows 7.



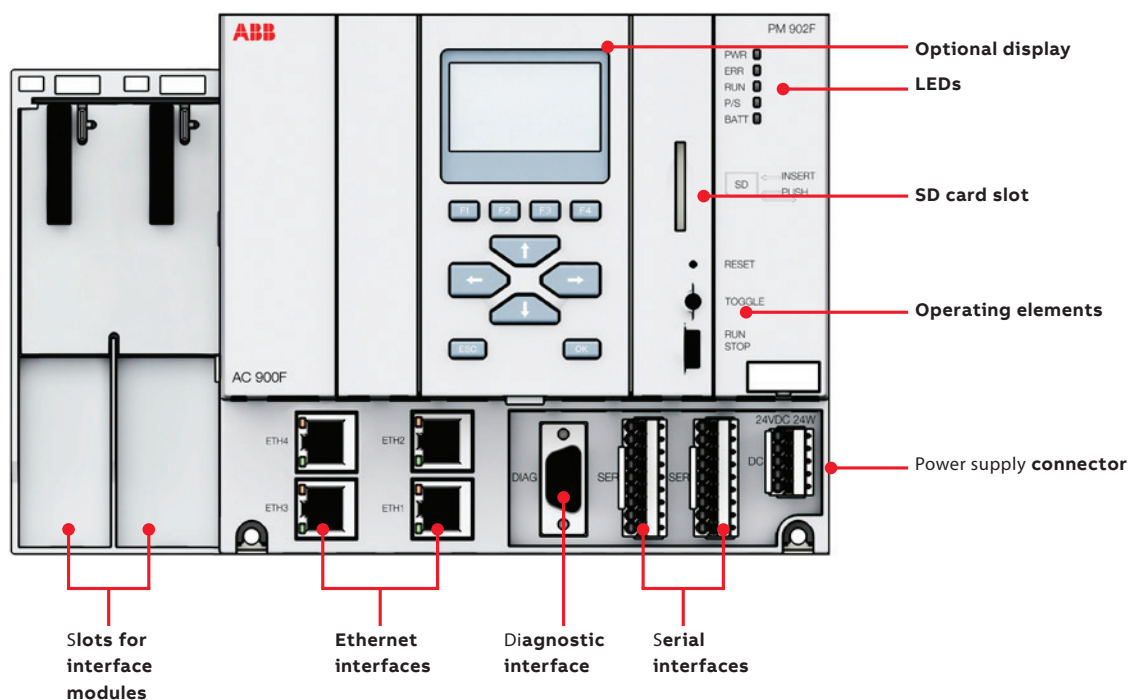
CPU module PM 904F



## PM 904F Technical data

Technical Data PM 904F	
RAM (Total)	48 MB
RAM battery buffered	16 MB
CPU clock rate	800 MHz
Number of direct I/O modules	Up to 10
Power consumption	24 W (full station assembly)
Power supply	Terminal for 24 VDC power supply DC-IN +24 VDC
Max. power dissipation within the module	18 W
Current consumption from 24 VDC	1 A
Inrush current at 24 VDC	1.5 A
Data backup source	Lithium battery for SRAM contents and real time clock
Buffering time at +40 °C	> 2 years After battery low warning: 14 days
Battery low indication	Warning indication issued about 2 weeks before the battery charge becomes critical
Real-time clock, with battery backup	Yes
Multitasking program execution:	<ul style="list-style-type: none"> <li>Cyclic (equidistant)</li> <li>Cyclic (as fast as possible)</li> <li>Event driven</li> </ul>
Serial interfaces (SER1 and SER2)	<ul style="list-style-type: none"> <li>Physical link:</li> <li>Connection:</li> <li>Usage:</li> </ul>
Onboard network interface	
4 Ethernet interfaces (RJ45)	<ul style="list-style-type: none"> <li>Ethernet 1:</li> <li>Ethernet 2:</li> <li>Ethernet 3 &amp; 4:</li> </ul>
Weight	1.1 kg (2.43 lbs)
Dimensions	Width 285 mm (11.22 inch) Height 152 mm (5.98 inch) Depth 95 mm (3.74 inch)

CPU module PM 902F



### Central processing unit

The PM 902F or PM 901F CPU modules are the central part of the AC 900F controller. The CPU provides a high performance processor for multi-tasking and executing fast loop cycle times. PM 902F comes with four on-board 100 Mbit/s Ethernet network connections and two serial interfaces. PM 901F comes with three on-board 100 Mbit/s Ethernet network connections and two serial interfaces. A third serial interface is reserved for diagnosis purpose and radio clock connection. Coupler bus slots and an I/O bus interface enables for adding further modules left and right to the CPU modules.

The front panel display shows status and diagnostic information directly at the module. Operating modes can be modified by switches on the front panel.

#### CI 930F PROFIBUS Master

Protocol	DP-V0/V1 protocol
Baud rate	9.6 kBit/s to 12 MBit/s
Connector	2 x D-SUB, 9-pole, female
Slaves	max. 126
Redundancy	Support of PROFIBUS line redundancy
Hot plug, hot configuration in run	The CI 930F PROFIBUS Master can be exchanged during operation of AC 900F

#### CI 773F PROFIBUS Master

Protocol	DP-V0/V1 protocol
Baud rate	9.6 kBit/s to 12 MBit/s
Connector	D-SUB, 9-pole, female
Slaves	max. 126

#### Technical data PM 902F and PM 901F

PM 902F	RAM (Total) = 24MB RAM battery buffered = 8MB
PM 901F	RAM (total) = 11MB RAM battery buffered = 3MB
Battery low indication	Warning indication issued about 2 weeks before the battery charge becomes critical
Real-time clock, with battery backup	Yes
Multitasking program execution Cyclic (equidistant) Cyclic (as fast as possible) Event driven	Configurable cycle times from 5 ms PLC mode Predefined events
Serial interfaces (SER1 and SER2) Physical link:	Configurable for RS-232 or RS-485 (from 600 bps to 38400 bps),
Connection:	Pluggable terminal block with spring connection
Usage:	Modbus RTU (Master / Slave) Telecontrol IEC 60870-5-101
Onboard network interfaces / Ethernet (RJ45)	PM 902F: 4 PM 901F: 3
PM 902F / PM 901F	Ethernet 1: for Control Net (optional Modbus TCP and Telecontrol IEC 60870-5-104)
PM 902F / PM 901F	Ethernet 2: for redundancy link
PM 902F / PM 901F	Ethernet 3: for Modbus TCP and Telecontrol IEC 60870-5-104
PM 902F	Ethernet 4: for Modbus TCP and Telecontrol IEC 60870-5-104

# The controllers

## AC 700F

**The AC 700F controller, as a member of Freelance, has numerous advantages over a PLC based solution: The distributed process control system simplifies engineering, commissioning and maintenance of the automation system.**

Visualization is directly incorporated into the engineering, making configuration particularly straightforward. Small or distributed plant components can be implemented cost effectively by using AC 700F. The competitive advantage is clear: the same engineering, operation and maintenance method for all plant components hand in hand with the well-known ease of use of Freelance.

### The AC 700F hardware

AC 700F comes with a modular design. The base elements are different types of terminal units, for the CPU module and for S700 I/O modules. Both, screw type and spring type terminal units are available.

The CPU and the local S700 I/O modules communicate very fast. I/O scan times of 2 ms are possible. Short circuit and line break detection is realized for each channel. Certificates according to CE, UL and GL enables AC 700F to be used in a wide variety of applications. S700 I/O can be connected directly to the controller, or remote via PROFIBUS. See "S700 I/O Modules" on page 20 for details.

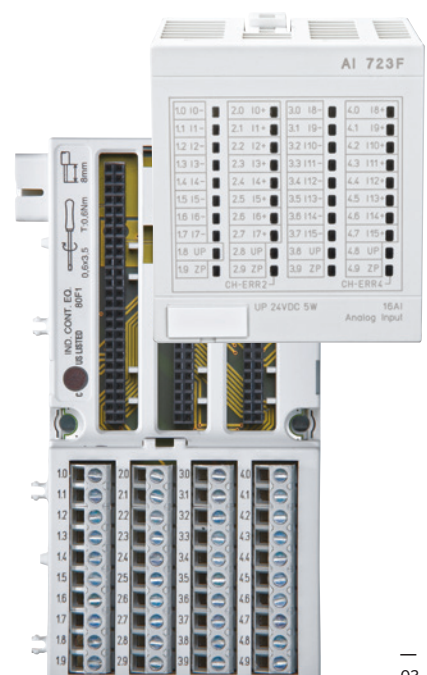
01 AC 700 CPU plugged on terminal unit

02 S700 I/O module plugged on terminal unit

The modules can be easily plugged to the terminal units and then terminal units can be plugged one to the other. The entire controller and the I/O modules are then mounted on a DIN rail.



01



02

AC 700F CPU PM 783F



Small front panel display

**The CPU module**

The CPU module is equipped with a high-performance processor allowing for fast cycle times. It comes with on-board 10/100 MBit/s Ethernet network connection used for communication between controllers, operator stations and engineering tool. Two serial line interfaces complement the connectivity. One interface can be used for Modbus communication while the other is used for diagnostics.

For demanding applications, eight cyclic and priority driven tasks with adjustable cycle time can be configured, as well as a PLC type task, which runs as fast as possible. This multi-tasking scenario enables engineers to design applications that reflect all demands of process control, while at the same time balancing the CPU load. This keeps the resources needed in a project at the minimum.

The small front panel display shows diagnostics information directly at the module.

AC 700F CPU PM 783F	
Processor Motorola Power PC (MPC8247) Max	
Number of I/O Modules	8
Serial interface "SER" (COM1)	Physical link: configurable for RS-232 or RS-485 (from 1200 bps to 38400 bps) Connection: pluggable terminal block, spring connection Usage: as Modbus RTU
Serial interface "DIAG" (COM2)	Physical link: RS-232 Connection: SUB-D Female connector Usage: for diagnostics
Onboard network interface	1 x Ethernet (RJ45)
Certificates	CE, GL, UL

CI 773F PROFIBUS Master	
Protocol	DP-V0/V1 protocol
Baud rate	9.6 kBit/s to 12 MBit/s
Connector	D-SUB, 9-pole, female

# The controllers

## Functions and function blocks

Functions and function blocks	
Analog value	<ul style="list-style-type: none"> <li>• Input and output conversion processing</li> <li>• Linearization</li> <li>• Deld dead-time filter</li> <li>• Average/extreme value determination in time</li> <li>• Setpoint adjustment</li> <li>• Counter with analog input</li> <li>• Time scheduler</li> </ul>
Binary value processing	<ul style="list-style-type: none"> <li>• Binary output, monostable</li> <li>• Input and output delay</li> <li>• Pulse/time counter, pushbutton</li> </ul>
PID loops	<ul style="list-style-type: none"> <li>• Continuous controllers</li> <li>• Step controllers</li> <li>• On/off controller, three-position controller</li> <li>• Ratio controller</li> <li>• Basic functions</li> <li>• Auto-tuning</li> </ul>
Open-loop control	<ul style="list-style-type: none"> <li>• Individual drive functions</li> <li>• Sequence control, dosing circuits</li> </ul>
Logic functions	<ul style="list-style-type: none"> <li>• Logic processing</li> <li>• Average/extreme value determination</li> <li>• Comparator, binary switch</li> <li>• Multiplexer</li> <li>• Converter (data type &amp; code)</li> <li>• Flip-flop, edge detection</li> <li>• String blocks</li> <li>• Radio controlled adjustment of daylight-saving time</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Analog and binary monitoring</li> <li>• Event monitoring</li> <li>• Audible alarm control</li> <li>• Connection monitoring</li> </ul>
Acquisition functions	<ul style="list-style-type: none"> <li>• Disturbance course acquisition, trend acquisition</li> </ul>
Arithmetic functions	<ul style="list-style-type: none"> <li>• Basic arithmetic functions, numerical functions</li> <li>• Logarithmic functions</li> <li>• Trigonometric functions</li> <li>• Analog value and time limitation</li> </ul>
Modbus functions	<ul style="list-style-type: none"> <li>• Master and slave functions</li> </ul>
PROFIBUS	<ul style="list-style-type: none"> <li>• DPV1 master functions</li> </ul>
Telecontrol functions	<ul style="list-style-type: none"> <li>• Master and slave functions</li> </ul>
Phase logic	<ul style="list-style-type: none"> <li>• Interface module for batch applications processing</li> </ul>

### Functions

The scope of functions provided by the Freelance system corresponds to the basic supply defined in IEC 61131-3, in addition to numerous other high performance, industry-proven functions and function blocks. They are accommodated in a function block library and can be expanded by user-specific function blocks.

While designing the station and during configuration, the processing capacity and speed of the controller can be easily adapted to the demands of the automation task. Program execution in the controller is based on a task oriented, real-time multitasking operating system, leading to a flexible strategy for processing programs.

Different modes are available for user task execution:

- Up to eight tasks with individual cycle times between 5 ms and 24 hours
- Processing as fast as possible (PLC mode)

Along with the user tasks, system tasks are automatically made available. These tasks are executed once in case of the following events:

- RUN
- STOP
- COLD START
- WARM START (voltage restored)
- REDUNDANCY TOGGLE
- ERROR

# Remote I/O

## S700, S800 and S900

The PROFIBUS Master module enables connection of remote I/O units such as S700, S800, or S900 Remote I/O. S700 I/O is meant for basic applications where traditionally PLC I/Os have been used. S800 is generally used in process automation. S900 is preferred, due to its extended channel diagnostics and intrinsic safety, in the chemicals segment and in areas where explosion protection is required.

One of the benefits using remote I/O is that it can be placed in junction boxes in the field and not in the control room.

### S700

S700 I/O can be used as direct I/O for AC 700F and AC 900F. S700 can be used as PROFIBUS remote I/O at AC 700F, AC 800F, AC 900F or other PROFIBUS Masters.

One of the S700 I/O benefits is the small footprint – the modules are featured with a high packing density, several modules are available with inputs and outputs mixed in one module. Currently, 14 different module types are available covering a wide variety of applications.

For further details, see:

**Freelance DCS Product Catalog 3BDD015188**

### S800

S800 I/O is a comprehensive, distributed and modular process I/O system that communicates with controllers via PROFIBUS. Installation in the field, close to sensors and actuators, S800 I/O greatly reduces the installation cost by reducing

the cost of cabling. It is possible to exchange modules and reconfigure the system during operation. Redundancy options in all areas allow a high degree of availability. For harsh environments, the I/O modules are compliant to G3 severity level of ISA-S71.04, Environmental Conditions for Process Measurement and Control Systems. A pass-through feature makes it possible to configure and examine all HART-compliant field devices directly from the control systems engineering tool.

For further details, see:

**System 800xA 6.1 Product Catalog 3BSE091397**

### S900

The remote S900 I/O system can be installed directly in zone 1 and zone 2 hazardous areas.

It communicates with the control system level using the PROFIBUS standard, therefore reducing marshalling and wiring costs. The system is sturdy, error-tolerant and easy to service. Moreover, the S900 I/O system is characterized by a compact design, cyclical transmission of secondary HART variables, parameterization and diagnosis of all HART field devices via the fieldbus. Its redundancy ensures maximum availability.

Integrated disconnection mechanisms allow replacement during operation, meaning that there is no need to interrupt the primary voltage in order to exchange the power supply units.

For further details, see:

**S900 I/O Datasheet Catalog 3BDD010420**

S700 I/O



S800 I/O



S900 I/O

