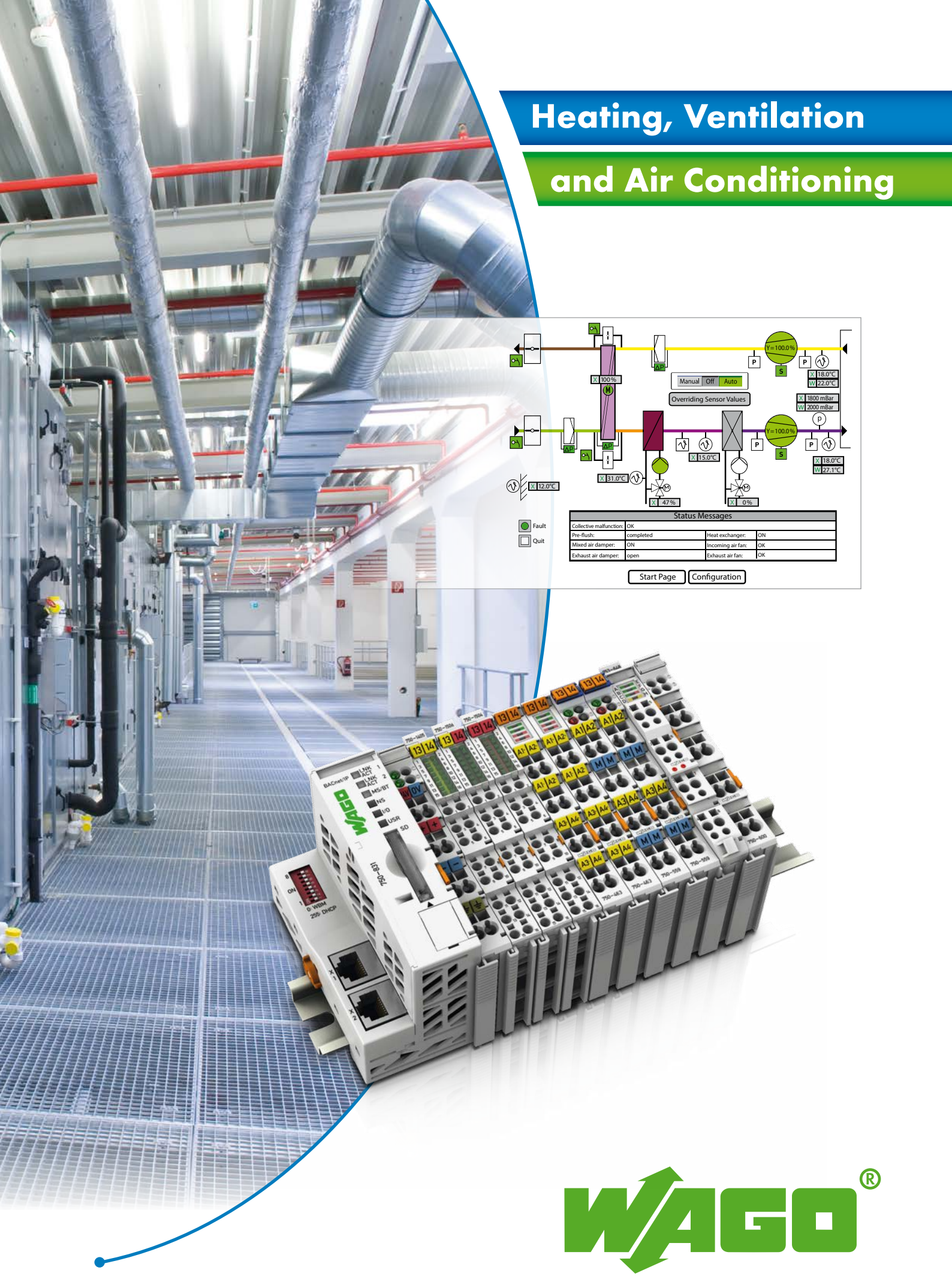
Heating, Ventilation and Air Conditioning



WAGO®

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WAGO Solutions for

Planning Lays the Foundation

Technical equipment and savvy planning are the building blocks that form an important foundation for energy-efficient building operation. One basic requirement for this: Everyone who participates in the construction shares a common and clear language. Foundations for this can be found in the Construction Tendering and Contract Regulations (VOB), the Association of German Engineers (VDI) 3814, and DIN EN ISO 16484-3. However, nothing is yet established in the guidelines and standards about the components to be used.
This applies to equipment, as well as for automation hardware and software. In addition to simple analog/digital inputs and outputs, BACnet, MODBUS TCP/IP, LON®, MP-Bus, M-Bus, KNX, EnOcean, and DALI are all well represented in the market. In larger commercial properties, a mixture of protocols and bus systems is often used simultaneously. Therefore, there is a need for automation hardware that can operate every prominent protocol and interface in one system. The WAGO-I/O-SYSTEM 750 is the hardware solution to meet this challenge. The controller, which takes on control tasks for the automation solution, can be easily expanded using various modules, so that almost any device can be connected to the system.

- **Fieldbus-independent systems provide many solution approaches in the planning stages.**
- **Pluggable connection systems, such as *WINSTA*®, help prevent waste caused by errors and expedite installations.**
- **Ready-to-use applications allow commissioning without programming.**
- **Web-based parameter setting and commissioning can be performed easily and independently.**
- **An integrated Web server enables visualization and operation via standard Web browser.**
- **Free download of standard HVAC system macros from WAGO's homepage.**

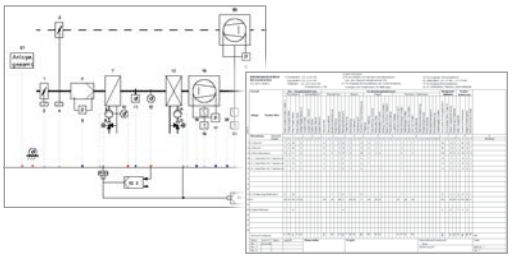
Every Step of the HVAC Cycle

From Planning to Implementation

WAGO provides a comprehensive HVAC library, which includes ready-made system macros for many common applications. This minimizes HVAC configuration for users. After configuring the application – via simple data point and system parameter assignment – the ready-made application can be directly commissioned.

There is no need for time-consuming programming. This leads to significant cost reductions for system commissioning, while simplifying the re-use of standardized solutions. Besides simple applications (e.g., heating circuit control and hot water conditioning), even complex applications, such as cascade control using cross-flow heat exchangers and frequency regulated fans, are available.

An Efficient Process: Ste



MODBUS

M-Bus

SMI

KNX

enocean

MP-BUS

BACnet

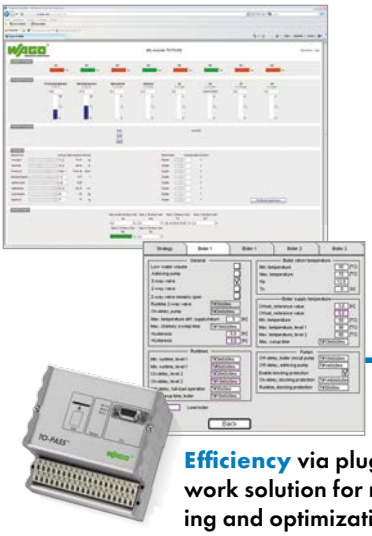
Efficiency in hardware planning

Planning

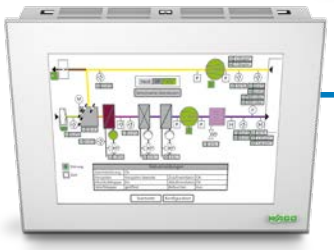
EN 15232
VDI 3813-2
DIN V 18599
VDI 3814

Standardization

Optimization

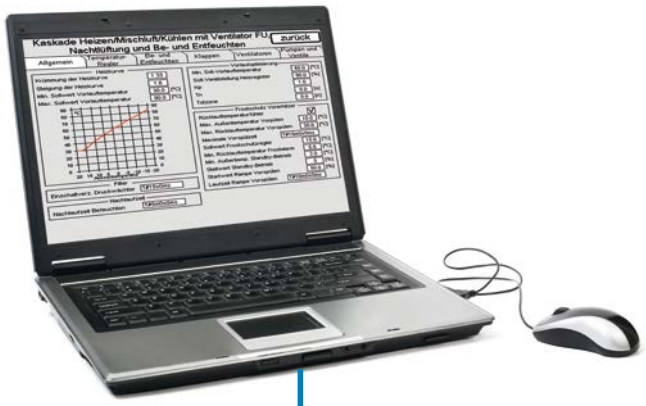


Efficiency via plug-and-work solution for monitoring and optimization of energy data



p-by-Step

Efficiency in the assembly via ***WINSTA***® pluggable connection system



Efficiency via Web-based commissioning and maintenance interface

Installation

Commissioning

First-time use

Operation

Efficiency in operation via integrated operating and monitoring

Efficiency in the building

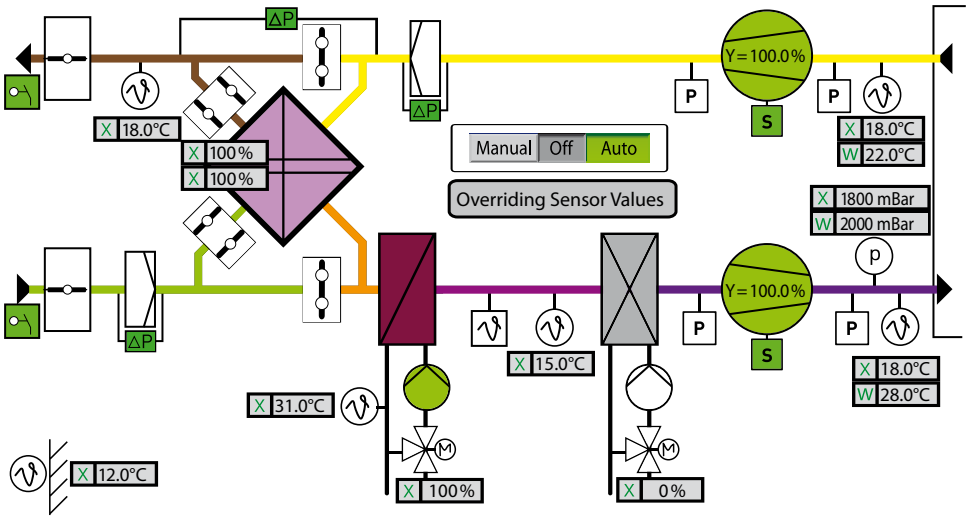
WAGO System Macros

Parameter Setting Instead of Programming

Planning and executing technical systems for building automation applications requires extensive knowledge from all involved professionals. Particularly when executing planned HVAC systems, extensive control and visualization programs must be created. Supporting this, WAGO provides extensive libraries with ready-made system macros to its customers, which generally makes programming unnecessary. The use of such system macros contributes to standardization, reducing project costs.

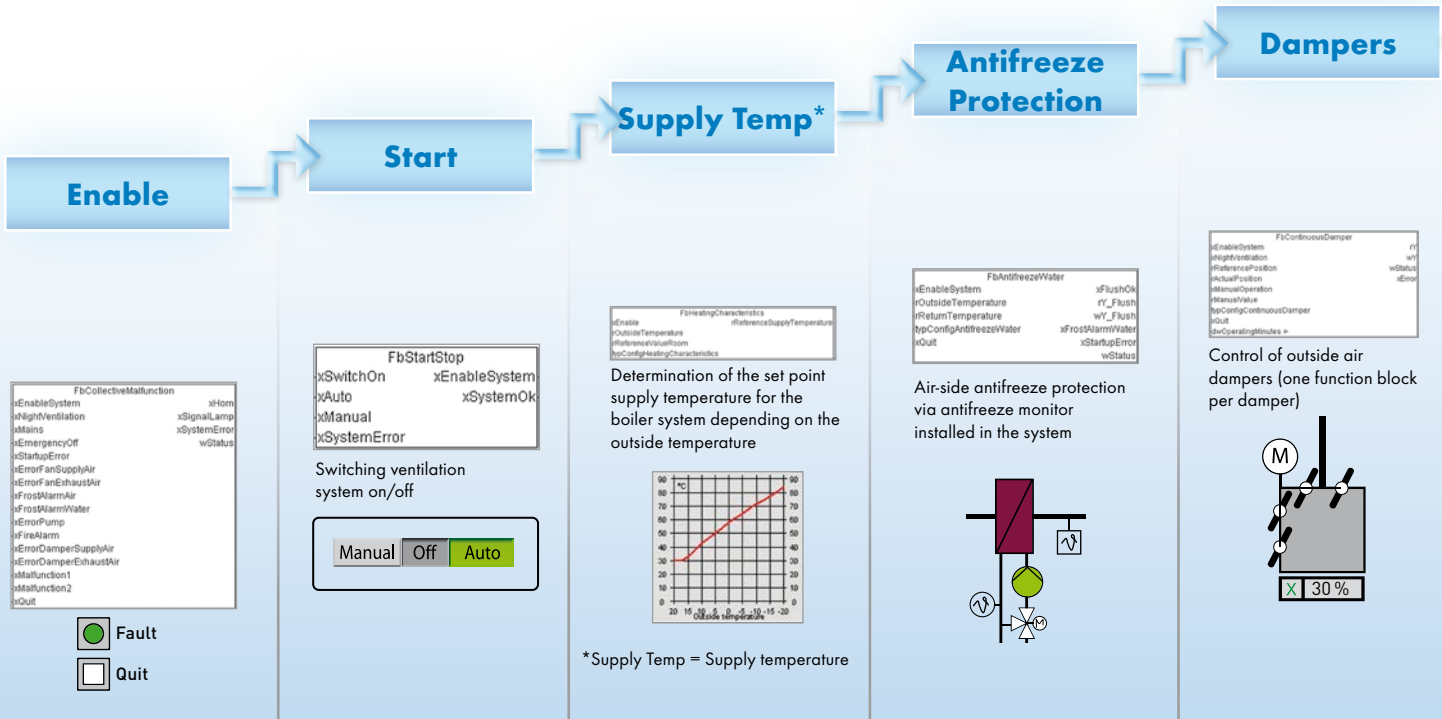
Your benefits at a glance:

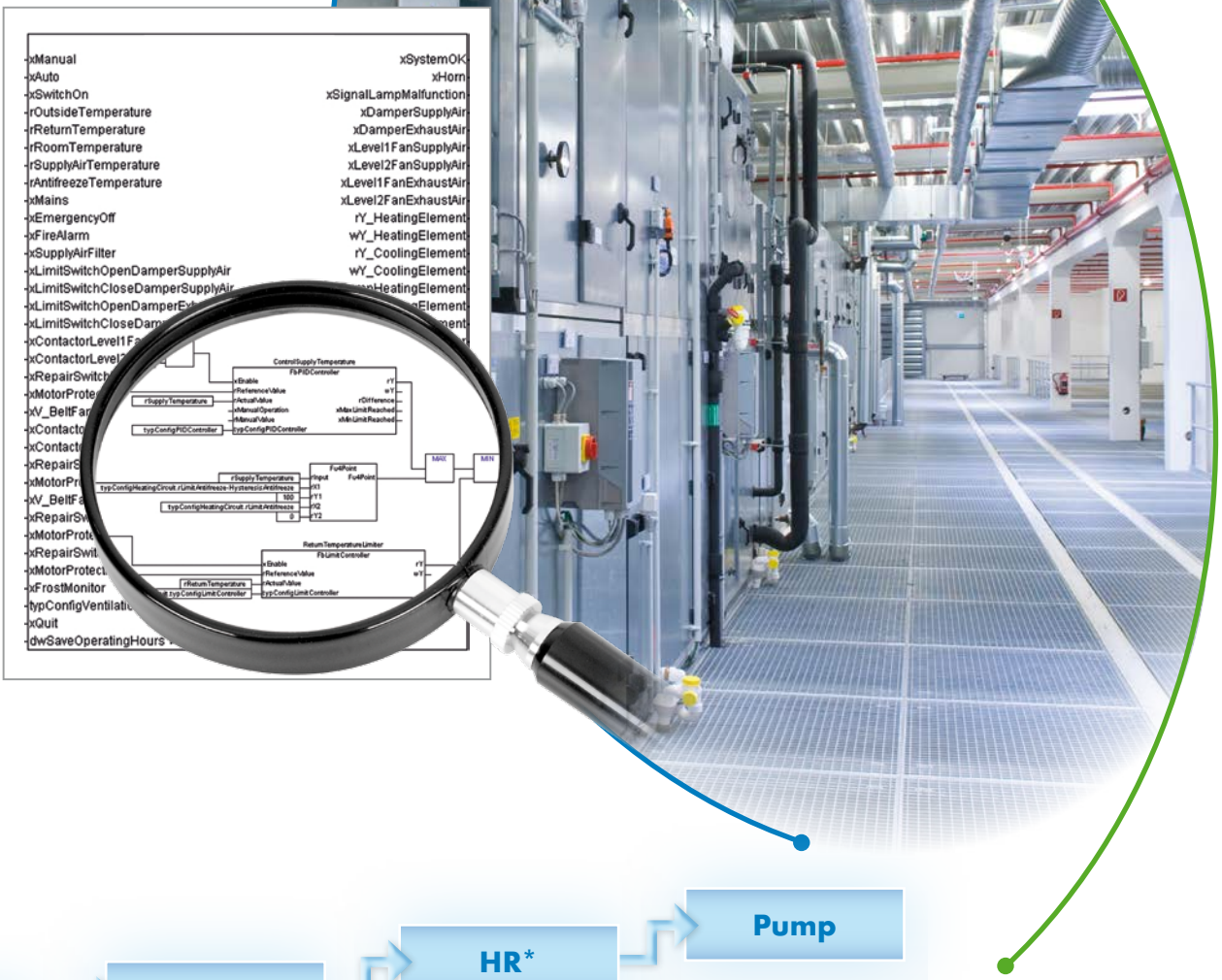
- Suitable for a wide range of HVAC applications
- No time-consuming programming
- Individual adjustment via parameter settings



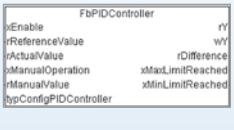
Status Messages			
Collective malfunction:	OK	Supply air (heat exchanger):	ON
Pre-flush:	completed	Exhaust air (heat exchanger):	ON
Air damper:	open	Incoming air fan:	OK
Exhaust air damper:	open	Exhaust air fan:	OK

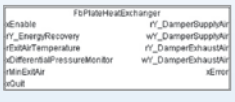
Start Page | Configuration

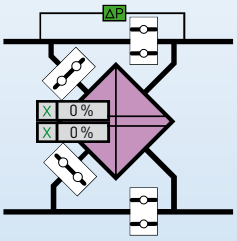




Fan → **Controller** → **HR*** → **Pump**



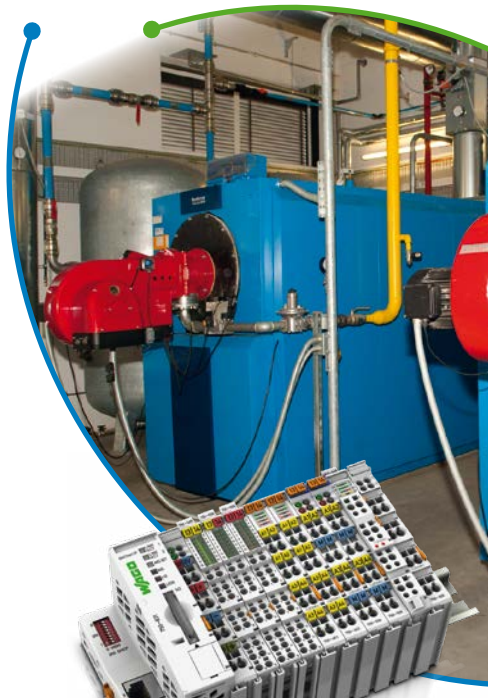


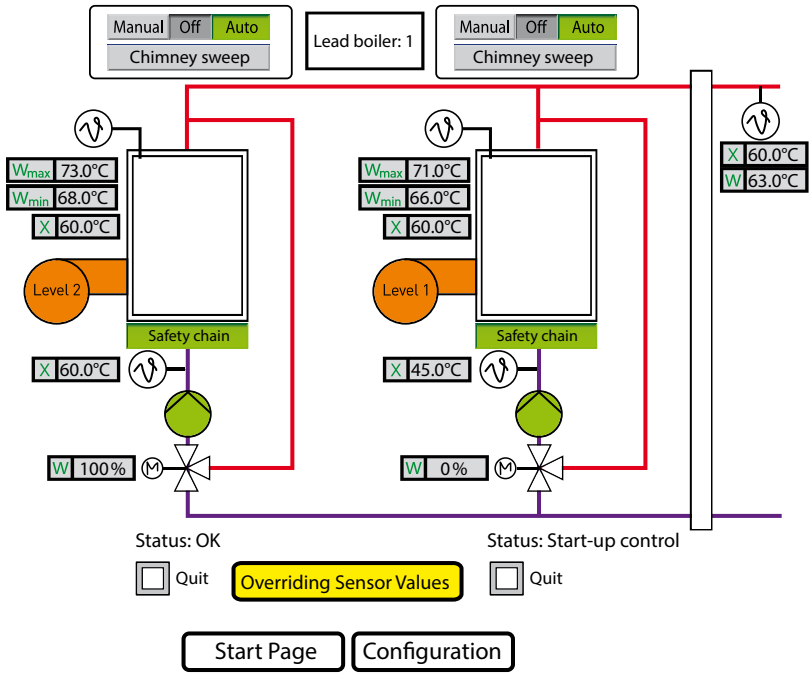


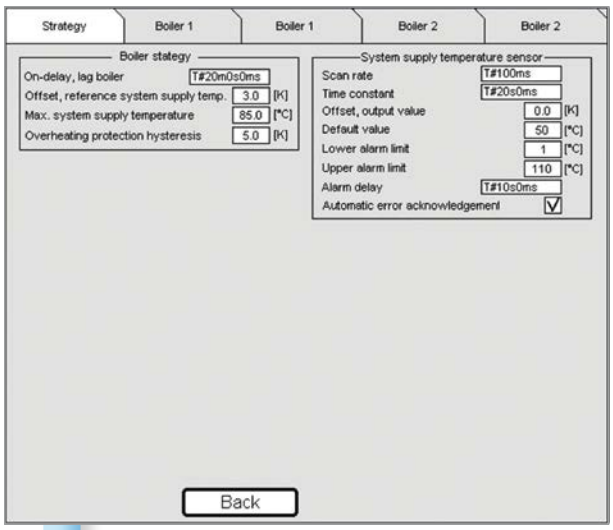
*HR = Heat recovery

Boiler Strategy with Two

Dual-Stage Boilers





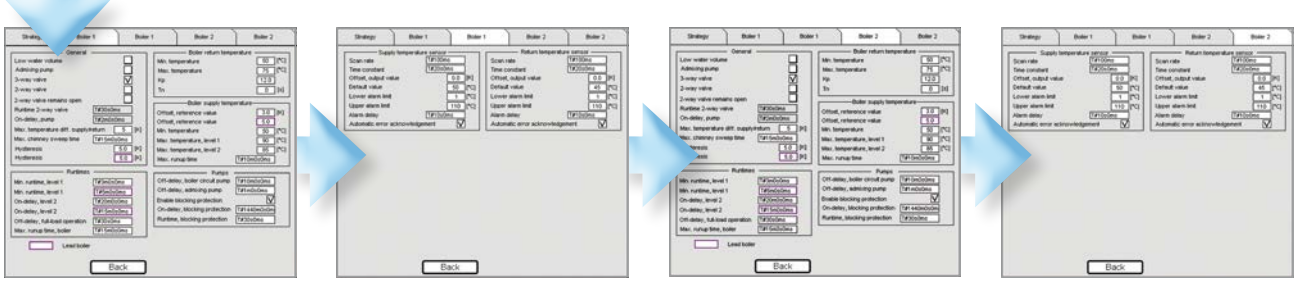


The following requirements are met:

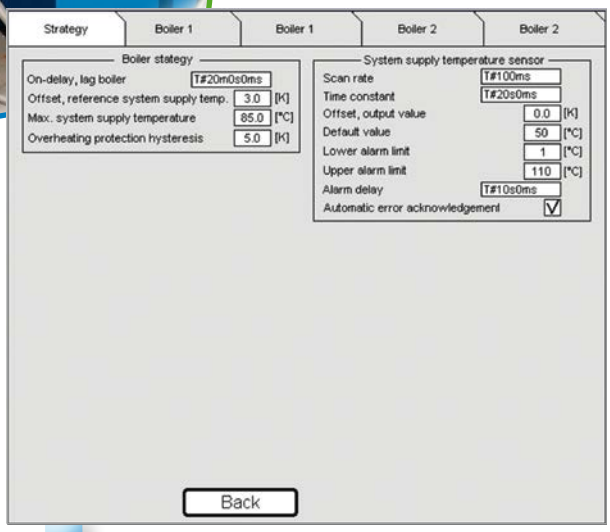
- Boiler strategy for two boilers
- Demand-driven connection of the second boiler
- Dynamic switch of the lead boiler
- Automatic switch of the lead boiler in the event of fault

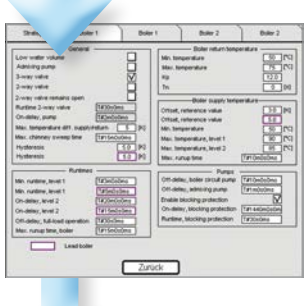
Dual-stage boiler:

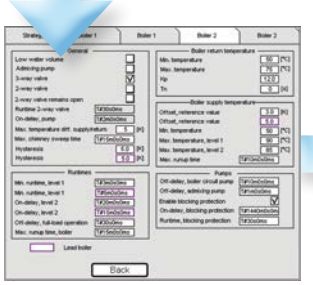
- Dual-stage heat generator control
- Maximum limit of supply temperature
- Minimum return temperature monitoring
- Maximum limit of return temperature
- Free selection: shunt pump, 3-way valve or boiler damper
- Condensation protection
- Blocking protection function for heat generator pump and valve
- Various parameters for lead boiler and lag boiler
- Different start-up procedures depending on water volume and valves used

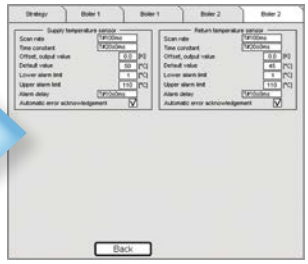


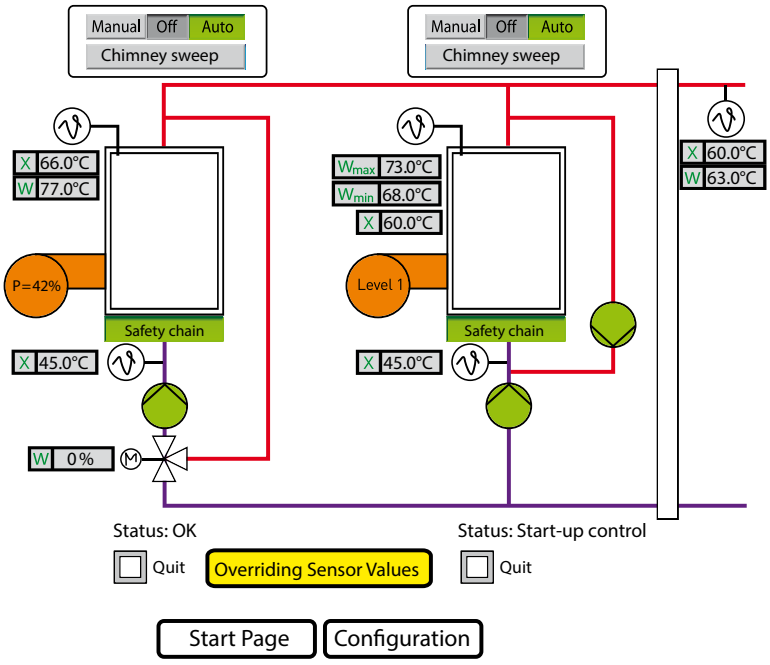
Boiler Strategy with One Dual-Stage and One Modulating Boiler











The following requirements are met:

- Boiler strategy for two boilers
- Demand-driven connection of the second boiler
- Dynamic switch of the lead boiler
- Automatic switch of the lead boiler in the event of fault

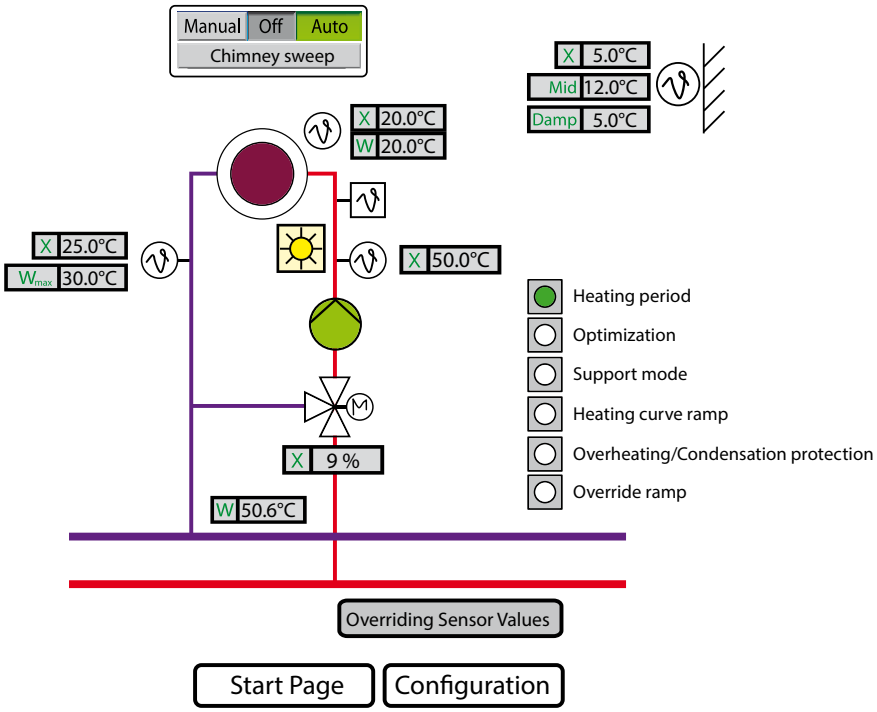
Dual-stage boiler:

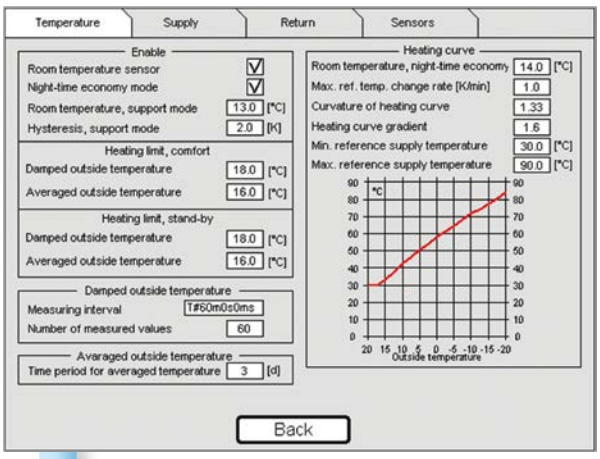
- Dual-stage heat generator control
- Maximum limit of heat generator temperature
- Minimum return temperature monitoring
- Maximum limit of return temperature
- Free selection: shunt pump, 3-way valve or boiler damper
- Condensation protection
- Blocking protection function for heat generator pump and valve
- Various parameters for lead boiler and lag boiler
- Different start-up procedures depending on water volume and valves used

Modulating boiler:

- Modulating burner control
- Steady limitation of the heat generator temperature
- Minimum return temperature monitoring
- Maximum limit of heat generator temperature
- Steady limitation of the return temperature
- Free selection: shunt pump, 3-way valve or boiler damper
- Condensation protection
- Blocking protection function for heat generator pump and valve
- Various parameters for lead boiler and lag boiler
- Different start-up procedures depending on water volume and valves used

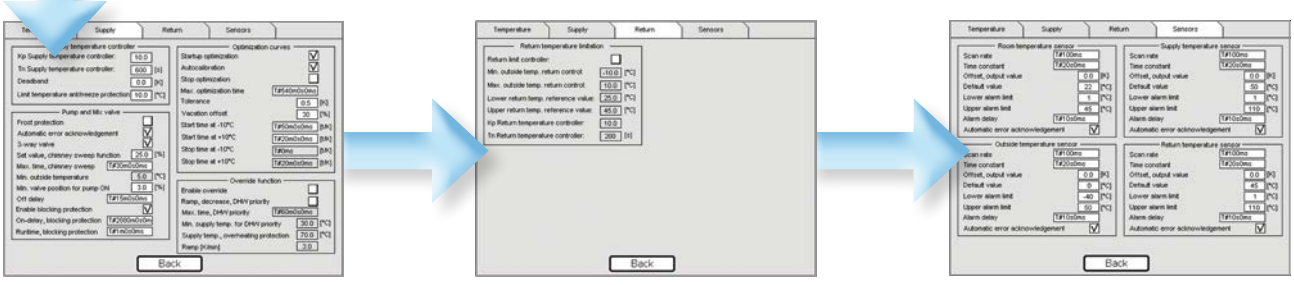
Heating Circuit Control





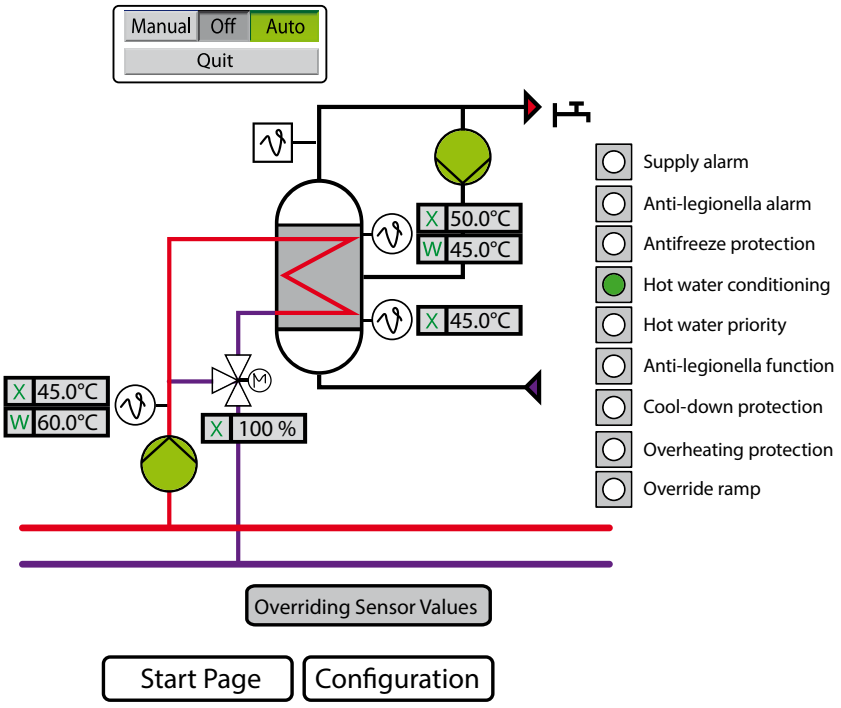
The following requirements are met:

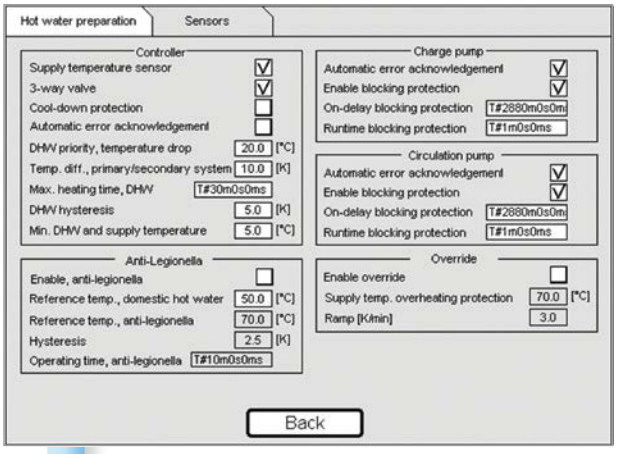
- Outside temperature-dependent heating limit
- Support mode
- Self-optimizing start optimization
- Automatic/Manual control
- Heating curve
- Ramp function for set point supply temperature
- Chimney sweep function
- Override, e.g., for DHWP* priority or primary system overheating
- Pump activation on demand
- Pumps with blocking protection
- Outside temperature-dependent return temperature limitation
- Antifreeze controller

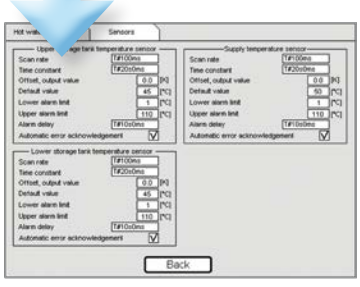


*DHWP = Domestic hot water preparation

Domestic Hot Water Preparation





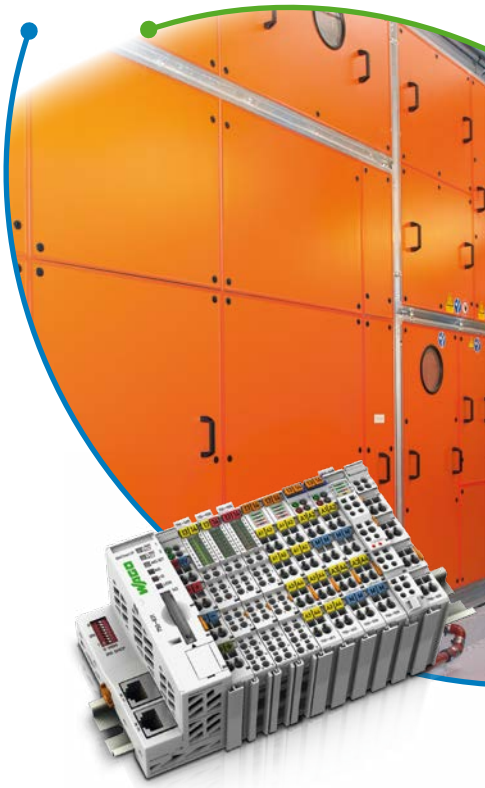


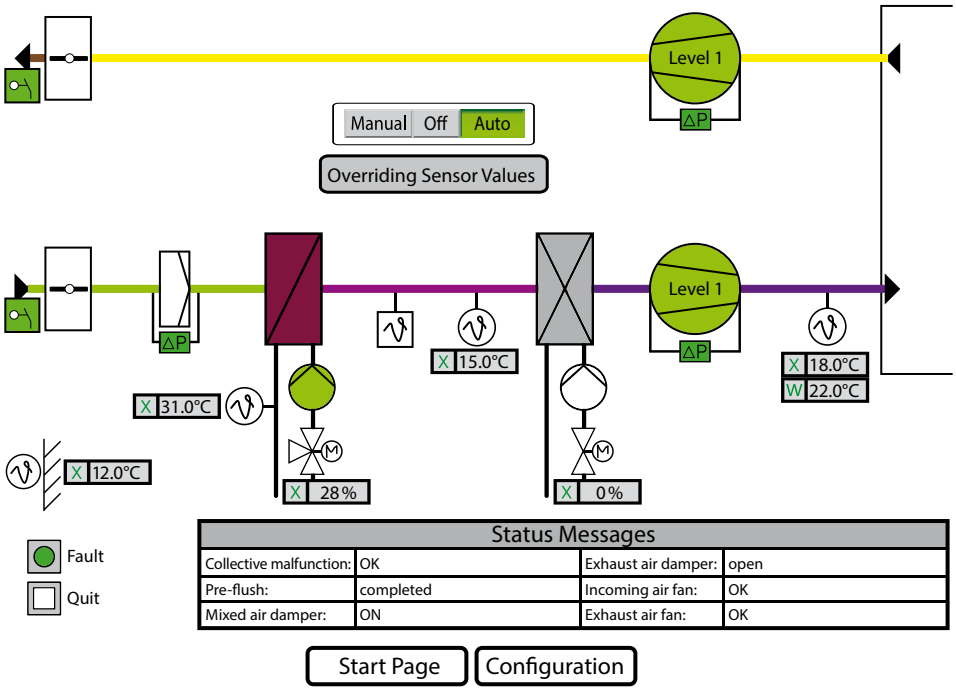
The following requirements are met:

- Temperature control from upper and lower storage tank temperature sensor
- Two-step control for hot water temperature
- Anti-legionella function
- Cool-down protection
- Charging pump control
- Circulation pump control
- Blocking protection function for pumps and valves
- Supply temperature set point
- Alarm when required system supply temperature is not reached

Supply Air Temperature Control

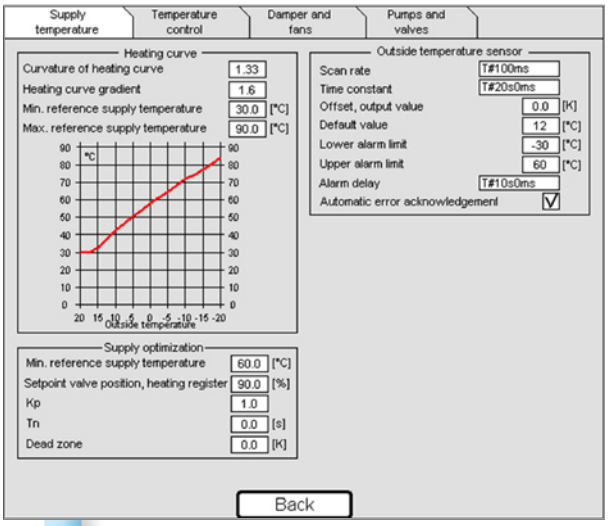
with Single-Stage Fan





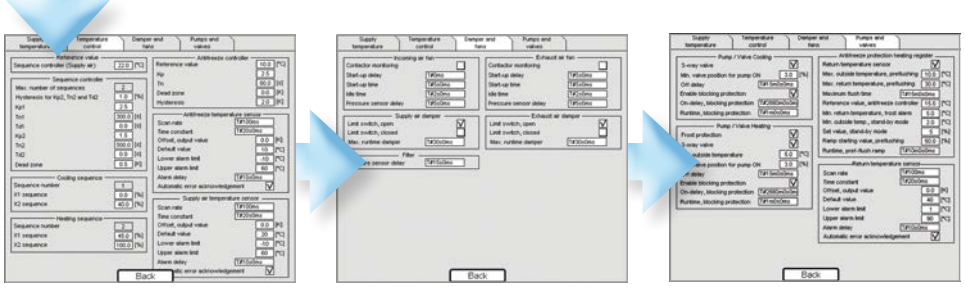
Status Messages			
Collective malfunction:	OK	Exhaust air damper:	open
Pre-flush:	completed	Incoming air fan:	OK
Mixed air damper:	ON	Exhaust air fan:	OK

Start Page | Configuration



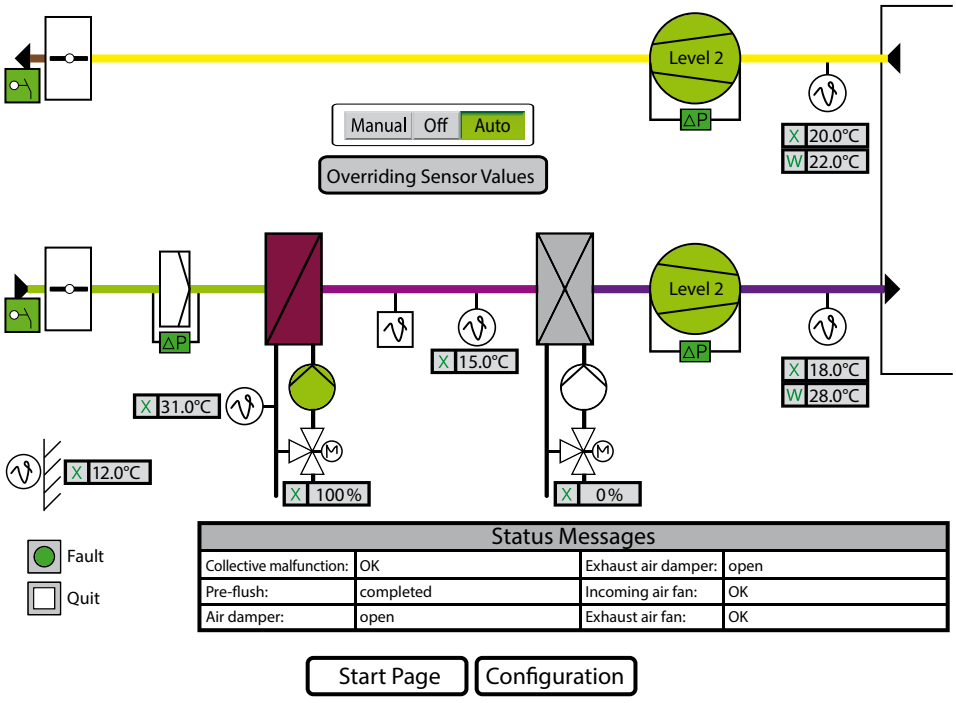
The following requirements are met:

- Single-stage fan
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of external air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Supply air temperature control in cooling/heating sequence
- Optimized supply temperature measurement



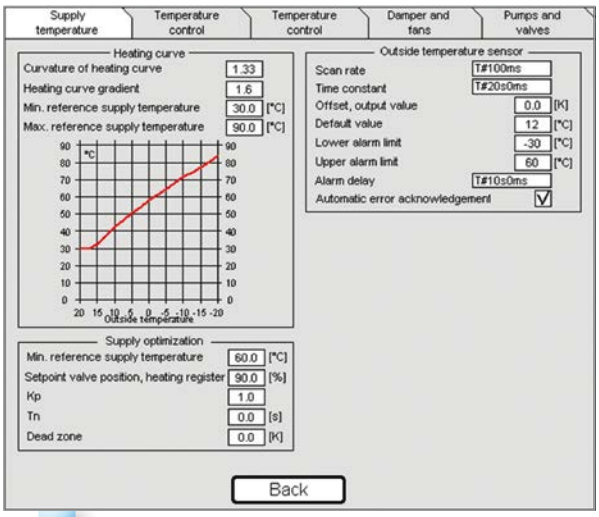
Cascade Control with

Dual-Stage Fan



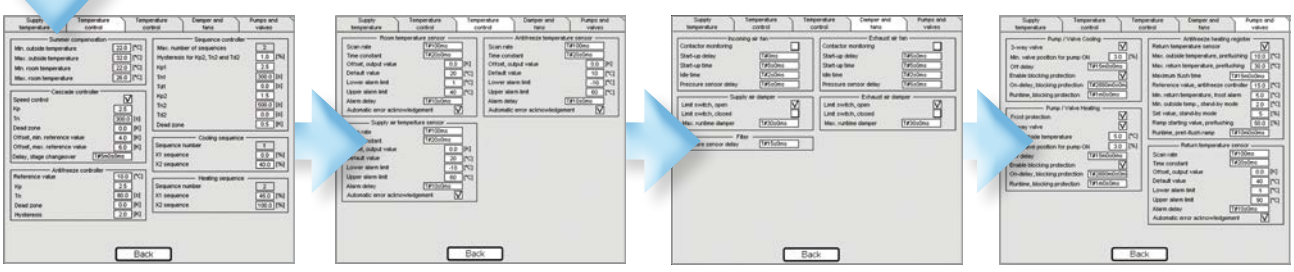
Status Messages			
Collective malfunction:	OK	Exhaust air damper:	open
Pre-flush:	completed	Incoming air fan:	OK
Air damper:	open	Exhaust air fan:	OK

Start Page | Configuration

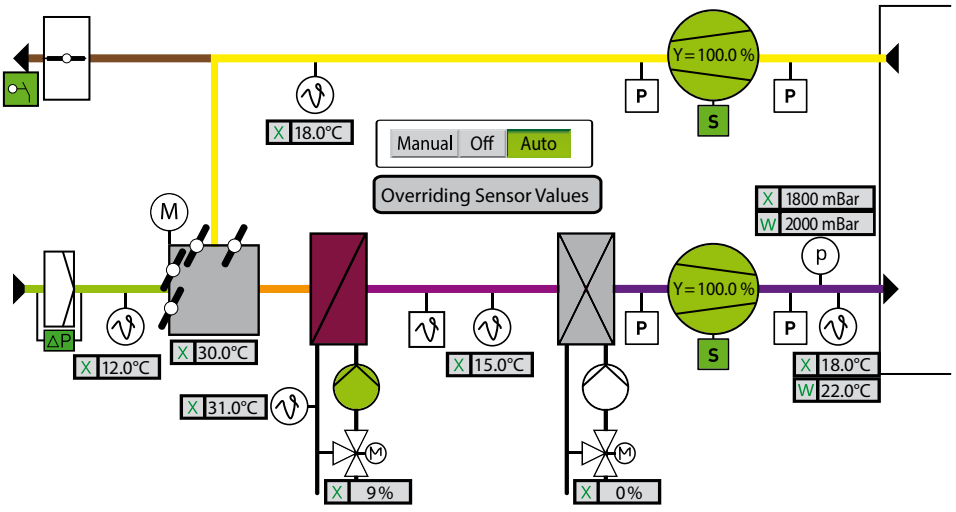


The following requirements are met:

- Dual-stage fan
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of external air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Energy-optimized room/exhaust temperature control with summer rise as per DIN 1946
- Cooling/heating in sequence
- Optimized supply temperature measurement



Supply Air Temperature Control with Mixed Air and Fan with Frequency Converter

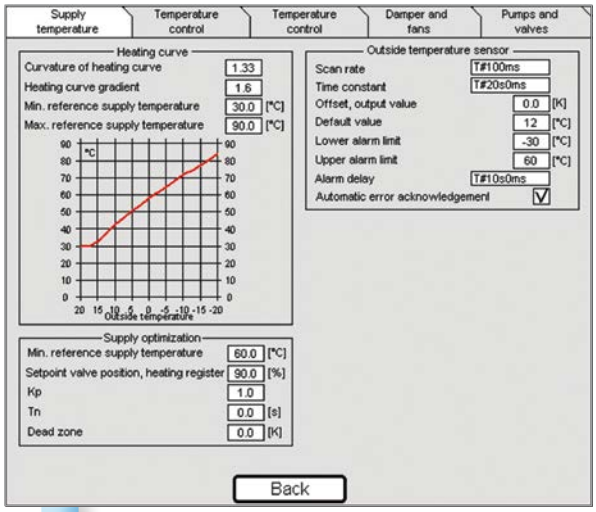


Fault

Quit

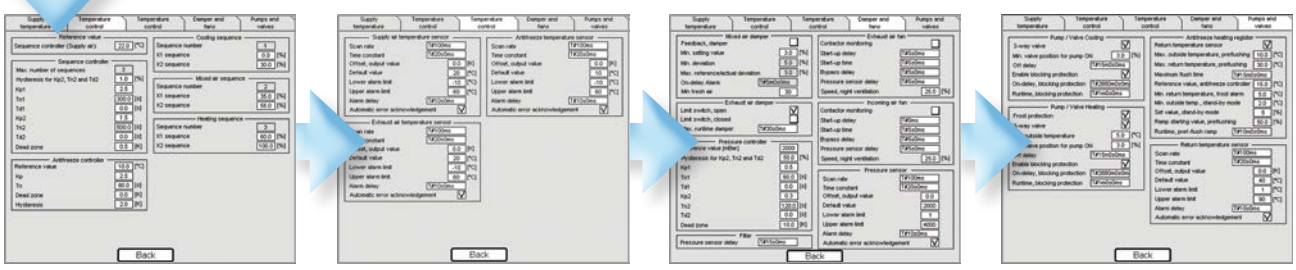
Status Messages			
Collective malfunction:	OK	Exhaust air damper:	open
Pre-flush:	completed	Incoming air fan:	OK
Mixed air damper:	ON	Exhaust air fan:	OK

Start Page | Configuration



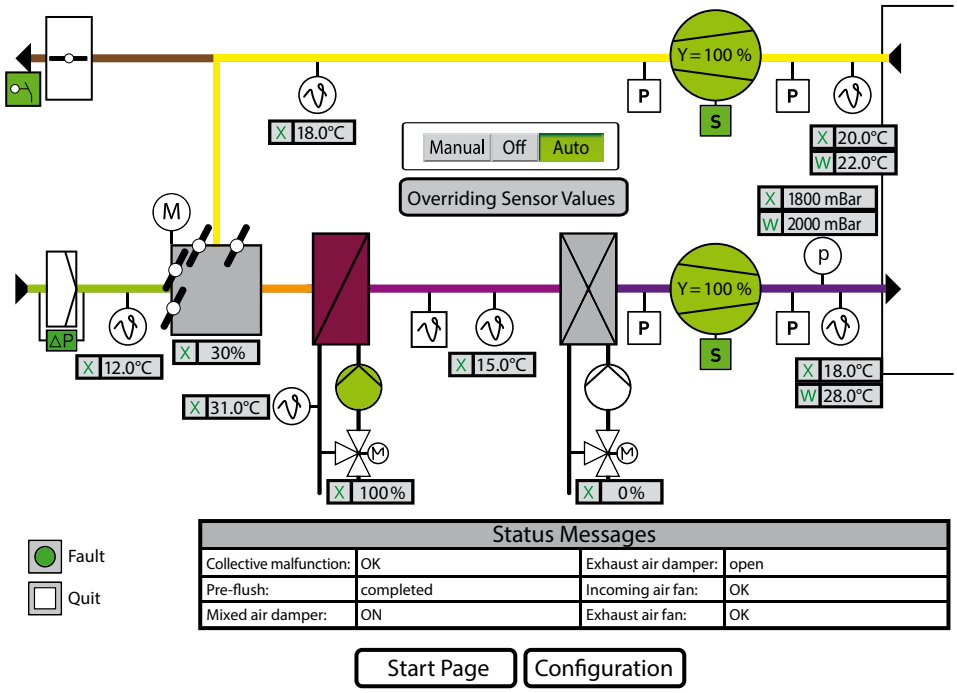
The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of mixed air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Supply air temperature control with re-circulated air
- Cooling/Recirculating/Heating in sequence
- Optimized supply temperature measurement
- Pressure control



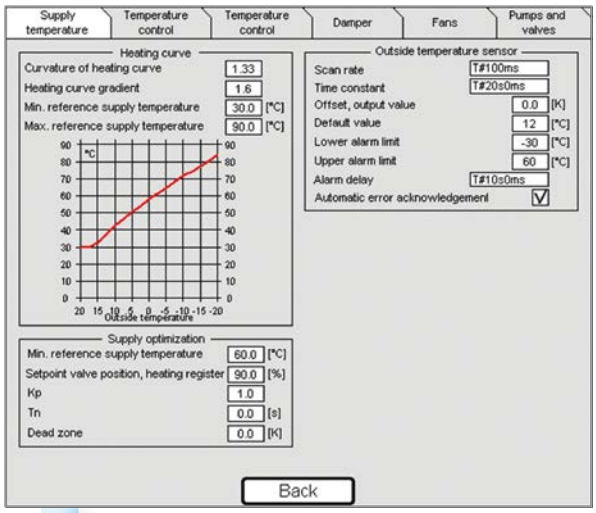
Cascade Control with Mixed Air and Fan

with Frequency Converter



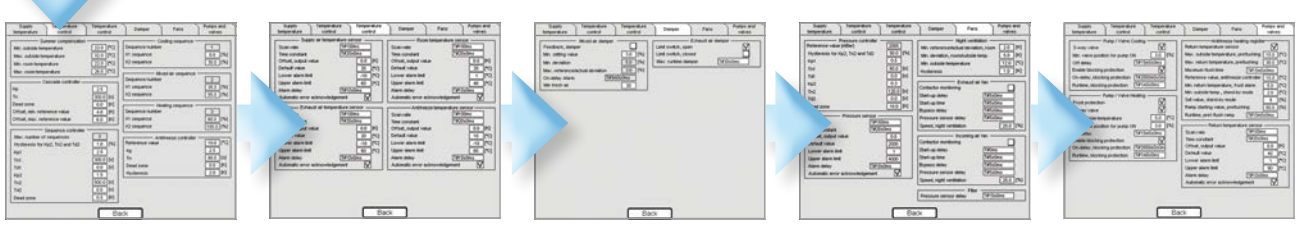
Status Messages			
Collective malfunction:	OK	Exhaust air damper:	open
Pre-flush:	completed	Incoming air fan:	OK
Mixed air damper:	ON	Exhaust air fan:	OK

Start Page | Configuration

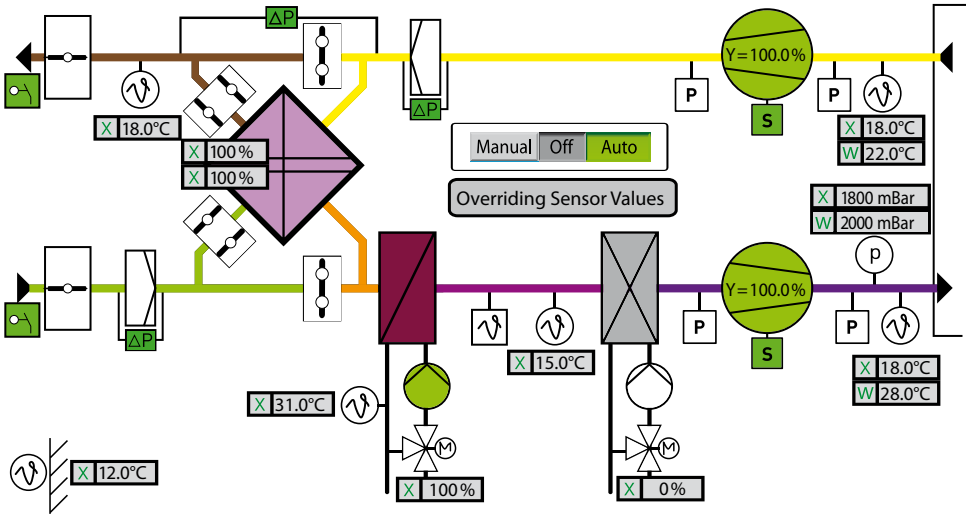


The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of mixed air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Room temperature control with supply air temperature control in cascade
- Integration of recirculated air addition in control strategy
- Cooling/Recirculating/Heating in sequence
- Energy-optimized room temperature control with summer rise as per DIN 1946
- Summer night ventilation
- Optimized supply temperature measurement
- Pressure control

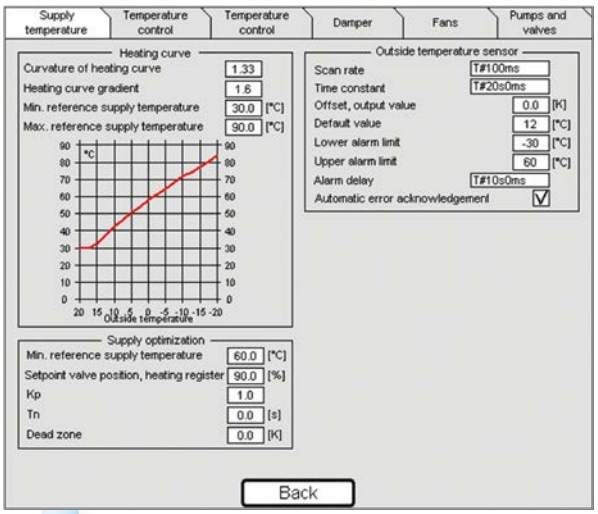


Cascade Control with Cross-Flow Heat Exchanger and Fan with Frequency Converter



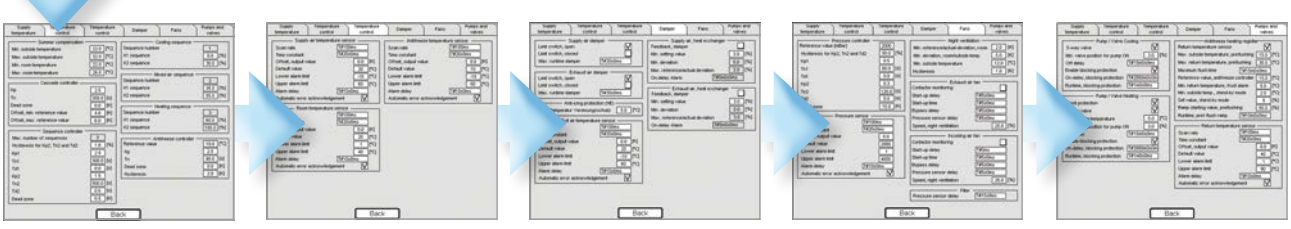
Status Messages			
Collective malfunction:	OK	Supply air (heat exchanger):	ON
Pre-flush:	completed	Exhaust air (heat exchanger):	ON
Air damper:	open	Incoming air fan:	OK
Exhaust air damper:	open	Exhaust air fan:	OK

Start Page | Configuration



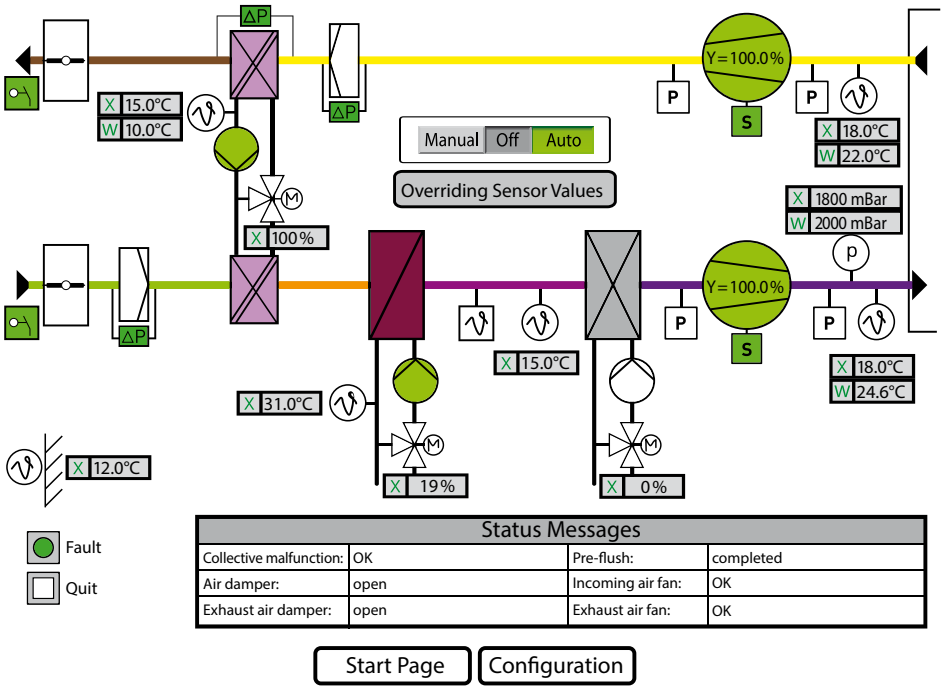
The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of incoming air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Room/Exhaust temperature control with supply air temperature control in cascade
- Heat recovery using plate heat exchangers (HR)
- Cooling/HR/Heating in sequences
- Energy-optimized room temperature control with summer rise as per DIN 1946
- Optimized supply temperature measurement
- Pressure control



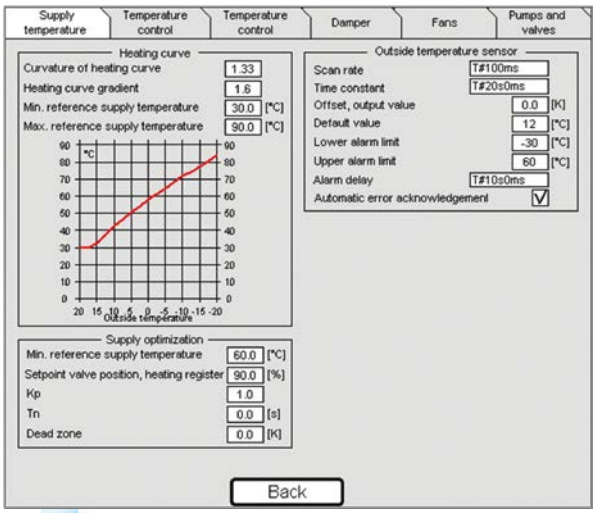
Cascade Control with Run-Around Coil System

and Fan with Frequency Converter



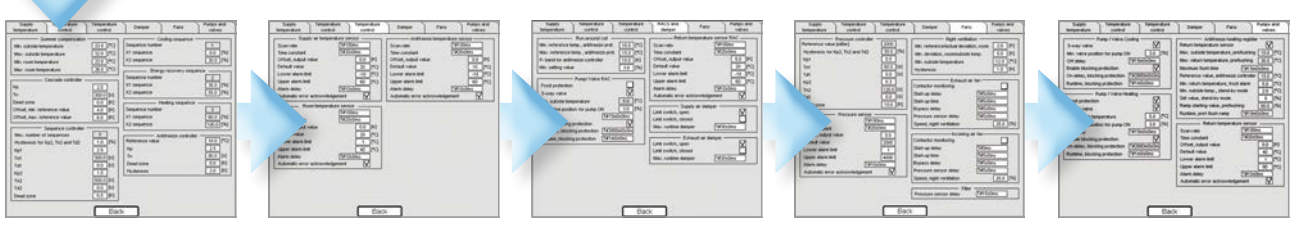
Status Messages			
Collective malfunction:	OK	Pre-flush:	completed
Air damper:	open	Incoming air fan:	OK
Exhaust air damper:	open	Exhaust air fan:	OK

Start Page | Configuration



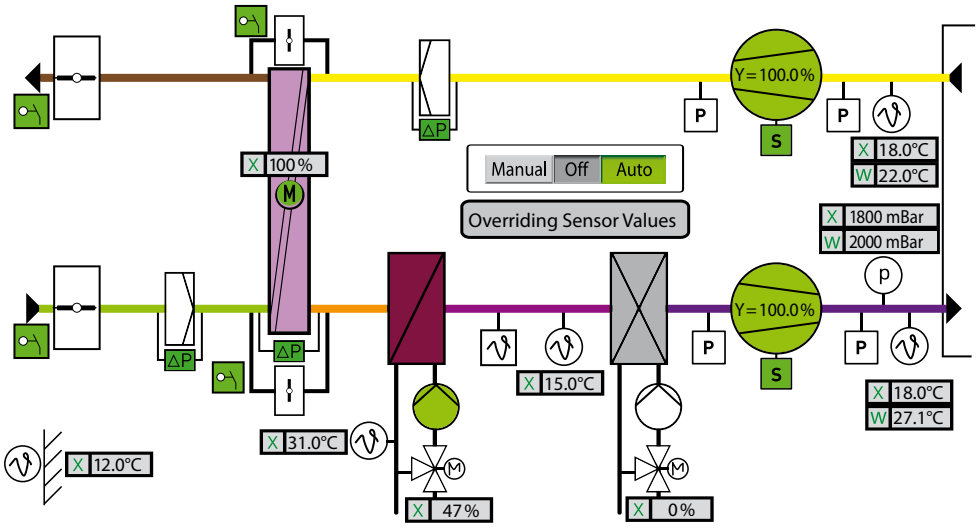
The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of incoming air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Room/Exhaust temperature control with supply air temperature control in cascade
- Heat recovery via run-around coil system (RACS)
- Cooling/RACS/Heating in sequences
- Energy-optimized room temperature control with summer rise as per DIN 1946
- Optimized supply temperature measurement
- Pressure control



Cascade Control with Rotary Heat Exchanger

and Fan with Frequency Converter

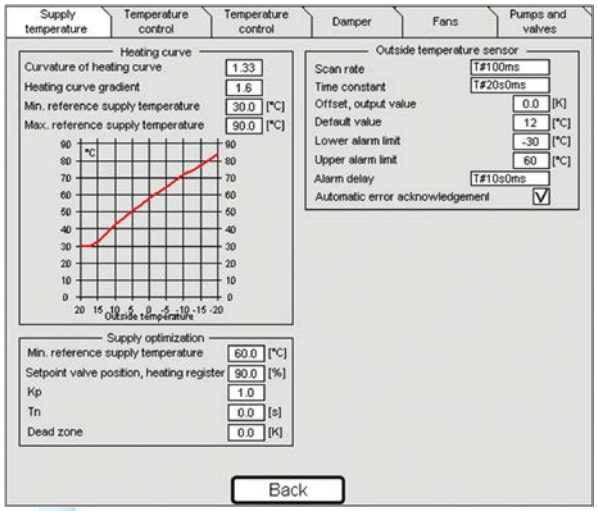


Fault

Quit

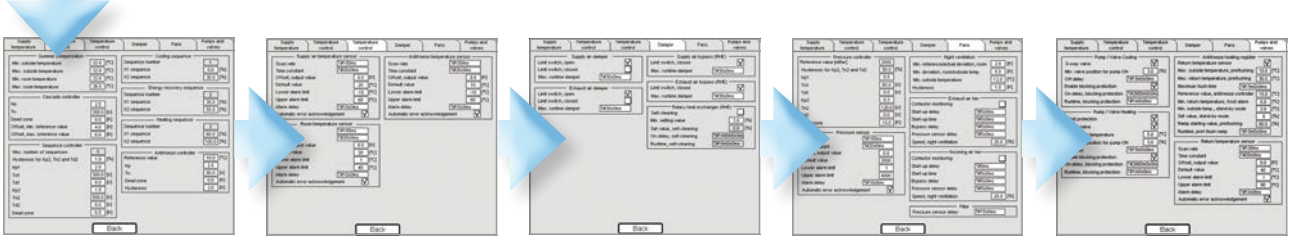
Status Messages			
Collective malfunction:	OK		
Pre-flush:	completed	Heat exchanger:	ON
Mixed air damper:	ON	Incoming air fan:	OK
Exhaust air damper:	open	Exhaust air fan:	OK

Start Page | Configuration



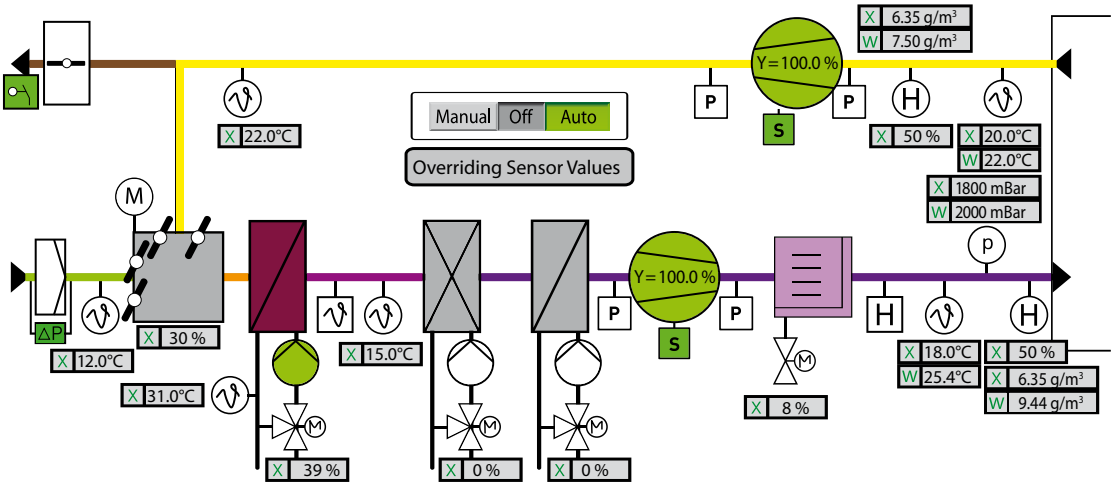
The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of incoming air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Room/Exhaust temperature control with supply air temperature control in cascade
- Integration of recirculated air addition in control strategy
- Heat recovery via rotary heat exchanger
- Cooling/Recirculating/HR/Heating in sequences
- Energy-optimized room temperature control with summer rise as per DIN 1946
- Optimized supply temperature measurement
- Pressure control



Full Air-Conditioning System with Mixed Air,

Preheater, Reheater, Humidifier

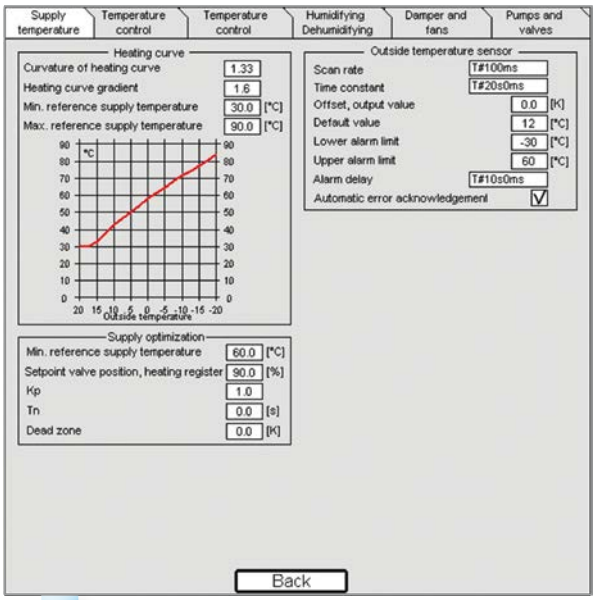


Fault

Quit

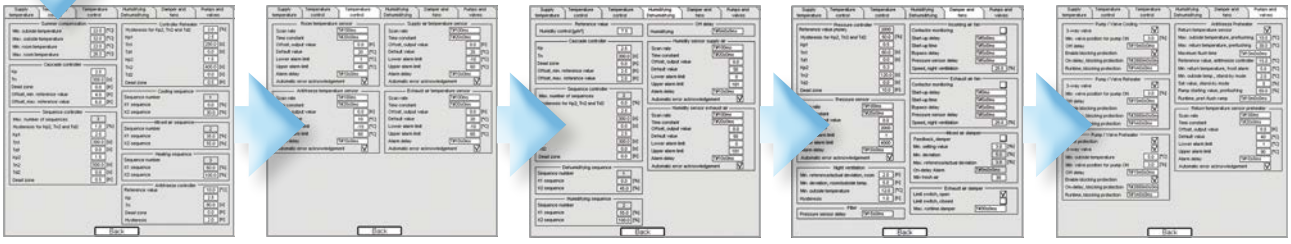
Status Messages			
Collective malfunction:	OK		
Pre-flush:	completed	Incoming air fan:	OK
Mixed air damper:	ON	Exhaust air fan:	OK
Exhaust air damper:	open	Humidifier:	OFF

Start Page | Configuration



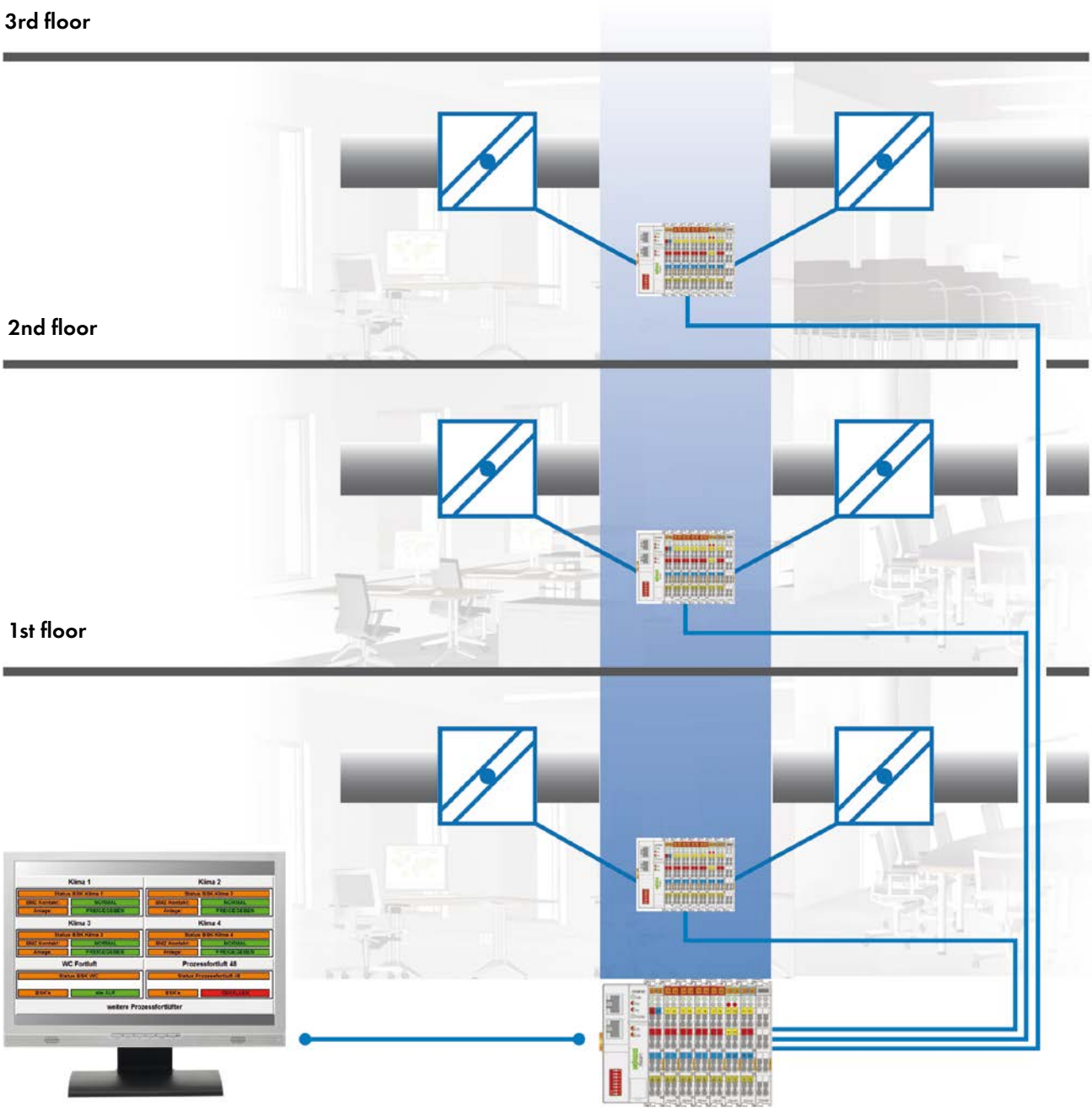
The following requirements are met:

- Fan with frequency converter
- Air-side antifreeze protection
- Preventive antifreeze protection with preflush
- Pump activation on demand
- Motor protection
- Pumps with blocking protection
- Control of incoming air and exhaust air dampers
- Fan V-belt monitoring with differential pressure switch
- Filter monitoring
- Room/Exhaust temperature control with supply air temperature control in cascade
- Integration of recirculated air addition in control strategy
- Cooling/Recirculating/Heating in sequence
- Humidification via steam humidifier
- Humidification and dehumidification in sequences
- Energy-optimized room temperature control with summer rise as per DIN 1946
- Optimized supply temperature measurement
- Pressure control



Status Indication

for Fire Dampers



Status Indication for Fire Dampers

Fire dampers are automatic shut-off devices for ventilation systems, preventing the propagation of fire and smoke in adjacent building sections. They are usually located directly in fire-resistant walls and ceilings. Since the introduction of the guideline for fire protection regulations of ventilation systems (M-LüAR) in September 2005, displaying and protocolling the states of fire dampers in ventilation systems has become more and more important primarily in utility and functional buildings.

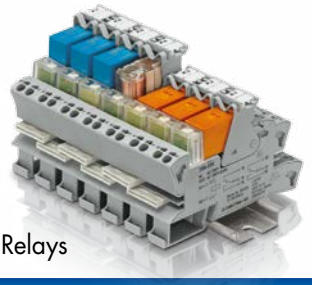
WAGO's solution for displaying the state of fire dampers is particularly well suited for use in buildings with centralized ventilation systems and decentralized fire dampers.

The fire dampers are open during normal operation. In the visualization (see graphic), this state is displayed as "Normal" on a green background. In case of fire, the trigger device causes the fire damper to drop or rotate, preventing the spread of fire and smoke. This state is reported as "Dropped" and displayed on a red background. Whether the ventilation display is enabled for the respective room is also indicated.

User-friendly installation, self-explanatory display and easy recording of displayed data via PC or notebook allows the user to meet the monitoring requirements quickly and easily.

WAGO's industry-proven portfolio has continually proven itself in controlling and monitoring HVAC components. Take the WAGO-I/O-SYSTEM, for example, its diversity enables users to precisely combine controllers with I/O system modules to meet their exact needs. *PERSPECTO*® Touch Screens or 789 Series Manually Operated Relay Modules are available for system operation. The WAGO-I/O-SYSTEM also provides ideal decentralized monitoring and control solutions for remote access via Internet or GPRS mobile radio standard.

EPSITRON®
Power Supplies



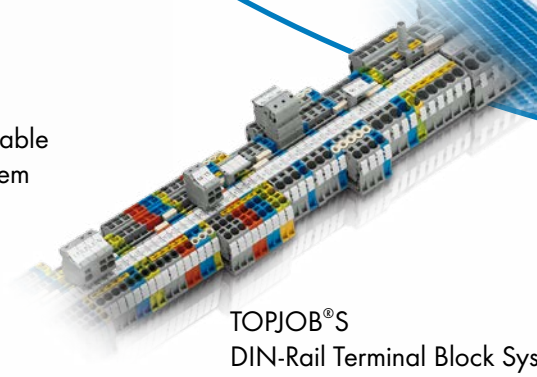
Relays

WAGO – Measuring. Controlling. Regulating.

With WAGO's product lines, we provide a modular toolbox that lets you select the right solution for your application's unique needs.

Junction box connectors, DIN-rail terminal blocks, *WINSTA*® pluggable connectors and universal automation components ensure that your installation will meet future demands.

WINSTA® Pluggable
Connection System



TOPJOB®S
DIN-Rail Terminal Block System

ETHERNET Switches

WAGO-I/O-SYSTEM

PERSPECTO®

TO-PASS® Telecontrol Module and GPRS Modem

Installation Connectors

Manually Operated Relay Modules

Service and Support

The WAGO Portal is home to all important building automation product and service information.

In addition to our online catalog, product data sheets, manuals, support documentation and bid forms are also available.

www.wago.com

WAGO Portal

Online Information

Project Support

Reference projects include:

- Commercial buildings
- Office buildings
- Shops, display facilities
- Public buildings
- Hospitals

We advise and assist you with:

- Conceptual design
- Network planning
- Application design
- Component selection
- Assistance in preparing your bid
- Planning and project design

We can help you...

Technical support for implementing your building projects

WAGO Seminars

WAGO products uniquely blend state-of-the-art development and manufacturing with practicality and usability. To ensure design engineers, system technicians and installers harness every product benefit for 100% performance, WAGO offers custom product seminars.

WAGO Seminar Center
Goals:

- Optimize product knowledge for maximum performance
- Reduce project costs through savvy implementation
- Active group discussions for knowledge transfer

WAGO's state-of-the-art Seminar Center has been developed as a professional environment that facilitates effective learning.

WAGO Company Courses

Along with open seminars, we offer subject-specific seminars at your company.

- For special topics (e.g., current projects)
- Tailored to fit your schedule with on-site courses
- 1:1 practical topics

Technical Support
AUTOMATION

For support on current applications and systems, please contact our technical department.

- Qualified fieldbus specialists
- Targeted fault analysis
- Spare parts service

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