Machine Struxure™

Modicon M171/M172 logic controllers for HVAC and Pumping solutions

Catalog

October 2015

Schneider Electric

Modicon M171/M172 logic controllers for HVAC and Pumping solutions

General contents

Chapter 1

General presentation

■ **General presentation**

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1

Automation solutions at your service

Improve your HVAC and Pumping system and business performance

Challenges

Whatever your area of focus in fluid systems - chillers, heat pumps, Air Handling Units, pumping stations, etc. for residential, building, or industrial applications - Schneider Electric has the right solution for you.

To keep your customers satisfied, you need to offer machines with intuitive automation, flexible and scalable performance, all-embedded functionality, and to be connected everywhere to the machines.

Your customers also expect a seamless integration into their Building Management Systems and the best service, anytime and anywhere in the world. Now more than ever, your choice of control solutions is key to distinguish yourself at every stage of the process, from design and development to implementation and machine maintenance.

Ready-to-use architectures and function blocks

Tested, Validated, and Documented Architectures (TVDAs) help reduce design time. They include system user guides, CAD files, and dedicated Pumping and HVAC Application Functions Blocks (AFBs) that make system design fast and easy.

Flexible and scalable machine control platforms

Scalable drive, HMI, logic, and motion controllers provide the foundation for a wide range of machine applications. Advanced drive technology and on-board energy efficiency solutions help you quickly design a cost-optimized system.

Your partner throughout the entire machine lifecycle

Our experts help you every step of the way, from engineering and perfecting machine design, to onsite service and optimization of the finished machine. For special product requirements, customization services are also available. Once installed, our global technical support, 24/7 hotline services, and replacement parts centers around the world help you deliver superior customer support and satisfaction.

Maximize your business and machine performance

With MachineStruxure™, you can maximize performance throughout the machine's entire life cycle. MachineStruxure™ solutions allow you to:
> Reduce your machine's time-to-market
> Increase profitability
> Improve efficiency
> Simplify integration and maintenance
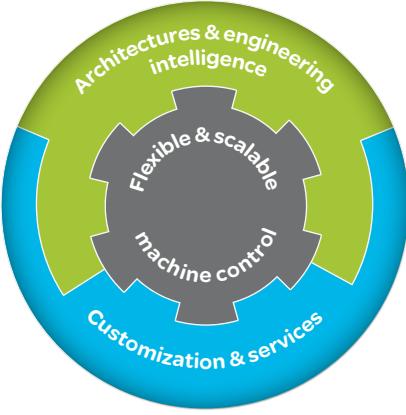
Hardware, software, and an extensive array of HVAC and Pumping specific know-how and services: MachineStruxure™ integrates it all in a single solution

Schneider Electric

General presentation
Design green machines

4 energy efficiency principles

Improve your machines energy consumption

Pumping and HVAC machines can represent up to 40% of the overall energy consumption of buildings and facilities. Schneider Electric offers smart strategies to improve machine energy consumption according to 4 energy efficiency principles:

1 Measure the energy consumption of your machine to identify potential savings.
2 Fix the basics and reduce energy consumption by selecting the right devices.
3 Optimize your machine's energy consumption with dedicated Energy Efficiency function blocks.
4 Monitor electrical energy consumption to maintain and improve machine efficiency.

1 Measure

Compliant with ISO 50001 standard

Passive energy efficiency   **Active** energy efficiency

2 Fix the basics   **3** Optimize   **4** Monitor, maintain, improve
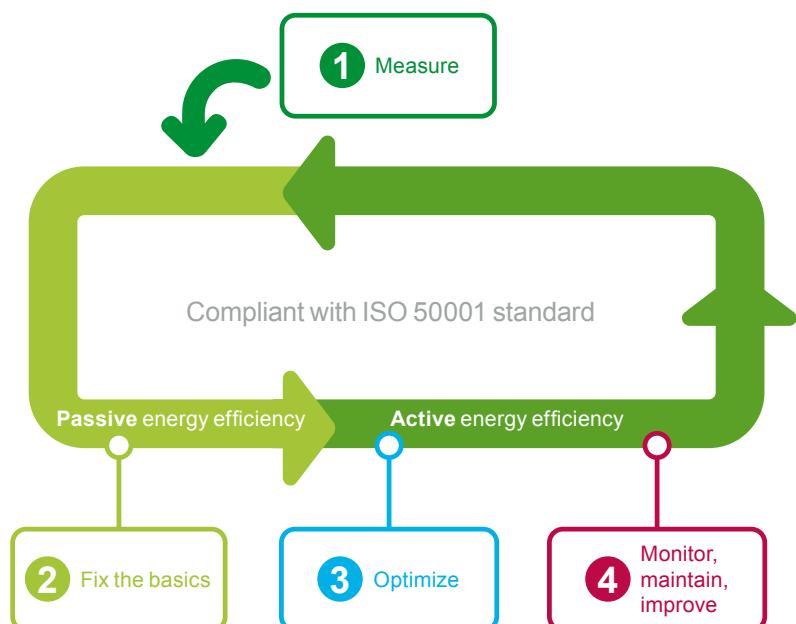
Your benefits

> Increased visibility of your machines' energy consumption
> Detection of "over-sized" equipment that consumes more energy
> Possible marketing argument to your customers with real evidence of energy savings

Your customers' benefits

> Significant reductions in energy bills
> Improved preventive maintenance for machines
> Increased lifespan for motors and electronic equipment

1

**Stage in the product life cycle: Design
What we can bring you at this stage...**

We find the optimum solution for your needs

> Based on your needs, our Solution Application Experts and Application Design Experts (SAE/ADE) work out innovative technical solutions including:
  > Co-engineering
  > Tests
  > Validation

We understand your challenges

> Consulting
> Audits

We execute the solution with a comprehensive service agreement

> Our solution design and delivery centers (Flex Centers) are committed to quality and results and provide tests, validation, and commissioning

We improve your team's competencies

> In-class and on-site training

↻ **Design**

**Stage in the product life cycle: Build
What we can bring you at this stage...**

We take care of the delivery of your solution

> Availability of components through a large worldwide network of distributors
> Collaboration, management, and delivery through local partners
> With Schneider Electric as your turnkey solution partner, your solutions will include:
  > Project management and responsibility
  > Engineered systems
  > Third-party components management
  > Customizations and adaptations

We provide on-site services and support

> Secondment of qualified personnel to deliver on-site engineering and technical services

We improve your service team's competencies

> Service and commissioning training
> Supply chain optimization

↻ **Build**

> **Make your machines stand out from the start**

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Service and support behind you every step of the way

Stage in the product life cycle: Operate
What we can bring you at this stage...

We provide international sales and after-sales services for you and your customers
> Maintenance contracts
> Spare parts and repairs
> Just-in-time delivery
> Return of goods
> Service expertise
> Diagnosis and repair
> Environmental measurements (EMC, fieldbus, thermography, power quality analyses, etc.)
> Customer International Support (CIS) as a single point of contact
> A network of dedicated local country experts
> Web-based collaborative platform for efficient communication

We improve your customers' competencies
> In-class customer training and on-site training
> Customer service and commissioning training

Operate

Stage in the product life cycle: Improve
What we can bring you at this stage...

We improve your pumping machine ranges
> Consulting

We improve your customers' pumping machines in their production line
> Audits
> Training
> Migration and upgrade
> Services expertise:
  > Consultancy
  > Retrofitting

Improve

Contact your HVAC and Pumping experts right now at your Customer Care Center at www.schneider-electric.com

Chapter 2
# Solutions overview

Contents

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Solutions overview
Application solutions for HVAC
Air/Water cooled chillers

2

Air/Water cooled chillers:
## Flexible solution (incorporating TVDA)
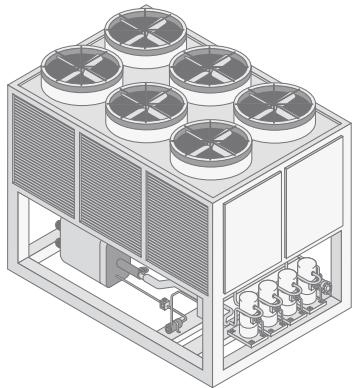
Challenges

> Your business is producing air-cooled and water-cooled chillers. Your machine development efforts involve both mechanical aspects and control requirements. You need a flexible control system that is compatible with the various types of machine you build. Connectivity with higher-level systems and the ability to adapt the control application to future requirements is a must.

> Time-to-market is key. You are looking for a supplier who offers smart solutions that optimize installation and commissioning time, and who has a high level of expertise in HVAC machine control.

> You also need comprehensive worldwide technical support for your machine control system throughout the entire machine lifecycle, from development to regular operation.

Solution

> Schneider Electric offers flexible Tested, Validated, and Documented Architectures (TVDA) designed specifically for air-cooled and water-cooled chillers. This is a flexible solution for all types of chiller that can be customized to your specific machine applications, with pre-designed control functions.

> The solution combines a logic controller, an operating panel, a motor starter, a circuit breaker, and a variable speed drive controlled via Modbus SL fieldbus. Optional I/O modules provide a high level of flexibility to optimize your control system.

> Schneider Electric also provides related functions to support your engineering efforts, and can quickly implement a large assortment of machine subfunctions. Dedicated energy efficiency functions deliver innovative solutions to enhance energy efficiency.

> Connectivity to various BMS networks is provided through optional communication modules (BACnet MS/TP, BACnet IP, Modbus TCP, and others).

Architecture
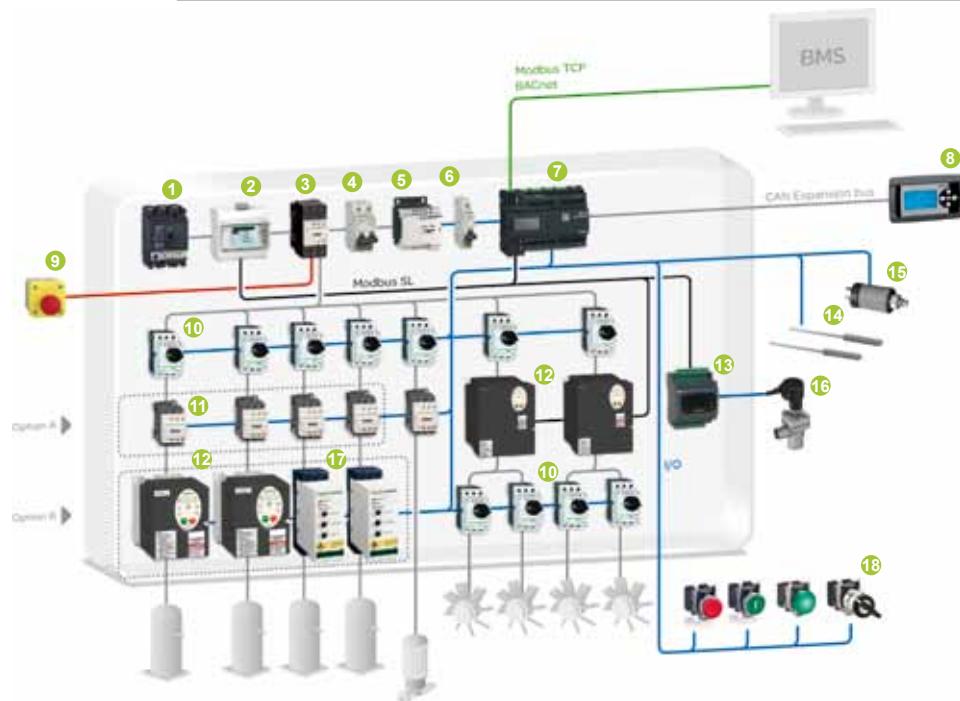
HVAC/Chiller/Modbus SL/Modicon M172 performance logic controller

Solution breakdown

1	**Compact NSX** circuit breaker *(1)*	**10**	**TeSys GV2L** magnetic circuit breaker
2	**iEM3000** energy meter *(1)*	**11**	**TeSys D** contactor *(1)*
3	**TeSys D** contactor *(1)*	**12**	**Altivar 212** variable speed drive, for 0.75 to 75 kW
4	**C60L-MA** modular circuit breaker *(1)*		(1.0 to 100 hp) motors *(1)*
5	**Phaseo** switch mode power supply *(1)*	**13**	**Modicon M171** electronic expansion valve driver *(2)*
6	**C60L-DC** DC circuit breaker *(1)*	**14**	**Modicon TM1S••••** humidity or temperature
7	**Modicon M172** performance logic		probes *(2)*
	controller *(2)*	**15**	**OsiSense XMLP** pressure sensors *(2)*
8	**Modicon M171** remote display *(2)*	**16**	Electronic expansion valve
9	**Harmony XALK** Emergency stop push	**17**	**Altistart 01** soft starter *(1)*
	button *(1)*	**18**	**Harmony XB4/XB5** control & signaling units *(1)*

(1) See chapter 5: Related offers.
(2) See chapter 3: Modicon M171/M172 logic controller offer.

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Solutions overview
Application solutions for HVAC
Air Handling Units

Air Handling Units: Flexible solution
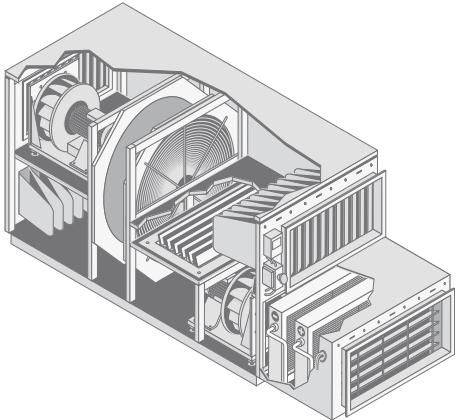
Challenges

> Your business is producing Air Handling Units (AHUs). Your machine development efforts involve both mechanical aspects and control requirements. You need a flexible control system that is compatible with the various types of machine you build. Connectivity with higher-level systems, the ability to integrate mobile machine access, and the adaptability of the control application to future requirements is a must.

> Time-to-market is key. You are looking for a supplier who offers smart solutions that optimize installation and commissioning time, and who has a high level of expertise in HVAC machine control.

> You also need comprehensive worldwide technical support for your machine control system throughout the entire machine lifecycle, from development to regular operation.

Solution

> Schneider Electric offers a flexible, fully-tested, complete control system designed specifically for Air Handling Units. This is an optimized solution for AHUs that can be customized to your specific machine applications, with pre-designed control functions.

> The solution combines a controller, an operating panel, a motor starter, a circuit breaker, and a variable speed drive controlled via Modbus SL field bus. Optional I/O modules provide a high level of flexibility for optimizing your control system.

> Schneider Electric also provides related functions to support your engineering efforts and quickly implement a large assortment of machine subfunctions. Dedicated energy efficiency functions deliver innovative solutions to enhance energy efficiency.

> Connectivity to various BMS networks is provided through native Modbus SL connectivity and optional communication modules (BACnet MS/TP, BACnet/IP , Modbus TCP, and others).

Architecture
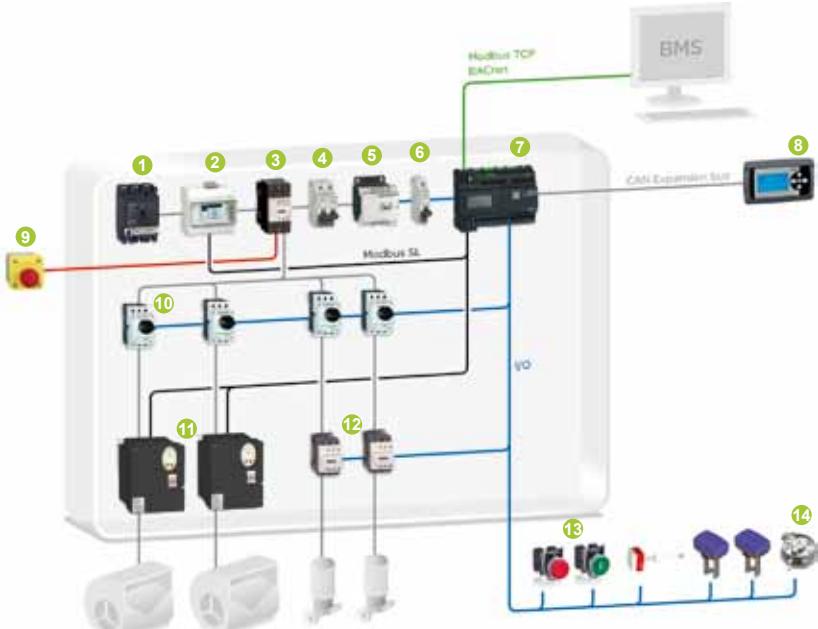
***HVAC/AHU /Modbus SL/Modicon M172 performance logic controller***

Solution breakdown

1	**Compact NSX** circuit breaker *(1)*	**10**	**TeSys GV2L** magnetic circuit breaker
2	**iEM3000** energy meter *(1)*	**11**	**Altivar 212** variable speed drive, for
3	**TeSys D** contactor *(1)*		0.75 to 75 kW *(1.0 to 100 hp)* motors *(1)*
4	**C60L-MA** modular circuit breaker *(1)*	**12**	**TeSys D** contactor *(1)*
5	**Phaseo** switch mode power supply *(1)*	**13**	**Harmony XB4/XB5** control & signaling
6	**C60L-DC** DC circuit breaker *(1)*		units *(1)*
7	**Modicon M172** performance logic controller *(2)*	**14**	Differential pressure switch *(1)*
8	**Modicon M171** remote display *(2)*		
9	**Harmony XALK** Emergency stop push button *(1)*		

(1) See chapter 5: Related offers.
*(2) See chapter 3: Modicon M171/M172 logic controller offer.*

Solutions overview
Application solutions for HVAC
Air/water cooled chillers, chillers, rooftop units, Air Handling Units, HVAC machines

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Customized solution
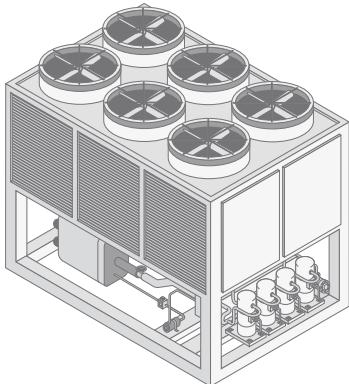
Challenges

> You need to reduce the overall cost of your machine control panels, and achieve optimal sizing of all electrical components. Building control panels is not part of your core business.
> You want to reduce the cost of your stock of electrical components.
> You are looking for expertise in the engineering, design, and manufacture of control solutions. You expect fully customizable turnkey control panel solutions with a minimum number of component suppliers.

Solution

> Schneider Electric provides manufacturers of HVAC machines with fully customizable turnkey control panel solutions. We deliver solutions quickly and offer a complete logistical management service.
> Our experts will design your specific control panel based upon your specifications, and optimize it in terms of size and components.
> In order to optimize the energy consumption of your HVAC machine, our experts provide the right solution to build an energy efficient machine.
> Based upon your needs, we can design your control solution in compliance with national standards in the countries where your machine is delivered.

Benefits

The main advantages offered by our customized solutions are:

Expertise in panel building and HVAC control
> Our experts have a high level of expertise in control panel design and HVAC control solutions.

A turnkey solution
> A control panel solution for a pre-assembled solution based upon your specific needs.

Increased profitability
> Optimized and standardized "repetitive" solutions for highly cost-efficient control panels.

Worldwide compliance
> We design your electrical cabinet in compliance with national standards, wherever you deliver.

Flexibility and openness
> Large choice of system configuration options. Features can be added to your machines as needed. Expert support for system adaptations.

A single supplier
> Complete control system architecture, including all installation components, completely assembled and delivered by a single supplier.
> A single provider of solutions, from machine controls and building management systems to large automation and management installations.

Your automation partner
> Our experts, our application centers, and our worldwide service provide you with comprehensive support throughout the entire machine lifecycle.

Application Function Blocks

Schneider Electric has also developed a user-friendly tool for customers to design their control systems quickly and efficiently themselves. A set of Application Function Blocks (AFBs) is included in SoMachine HVAC software to help, for example:

> to reduce the development time for new machines
> to manage your compressors or fans efficiently with a variable speed drive
> to include floating High Pressure control
> to control Schneider Electric variable speed drives via Modbus serial line
These AFBs have been created to help you reduce your development times and improve the efficiency of your control solutions.

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Presentation

Solutions overview
Application solutions for HVAC
Related functions: Global overview

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Global overview of related functions

Related functions for HVAC control solutions involving chillers

Fan management

Floating High Pressure control

Compressor management

PID with autotuning

Energy management

Drive communication control
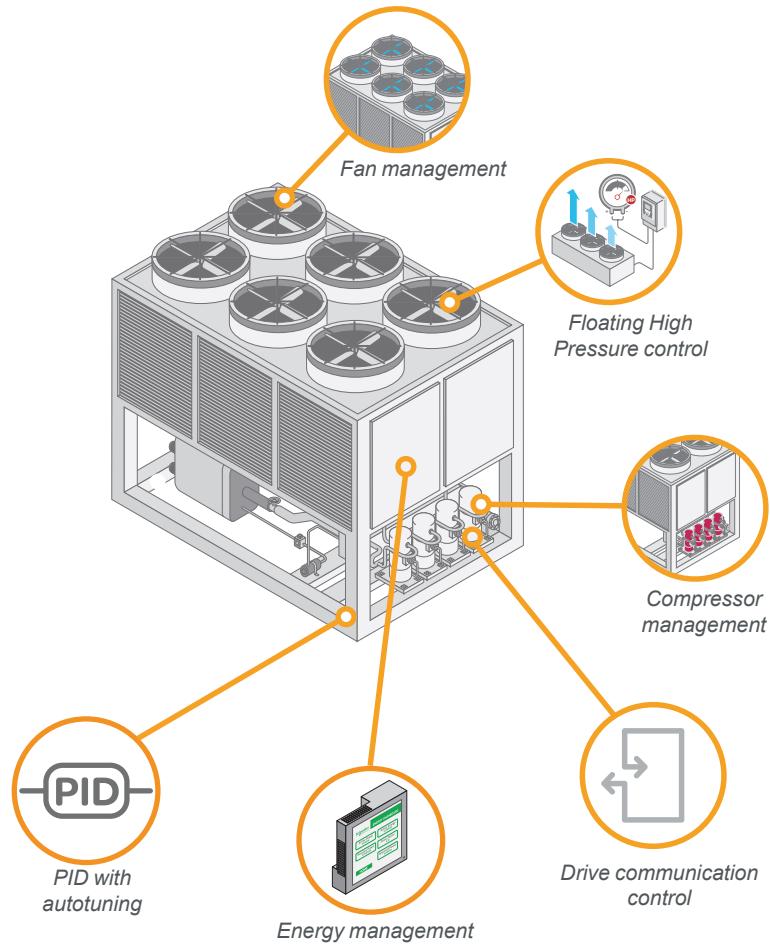
Related functions for HVAC control solutions involving Air Handling Units

Energy management

Plant mode control

Drive communication control

PID with autotuning

Air Handling Unit temperature control

Presentation

Solutions overview
Application solutions for HVAC
Related functions: Compressor management

2
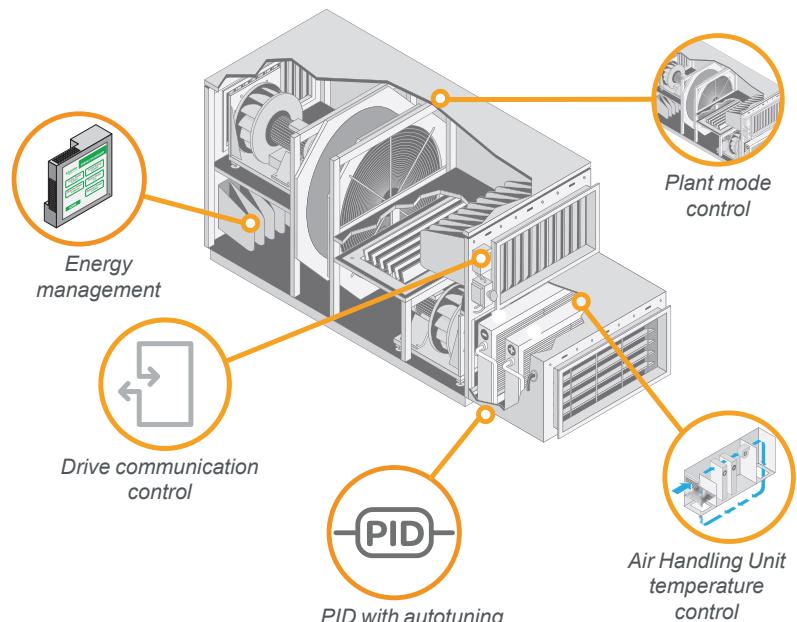
Compressor management
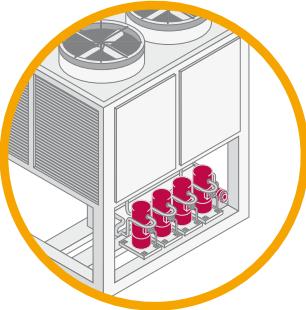
Description

The compressor management function controls a combination of fixed and variable speed compressors to maintain a constant pressure or water temperature in a chiller system.

Benefits

Performance
> Maintains the required temperature or pressure by controlling:
> > the capacity of the compressors in a system with a variable speed drive
> > or the number of compressors

Response
> Makes the system energy efficient by controlling compressor capacity prior to switching compressors on/off
> Facilitates smooth operation by monitoring compressor availability and changing over to the next available compressor if an error is detected

Operating principle

The main objective of this function block is to perform control and switching of multiple compressors to maintain a pre-defined temperature or pressure in a chiller system. The temperature and pressure are measured through sensors while the setpoints are entered through the HMI. The function uses intelligent algorithms to manage switching by assigning priorities to the compressors based on availability and energy optimization.

Characteristics

Main characteristics:
> Controls scroll, screw, or reciprocating compressors
> Balances operating hours based on first in first out (FIFO), last in first out (LIFO), or runtime algorithms
> Supports minimum on timer, minimum off timer, and minimum cycle timer to help prevent frequent compressor switching
> Supports timers to help prevent frequent compressor switching
> Oil recovery function helps prevent compressor damage during partial load conditions
> Helps eliminate resonance frequencies during compressor operation, thereby helping to increase compressor lifetime and reduce noise
> Supports up to 8 compressors per refrigerant circuit
> Allows variable speed drive regulation
> Supports heating or cooling mode

Typical applications
> Air and water cooled chillers
> Heat pumps
> Rooftop units
> Compressor racks

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Presentation

Solutions overview
Application solutions for HVAC
Related functions: Floating High Pressure control with variable speed drives

Floating High Pressure control with variable speed drives

Description

This Application Function Block (AFB) controls the condensing pressure of the air-cooled condenser. It manages the High Pressure setpoint and provides the information to the fan management AFB. The setpoint is defined so as to be able to reduce the energy consumption of the system.

Benefits

Energy performance
> Energy saving of up to 40% by combining variable speed drives with floating High Pressure control

Operating principle

The AFB calculates a High Pressure setpoint based on the outside temperature evolution. The required pressure is controlled by modulating the air flow through fans (on/off and speed control).
3 methods are used to calculate the High Pressure setpoint:
> fixed High Pressure setpoint
> floating High Pressure setpoint with constant offset
> floating High Pressure setpoint with variable offset

Characteristics

This AFB:
> includes a heat recovery input to allow the High Pressure setpoint to be increased if necessary
> manages the minimum and maximum setpoints
> includes a function to limit setpoint variation
> includes PID control

Typical applications
> Air-cooled condensers

High pressure control white paper

Refrigeration processes use a considerable amount of energy (30 to 80%) in the food industry, storage, grocery stores, and hypermarkets. It is one of the first expenditures where users want to save money, but it is also the least known and most critical. Despite solutions that have been existing for years, the initial choice favors operation and investment rather than energy consumption.
Among solutions to save energy in refrigeration, High Pressure (HP) control is one of the most well-known, if not the best known, for refrigeration equipment. When properly implemented, this solution can help cut electricity bills by more than 30%. However, technology alone is not sufficient to obtain energy savings. It is necessary to properly implement HP control to maximize savings and avoid technical problems.
A white paper has been drawn up by Schneider experts and is available to download from our website: http://www2.schneider-electric.com/sites/corporate/en/support/white-papers/high-pressure-control.page
It explains how HP control generates energy savings versus regulation with constant HP, and gives technical constraints.

Energy savings in commercial refrigeration equipment:

High Pressure Control

July 2011/White paper

by Christophe Borlein

AFF and IIF-IIR member

Make the most of your energy

Schneider Electric

White paper by Schneider Electric

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Presentation

Solutions overview
Application solutions for HVAC
Related functions: Fan management

Fan management
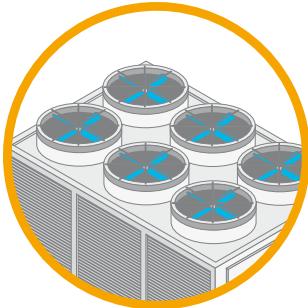
Description
In order to control the condensing pressure of air-cooled condensers, this function block controls the frequency, starting, and stopping of the fans in a predetermined order to optimize their energy consumption, operating time, and availability.

Benefits
Reliability
> Fans with detected errors are automatically replaced in the sequence by operational fans.
> Fan service life is optimized through operation sequences (FIFO, balancing hours, LIFO).

Performance
> Fan switch-on and operating frequency are optimized in order to reduce the energy consumption of the air-cooled condenser.

Operating principle
Depending on the input, this AFB manages the number of stages of fans to be used. Up to 12 fans per stage can be used, with a maximum of 4 stages.
Regulation allows the maximum surface of the condenser to be used in order to reduce the consumption of the fans.

Characteristics
This AFB provides:
> Linear action between PID and flow
> Management of detected errors and subsequent compensation of fan operation
> Operation with no delay and management of frequencies:
this function increases control stability and reduces the number of fan starts/stops.

Typical applications
> Air-cooled condensers

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Presentation

Solutions overview
Application solutions for HVAC
Related functions: Plant mode control

Plant mode control
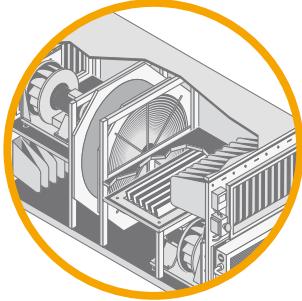
Description

This Application Function Block (AFB) determines the operating mode for an Air Handling Unit. Besides monitoring the status of alarms, the AFB also monitors room and outdoor air temperatures to reduce cooling energy needs and improve comfort levels.

Benefits

Monitored operation
> The Air Handling Unit is set to a secure operation mode on detection of a fire alarm, fan alarm, or freeze state alarm
> The night cycle function monitors room temperatures to help protect the building against condensation or other damage due to extreme indoor temperature conditions (too hot or too cold).

Energy optimization
> The night purge function purges and pre-cools the building during unoccupied periods to reduce cooling energy needs (free cooling).
> The night cycle mode maintains a lower room temperature during heating periods and a higher room temperature during cooling periods to reduce the cooling or heating energy needs.

Operating principle

At start-up, the AFB checks the status of the alarms and the various operating modes, then automatically starts or stops the Air Handling Units.

Characteristics

This AFB can be used with all types of Air Handling Units.

Typical applications
> Air Handling Units

Solutions overview
Application solutions for HVAC
Related functions: Air Handling Unit temperature control

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Air Handling Unit temperature control
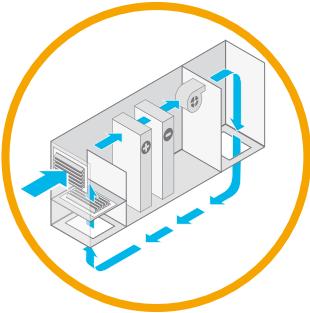
Description

This Application Function Block (AFB) controls the discharge air temperature of Air Handling Units with or without mixing dampers. Heating coil, cooling coil, dampers, and fan speed are modulated in sequence to control the temperature. The function block supports 2 major temperature algorithms: constant discharge air temperature control and return air compensated discharge air temperature control.

Benefits

Energy performance
> The Air Handling Unit air volume is controlled to keep optimum indoor air quality conditions with minimum air volume.
> The economizer control function reduces cooling energy costs by choosing the most economical air for cooling indoor space.
> The summer compensation function reduces cooling energy costs by increasing indoor space temperature in summer seasons.

Comfort
> Optimum comfort is achieved by adjusting the compensated discharge air temperature according to changes in the outdoor air temperature.
> An increased indoor space temperature during summer seasons avoids climate shocks when entering or leaving buildings.
> An increased discharge air temperature during winter seasons increases human comfort by compensating conductive cold from walls during winter seasons.

Operating principle

At startup, the freeze protection and recovery function stops the AHU cycling due to low outdoor air temperature conditions. The AHU can operate in constant discharge air temperature control mode or in a return air compensated discharge air temperature control mode. The temperature is controlled by sequencing the heating coil, damper, cooling coil, and fan speed.

Characteristics

This AFB can be used with all types of Air Handling Units.

Typical applications
> Air Handling Units

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PID with autotuning

Description

The advanced PID function blocks are optimized for temperature or pressure control in HVAC systems. With the additional PID Autotune function, the control system is capable of analyzing the response time of the control loop and calculating the correct PID parameter settings.

Benefits

Precision
> PID control maintains the required controlled variable through adjustment.
> It minimizes the deviation of the actual process value from the setpoint to optimize system control.

Efficient setup
> Various loop control interactions available to manage different required machine operating modes
> Automatic detection of PID control loop parameter with autotuning

Operating principle

PID control maintains the actual value and adjusts the output value according to deviations in the system's response. The PID function supports automatic and manual operating mode and is capable of monitoring a user-defined deadband on the actual value in case with alarm indication in case of undershoot or overshoot. The hold and reset commands can also be used to regulate the process.

The PID Autotune function is used to analyze the system response and determine the correct PID parameters.

The PID Autotune and PID Advanced functions interact directly. Depending on the operating mode of the PID Autotune function, it controls the PID Advanced function regulation and provides PID parameters for it.

Characteristics

Main characteristics:
> Operating modes: automatic and manual
> Hold function to help eliminate windup
> Integral anti-windup
> Deadband for more stable control
> Adjustable high or low limits
> Direct and reverse control

Typical applications
> Air and water cooled chillers
> Heat pumps
> Rooftop units
> Air Handling Units

2

Presentation

Solutions overview
Application solutions for HVAC
Related functions: Drive communication control

Drive communication control

*Altivar 212
variable speed drive*

*Modicon
M171 logic
controller*

Chiller OR Air Handling Unit
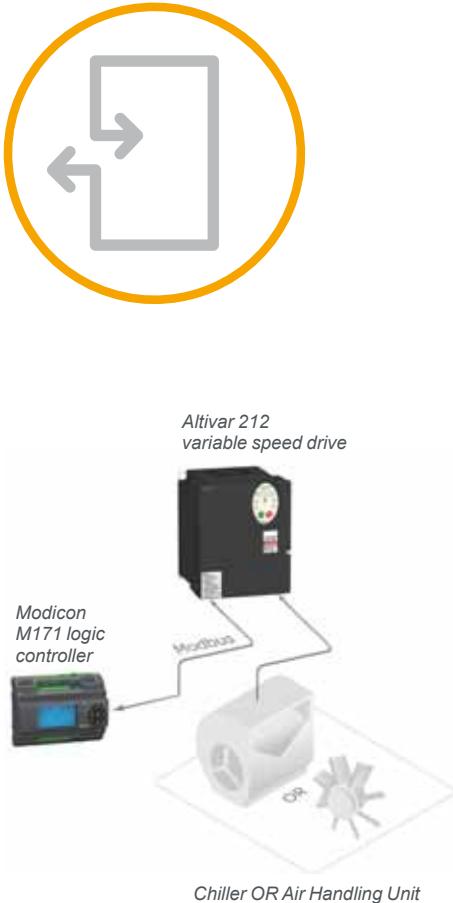
Description
These function blocks provide an easy and efficient way to integrate one or several Altivar variable speed drive(s) connected, via Modbus SL fieldbus, in the Modicon M171/M172 system. The function blocks manage communication with the drives and provide control and monitoring capabilities.

Benefits
Easy integration
> Easy and efficient integration of Altivar variable speed drives in the Modicon M171/M172 logic controller offer.

Complete drive control
> Control and monitoring of Altivar variable speed drives on a Modicon M171/M172 logic controller without any additional development.

Operating principle
The drive communication function blocks are designed to control and monitor Altivar variable speed drives connected to a Modicon M171/M172 logic controller via Modbus SL. The function blocks completely manage the Modbus SL communication with the drive and provide direct control of the speed and drive modes. Communication and drive status are monitored permanently and detected faults are indicated on the function block.

Characteristics
These function blocks are designed for the Modicon M171/M172 logic controllers. They can be used with all types of HVAC machine and pumping application requiring an Altivar variable speed drive to operate e.g. compressors, fans, and pumps. Function blocks are available for Altivar 12, Altivar 21, Altivar 212, Altivar 31, Altivar 312, Altivar 32, Altivar 61, and Altivar 71 variable speed drives.

Typical applications
> HVAC machines
> Pumping applications

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Presentation

Solutions overview
Application solutions for HVAC
Related functions: Energy management

Energy management

Description

The energy management function blocks are designed for applications where the machine energy consumption needs to be metered and energy efficiency information is required. The function blocks provide an easy integration of metering devices into the system and offer calculations methods to determine the machine efficiency, COP, or ESEER *(1)*.
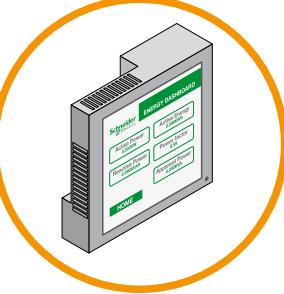
Benefits

Quick and easy integration

> Preprogrammed and fully tested metering functions are provided for a quick and easy integration of energy metering devices and machine efficiency calculation methods.
> The function blocks provide an efficient integration of electrical metering devices either connected via Modbus SL or hardwired by using pulses.
> A thermal energy calculation function block is embedded to determine the produced thermal energy. With dedicated trending and COP *(1)* calculation functions, machine efficiency can be monitored and analyzed in detail.
> The function block allows the cooling capacity to be calculated without adding a flow meter.

Operating principle

A wide range of functions are covered by a comprehensive set of metering function blocks, from retrieving energy information to energy efficiency calculations and trending.

Characteristics

The following function blocks are designed to be used in the Modicon M171/M172 logic controller application:

> Digital input pulse totalizer: counts the digital input pulses from an energy meter
> Converter of totalized pulses from energy meter: converts the digital input pulses into the consumption
> Thermal power calculation: calculates the thermal power, an energy based on the flow (for water chillers)
> Coefficient of performance calculation: calculates the COP based on the consumption and the thermal power
> Energy meter data trend: Trend of consumption data over time

To calculate the thermal energy, a flow meter must be installed in the system and the heat capacity of the medium must be known.
Thanks to a new AFB named "COPMonitor", which combines 6 other AFBs, the COP can be calculated without the need for a flow meter. The flow is calculated based on the compressor characteristics and the thermal power produced by the machine is calculated based on the enthalpies of the machine.

Typical applications

> Air and water cooled chillers
> Heat pumps
> Rooftop units
> Compressor racks

*(1) COP = Coefficient Of Performance. Efficiency of the chiller or heat pump calculated by the cooling or heating power divided by electrical power consumption.*
ESEER = European Seasonal Energy Efficiency Ratio: seasonal efficiency of refrigeration equipment, chillers, and air conditioners calculated by the cooling or heating power divided by the electrical power consumption at different loads.

2

Solutions overview
Application solutions for pumping
Booster multi drive

Booster multi drive

Description

This architecture is adapted for pumping manufacturers with high-level specialized expertise. It combines a logic controller, an energy meter, and variable speed drives (on Modbus or hardwired). The whole setup gives you maximum flexibility and helps you to simplify your installation. At the same time, the SoMachine HVAC controller software provides dedicated pumping functions to increase the performance of your booster and optimize operation.

Architecture
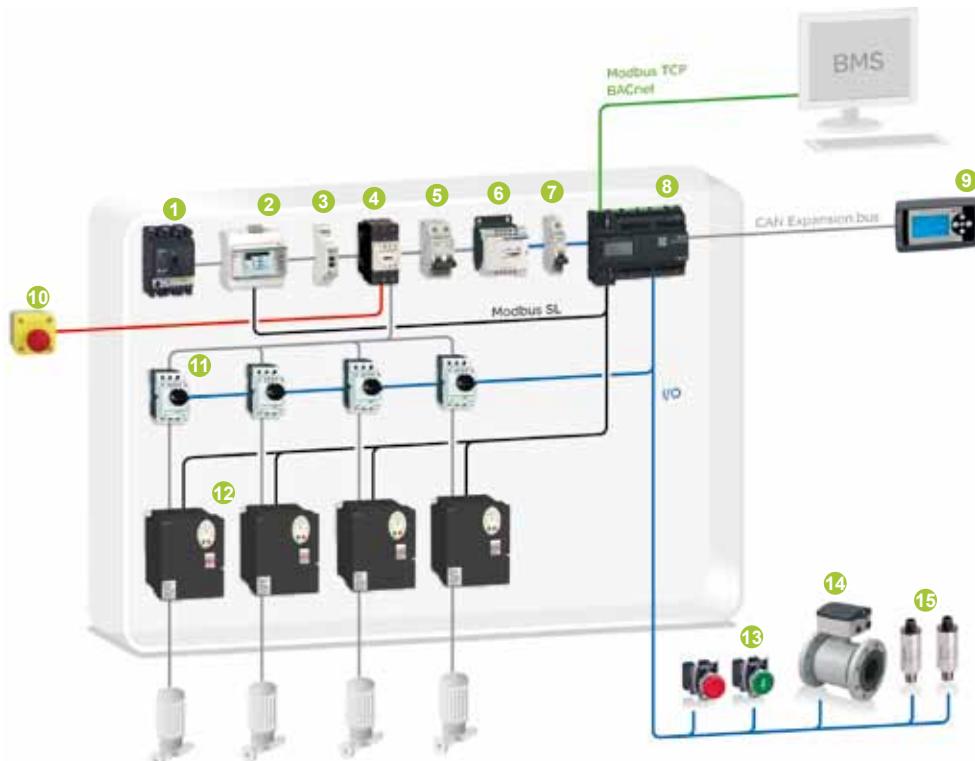
*Pumping Booster / Multi Drive/Modbus SL/**Modicon M172 performance** logic controller*

Solution breakdown

1 **Compact NSX** circuit breaker *(1)*
2 **iEM3000** energy meter *(1)*
3 **Zelio control** phase sequence *(1)*
4 **TeSys D** contactor *(1)*
5 **C60L-MA** modular circuit breaker *(1)*
6 **Phaseo** switch mode power supply *(1)*
7 **C60L-DC** DC circuit breaker *(1)*
8 **Modicon M172** performance logic controller *(2)*
9 **Modicon M171** remote display *(2)*
10 **Harmony XALK** Emergency stop push button *(1)*

11 **TeSys GV2L** magnetic circuit breaker
12 **Altivar 212** variable speed drive, for 0.75 to 75 kW *(1.0 to 100 hp)* motors *(1)*
13 **Harmony XB4/XB5** control & signaling units *(1)*
14 Flow meter (third-party product)
15 **OsiSense XMLP** pressure sensors *(2)*

(1) See chapter 5: Related offers.
(2) See chapter 3: Modicon M171/M172 logic controller offer.

Schneider Electric

Presentation

Solutions overview
Application solutions for pumping
Booster single drive

Booster single drive

Description

This solution is dedicated to simple and standard boosters in buildings. This is the first step towards automation of traditional relay architectures. With a built-in display on a Modicon M171/M172 logic controller, this solution is very cost effective. Single drive can be used in single or multi drive mode.

Architecture
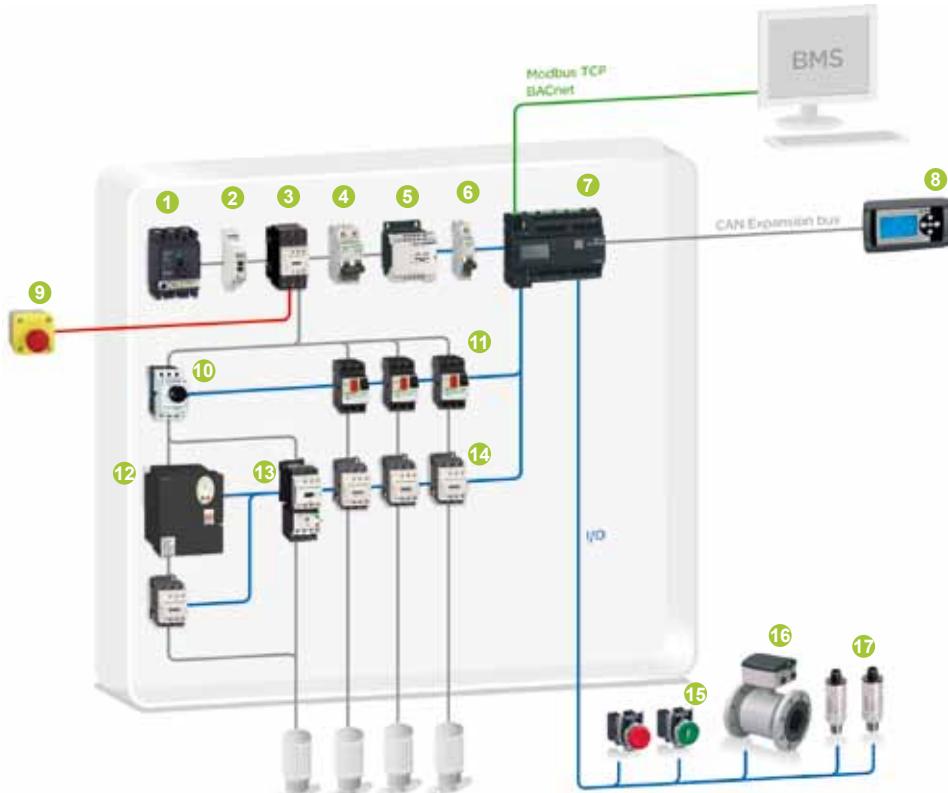
Pumping Booster / Single Drive/Hardwired/Modicon M172 performance logic controller

Solution breakdown

1 **Compact NSX** circuit breaker *(1)*	**11** **TeSys GV2** motor circuit breaker
2 **Zelio control** phase sequence *(1)*	**12** **Altivar 212** variable speed drive, for 0.75
3 **TeSys D** contactor *(1)*	to 75 kW *(1.0 to 100 hp)* motors *(1)*
4 **C60L-MA** modular circuit breaker *(1)*	**13** **TeSys GV2M** circuit breaker *(1)*
5 **Phaseo** switch mode power supply *(1)*	**14** **TeSys D** contactor
6 **C60L-DC** DC circuit breaker *(1)*	**15** **Harmony XB4/XB5** control & signaling
7 **Modicon M172** performance logic controller *(2)*	units *(1)*
8 **Modicon M171** remote display *(2)*	**16** Flow meter (third-party product)
9 **Harmony XALK** Emergency stop push button *(1)*	**17** **OsiSense XMLP** pressure sensors *(2)*
10 **TeSys GV2L** magnetic circuit breaker	

(1) See chapter 5: Related offers.
(2) See chapter 3: Modicon M171/M172 logic controller offer.

Presentation

Solutions overview
Application solutions for pumping
Related functions: Global overview

2

Global overview of related functions

Related functions for pumping control solutions

Pump Stage and De-Stage

PID

Booster working mode

Friction loss

Cavitation protection

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Solutions overview
Application solutions for pumping
Related functions: Booster working mode
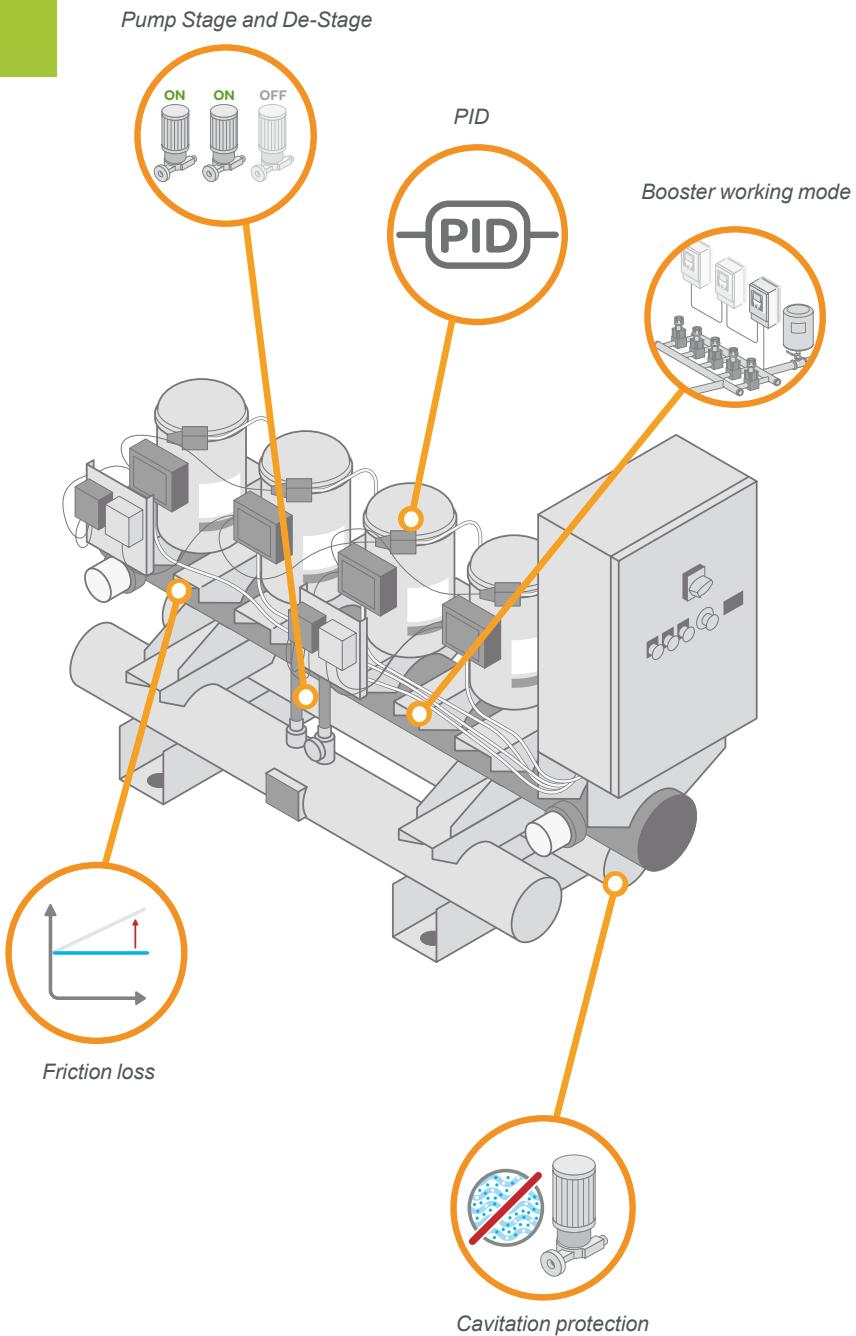
Booster working mode

Description
This function is used to run in the "single drive" or "multi drive" operating mode in a booster system.

Definition and benefits

Multi drive
> Definition: in this mode, each pump in the system is connected to an individual drive.
> Main advantage: this type of arrangement provides the most energy efficient systems and a higher level of pump protection. Systems are easy to maintain.

Single drive, multi-lead
> Definition: In this mode, a single drive is used to start the first pump in the system. Pump selection is based on pump operating hours or detected error status, or a user-defined priority.
> Main advantage: these types of arrangement are cost effective.

Single drive, single-lead
> Definition: In this mode, a single drive is used to start one pump only in the system and there is no switching of drives to another pump.
> Main advantage: these types of arrangement are cost effective.

Operating principle
The main purpose of this function is to enable the user to select the optimum operating mode for the booster system. By selecting multi-lead systems, multiple pumps, connected to drives or contactors, can be controlled to switch different pumps to operate them in the most optimized manner. Switching is based upon pressure, operating hours, and the available pumps in the system.
Single drive systems can select the pump to be connected and started with the only drive present in the system. The other fixed-speed pumps are started or stopped based upon pressure requirements. If an error is detected on the pump connected to the drive or it experiences a stoppage, the drive will be connected to the first available pump based upon the operating hours or detected error status of the pump, or a user-defined priority.
In single drive, single-lead systems the single drive in the system is connected to only one pump and there is no switching of the drive to other pumps in the system. The other fixed-speed pumps are started by DOL based upon pressure requirements.

Characteristics
Main characteristics:
> Pump switching is performed to operate the pumps in the most optimized and energy efficient manner.
> The function detects the next available pump based on operating hours, detected errors, and pressure requirements.
> The function is capable of bypassing drives in the event of a detected error.
> Switching values can be set from the HMI.

Typical applications
> Booster pumping system consisting of multiple pumps

2

Presentation

Solutions overview
Application solutions for pumping
Related functions: Pump Stage and De-Stage

Pump Stage and De-Stage

2
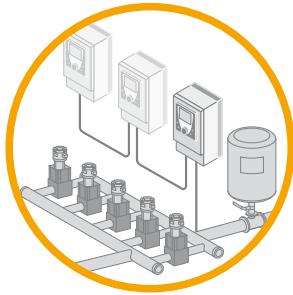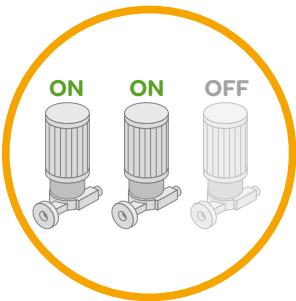
Description

The Pump Stage and De-Stage function switches a combination of fixed and variable speed pumps to maintain a constant pressure in a booster system.

Benefits

Performance
> Maintains the required pressure by performing switching between the pumps available in the system

Optimization
> Makes the system energy efficient by defining the operational combination of pumps in such a way that the pumps operated by drives are given priority
> Facilitates smooth operation by monitoring pump availability and changing over to the next available pump if an error is detected

Operating principle

The main objective of this function is to perform switching of multiple pumps to maintain a pre-defined pressure in the booster system. The flow and pressure are measured through sensors while the setpoints are entered from the HMI.
The function uses intelligent algorithms to manage switching by assigning priorities to the pumps based on availability and energy optimization.

Characteristics

Main characteristics:
> This function is capable of maintaining the required pressure in the booster system using an energy efficient algorithm to determine optimum pump operation.
> Pump switching is based on the principle of assigning higher priority to variable speed pumps and pumps with fewer operating hours.
> In the event of a detected error, the function uses an intelligent algorithm to switch to the next available pump.

Typical applications
> Booster pumping system consisting of multiple pumps

Cavitation protection

Description

This function stops pumps from operating under conditions of cavitation.

Benefits

Optimization
> Promotes a longer service life by helping to ensure pumps do not operate in cavitation
> Adapts setpoints to optimize pump operation

Monitoring
> Generates alarms in case of detection of cavitation in the system

Operating principle

The main purpose of this function is to help ensure pumps do not operate under cavitation conditions. If cavitation is detected, the function immediately stops the pumps. This is achieved by reducing the pressure setpoint/flow in the system. After completing this task and resetting the alarm, the function checks the suction pressure. If the suction pressure is within the permissible limits, the function restarts the pumps in normal mode.

Characteristics

> Detects abnormality in pressure using the actual suction feedback pressure value
> Activates algorithms to adjust setpoints to avoid cavitation conditions
> Uses a limit switch function to avoid toggling of the cavitation mode
> Generates alarms on detection of cavitation conditions

Typical applications
> Booster pumping system consisting of single or multiple pumps

Schneider Electric

Presentation

Solutions overview
Application solutions for pumping
Related functions: Friction loss, PID
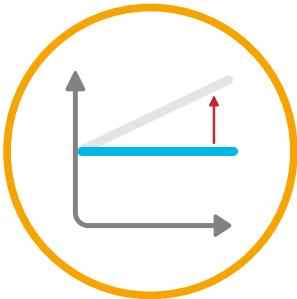
Friction loss

Description
This function compensates the friction lost by adapting the pressure setpoint according to the number of running pumps or the flow value (optional) in the discharge side.

Benefits

Optimization
> Promotes a longer operating life of the pump by maintaining a linear pressure in the system
> Adapts pressure setpoints to optimize pump operation

Monitoring
> Generates alarms in case of detection of abnormality in the suction pressure curve

Operating principle
Ideal pressure can be maintained either based on flow or the setpoints of each pump in the system. For flow, the function adapts the setpoint based on the system curve with the help of the actual flow value. Both absolute and percentage values can be used. The minimal setting (two points) to use this function are:
> The increased value in percent (% to increase the standard setpoint) or the absolute value of the setpoint to reach the setpoint value on the highest and farthest point of the system in case of minimal flow. The standard value of this point is zero (relative) or equal to the setpoint (absolute).
> The increased value in percent (% to increase the standard setpoint) or absolute value of the setpoint to reach the setpoint value on the highest and farthest point of the system in case of maximal flow. The value of this point is higher than zero (relative) or greater than the setpoint (absolute).

The results of this measurement are minimum two correction values in percent or absolute values and its corresponding flow values.
In case of adaptation of the setpoints of the pumps, the function adapts the setpoint depending on the number of used pumps and the moment of the stage change.

Characteristics
> Detects pressure abnormalities in the system
> Executes algorithms to maintain the pressure using flow or setpoints to manage the pumps
> Generates alarms on detection of pressure abnormalities in the system

Typical applications
> Booster pumping system consisting of single or multiple pumps

PID

Description
The PID function adjusts the setpoint of the pumps to maintain a constant pressure in a booster system on the basis of flow and pressure.

Benefits / Operating principle / Characteristics
The benefits, the operating principle, and the characteristics are identical to those described in previous pages for HVAC equipment, for more details, see page 2/11.

2

Chapter 3

Hardware control platforms

Technical data relating to products listed in this chapter is available online at www.schneider-electric.com/m171-m172

3

Hardware control platform
Modicon M171/M172 logic controllers
Maximize your business and machine performance with MachineStruxure

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Maximize your business and machine performance with MachineStruxure
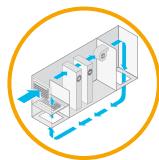
Fan management

Floating High Pressure control

Compressor management
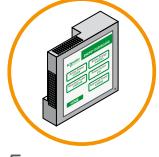
Energy management
Application Function Blocks (AFBs)

Machine builders are constantly looking for new ways to design and build more innovative machines in less time and at lower costs. MachineStruxure™ can help.

The NEXT generation of MachineStruxure™ is a complete machine automation solution that provides flexible and scalable machine control, ready-to-use architectures, efficient engineering solutions, and comprehensive customization and engineering support services. It can help to meet your challenges for improved efficiency and greater productivity, as well as allow to deliver higher added value to your customers throughout the entire machine life cycle.

Ready-to-use architectures and function blocks

> Tested, Validated, and Documented Architectures (TVDAs) are just one of the ways we help to reduce design time.
> Whether machines are simple or complex, Application Function Blocks (AFBs) make system design fast and easy.

Modicon M171/M172 is part of MachineStruxure
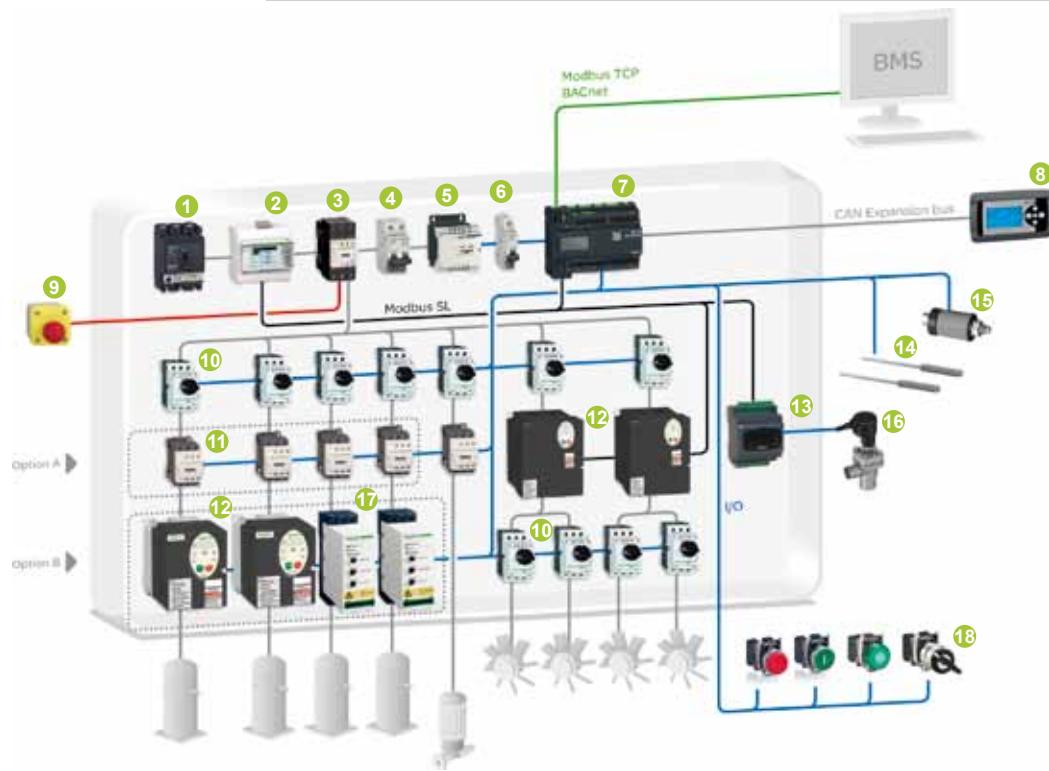
HVAC/Chiller/Modbus SL/Modicon M172 performance logic controller

Solution breakdown

1 **Compact NSX** circuit breaker
2 **iEM3000** energy meter
3 **TeSys D** contactor
4 **C60L-MA** modular circuit breaker
5 **Phaseo** switch mode power supply
6 **C60L-DC** DC circuit breaker
7 **Modicon M172** performance logic controller
8 **Modicon M171** remote display
9 **Harmony XALK** Emergency stop push button
10 **TeSys GV2L** magnetic circuit breaker
11 **TeSys D** contactor

12 **Altivar 212** variable speed drive, for 0.75 to 75 kW *(1.0 to 100 hp)* motors
13 **Modicon M171** electronic expansion valve driver
14 **Modicon TM1S●●●●** humidity and temperature probes
15 **OsiSense XMLP** pressure sensors
16 Electronic expansion valve
17 **Altistart 01** soft starter
18 **Harmony XB4/XB5** control & signaling units

Schneider Electric

Hardware control platform
Modicon M171/M172 logic controllers
Improve efficiency

Improve efficiency

Flexible and scalable performance

Whether you focus on chillers, Air Handling Units for commercial buildings, residential, or industrial applications...
With the range of Modicon M171/M172 logic controllers, the next generation of MachineStruxure™ is now better positioned than ever.
Multiple BMS (Building Management System) connectivity, embedded or in option, and an embedded web server enable ease in remote control; while a unique software environment supports the development of algorithms and functions that can be used on all platforms.

Modicon M172 performance logic controllers

Modicon M171 performance logic controllers

Modicon M171 optimized logic controllers

Scalability

Performance and connectivity

> ★ Best-in-class versatility and compact size
> Best-in-class performance

> Modicon™ **M171 optimized** logic controller for simple and compact machines is one of the smallest programmable controllers on the market. Available also for flush mounting, it requires minimal installation time and offers tremendous versatility.
> Modicon™ **M171 performance** logic controller for complex and BMS connectable machines can be adapted to virtually any application.
> Modicon™ **M172 performance** logic controller for large and connected machines with more scalability and connectivity.

3

Hardware control platform
Modicon M171/M172 logic controllers
Increase profitability
Reduce time-to-market

Increase profitability

Everything needed is embedded

The high degree of flexibility makes it very easy to install additional modules and still keep everything in just one configuration:
> Remote displays
> Expansion modules
> Communication modules
> Wall thermostats
> Wide range of humidity and temperature probes

Remote displays

Expansion modules

Communication modules

Wall thermostat
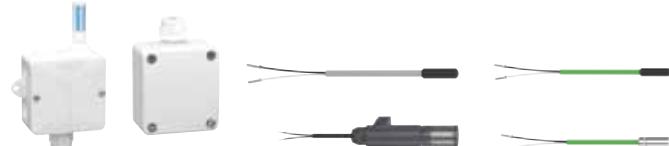
Humidity and temperature probes

Reduce time-to-market

Intuitive automation with SoMachine HVAC

SoMachine™ HVAC is the universal programming software for machines automated by Modicon M171/M172 logic controllers.
Simplified navigation that requires only a few clicks delivers a more efficient engineering process.

> **SoMachine HVAC simplifies every step in machine design and commissioning**

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General presentation
(continued)

Hardware control platform
Modicon M171/M172 logic controllers
Simplify integration and maintenance

Simplify integration and maintenance

Connected everywhere

3/3
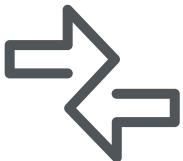
Integration into machines and management systems has never been easier – many needed connectivity features are embedded in the offer:
> Modbus RTU
> BACnet/IP and MS/TP (B-AAC profile)
> Modbus TCP with Webvisu embedded
> ASCII support for GSM Modem
> Profibus
> CAN
> LonWorks (FFT-10)

Customization and services

Our experts help you every step of the way, from perfecting machine design to on-site services of the finished machine.
Global support, 24/7 hotline services, and replacement parts centers around the world enable you to deliver superior customer support and satisfaction.

3

Hardware control platform
Modicon M171/M172 logic controllers
General presentation

3

1 Remote LED display
2 Wall thermostat
3 **M171 optimized** *logic controller*
4 *I/O expansion module*

1 Remote LCD display
2 Communication module
3 **M171 performance** *logic controller*
4 I/O expansion module
5 Electronic expansion valve driver

1 Remote LCD display
2 Communication module
3 **M172 performance** *logic controller*
4 I/O expansion module
5 Electronic expansion valve driver
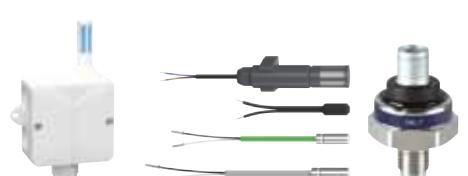
Measurement accessories   *Pressure transmitters*

Presentation

The Modicon M171/M172 logic controller range has been developed to manage digital and analog inputs and outputs, to offer numerous possibilities for connection to different Building Management System communication networks.

Modicon M171/M172 range

The range of Modicon M171/M172 comprises 21 logic controllers, programmable with SoMachine HVAC software, and is divided in 3 types: **M171 optimized** logic controllers, **M171 performance** logic controllers and **M172 performance** logic controllers.

■ **M171 optimized** logic controllers are suitable for customized applications designed to control simple and compacts machines:
□ Air/water-cooled chiller
□ Rooftop unit
□ Heat pump
□ Compressor rack
□ Ventilation unit

■ **M171 performance** logic controllers type are suitable for customized applications designed to control complex and BMS connectable machines:
□ Air/water-cooled chiller
□ Rooftop unit
□ Heat pump
□ Precision air conditioner
□ Booster station
□ Compressor rack
□ Heat recovery unit

■ **M172 performance** logic controllers increase the scalability and the connectivity achieved by M171 performance controllers. They control the same type of applications as the Modicon M171 performance do, and embed more universality and connectivity.

System components

The offer range comprises:

■ 21 logic controllers:
□ 10 **M171 optimized** logic controllers,
□ 5 **M171 performance** logic controllers
□ 6 **M172 performance** logic controllers
The Modicon M171/M172 logic controllers are available with or without embedded display. See pages 3/12, 3/16 and 3/18.

■ 5 I/O expansion module types (mixed digital and analog):
□ 2 **TM171EP●●R** for **M171** and **M172 performance** logic controllers
□ 3 **TM171EO●●R** for **M171 optimized** logic controllers. See page 3/20.

■ 5 remote displays (LED or LCD technology):
□ 1 **TM171DGRP** for for **M171** and **M172 performance** logic controllers
□ 4 **TM171D●●●●** for **M171 optimized** logic controllers. See pages 3/14, 3/17 and 3/19.

■ 8 **TM171A●●●●** communication modules (BMS fieldbus interfaces) to provide to the **M171** and **M172 performance** logic controllers a connection to:
□ BACnet MS/TP (B-AAC profile) or IP
□ Modbus SL (Serial Link)
□ Modbus TCP
□ LonWorks (FFT-10)
□ Profibus
□ CAN bus
□ etc, see page 3/21.

■ 3 **TM171VEV●●** electronic expansion valve drivers compatible with the entire Modicon M171/M172 logic controller range and also with third party controllers and electronic expansion valves. See page 3/24

■ 23 specific measurement accessories: **TM1S●●●●** humidity and temperature probes. See page 3/26.

■ Pressure sensors from our partner Telemecanique sensors, see page 3/27.

■ Adapted connection accessories: I/O connectors and cables. See pages 3/15 and 3/21.

■ SoMachine HVAC programming software. See page 4/2.

■ Programming accessories. See page 4/3.

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Hardware control platform
Modicon M171/M172 logic controllers
General presentation

SoMachine HVAC programming software

5 languages compliance IEC 61131-3
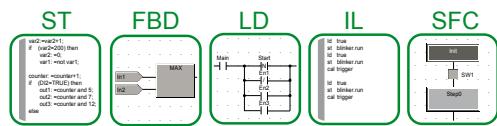
General presentation (continued)

Configuration software

Modicon M171/M172 logic controllers are supported by a completely intuitive software package SoMachine HVAC (see page 4/2).

■ SoMachine HVAC uses 5 languages compliance IEC 61131-3.

■ This software follows a simple drag and drop function block approach to configuration and is completed with a library of Application Function Blocks (AFBs) and logic functions.

■ This software runs with 5 programming languages.

■ Examples:

□ ST language   □ FBD language   □ LD language

□ IL language   □ SFC language

Available resources on logic controllers for IEC programming

	Logic controller type		
	M171 optimized	**M171 performance**	**M172 performance**
CPU	14.7 MHz	72 MHz, 32 MB RAM	120 MHz, 32 MB RAM
Available memory for application	188 kB	1.0 MB	1.0 MB
Available memory for user interface	–	1.5 MB	1.5 MB
Flash memory data	–	126 MB	5 MB
RAM memory (automatic mapping)	2048 B (1024 word)	512 kB (256000 word)	512 kB (256000 word)
RAM memory (Modbus mapping)	1024 B (512 word)	10 kB (5000 word)	10 kB (5000 word)
EEPROM variables	1024 B (512 word)	28 kB (14000 word)	28 kB (14000 word)

*Communication module (TM171AETH or TM171AETHRS485) and **M171 performance** logic controller*

Ethernet connection

Ethernet access is available on **performance** logic controllers:
■ Ethernet access is optional with **M171 performance** logic controllers by means of a communication module
■ Ethernet access is embedded with **M172 performance** logic controllers.

Ethernet access enables several functions to **M171** and **M172 performance** logic controllers, such as:
> Text e-mail (via NMTP server)
> TFTP transfer protocol (for M171 performance only)
> DNS
> Program transfers (upload/download)
> Online debugging
> Firmware updates
> Parameter management
> File management (virtual FTP)
> Bridge: specific function allowing PLCs to be configured via the performance logic controllers, on Modbus
> WebVisu

M172 performance logic controller

3

Presentation (continued)

Hardware control platform
Modicon M171/M172 logic controllers
General presentation
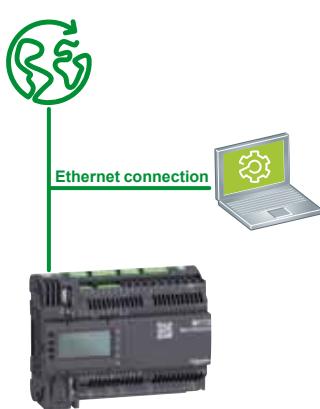
General presentation (continued)

Modicon M171 optimized logic controllers for simple and compact machines

Ethernet (Modbus TCP, BACnet/IP, Web Visu)

Wi Fi

Modbus SL

LAN expansion bus

LAN expansion bus

I/O

1 **M171 performance** logic controller, see page 3/16
2 **M171 optimized** logic controller - flush mounting, see page 3/12
3 I/O expansion module TM171EO see page 3/20
4 Remote display TM171DLCD, see page 3/14
5 Wall thermostat TM171DWAL , see page 3/14
6 Altivar 212, see page 6/4
7 Temperature probes TM1ST, see page 3/26
8 Humidity probes TM1SH, see page 3/26

Modicon M171 performance logic controllers for complex and BMS connectable machines

Ethernet (Modbus TCP, BACnet/IP, Web Visu)

Wi Fi

BACnet MS/TP (B-AAC profile)

Profibus

LonWorks (FFT-10)

CAN (binding)

RS 485/RS 232

CAN expansion bus

Modbus SL

I/O

1 **M171 performance** logic controller, see page 3/16
2 Modem
3 HMI Magelis STO/STU, see page 6/14
4 Communication module, see page 3/22
5 I/O expansion module TM171EP, see page 3/20
6 Remote display TM171DGRP, see page 3/17
7 Altivar 32, see page 6/4
8 Altivar 212, see page 6/4

9 Electronic expansion valve driver TM171VEV, see page 3/24
10 Energy meter iEm 3000, see page 6/18
11 Temperature probes TM1ST, see page 3/26
12 XMLP pressure transmitters, see page 3/27
13 Humidity probes TM1SH, see page 3/26
14 TeSys GV2 + TeSys D, see page 6/8

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Presentation (continued)

Hardware control platform
Modicon M171/M172 logic controllers
General presentation

General presentation (continued)

M172 performance logic controllers for large and connected machines

Ethernet (Modbus TCP, BACnet/IP, Web Visu)

BACnet MS/TP (B-AAC profile)

LonWorks (FFT-10)

Konnex (KNX)

Modbus TCP

Modbus SL 2

RS 485/RS 232

CAN (binding)

CAN expansion bus

Modbus SL 1

I/O
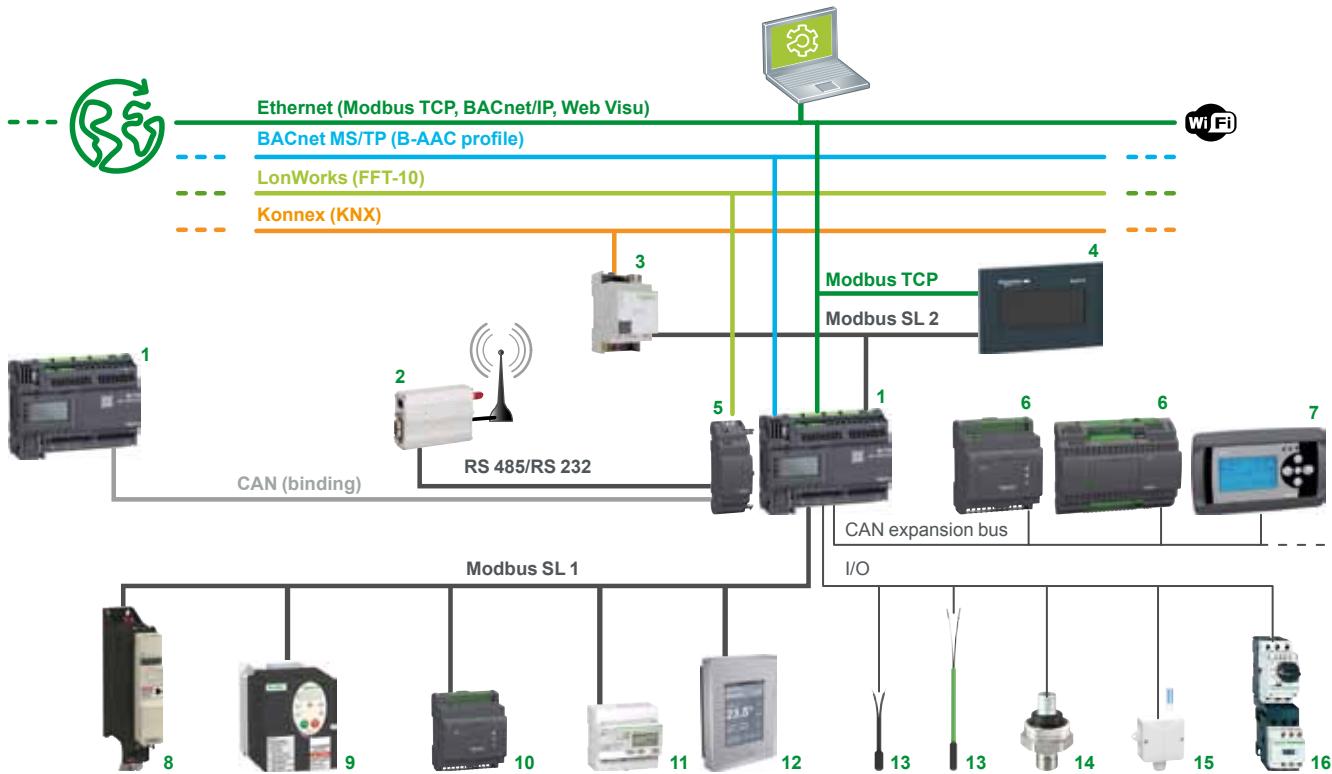
1 *M172 performance* logic controller, see page 3/18
2 Modem
3 spaceLYnk gateway, see page 5/5
4 HMI Magelis STO/STU, see page 6/4
5 Communication module TM171ALON, see page 3/22
6 I/O expansion module TM171EP, see page 3/20
7 Remote display TM171DGRP, see page 3/17
8 Altivar 32, see page 6/4
9 Altivar 212, see page 6/4

10 Electronic expansion valve driver TM171VEV, see page 3/24
11 Energy meter iEm 3000, see page 6/18
12 Room controller SE8000, see page 6/2
13 Temperature probes TM1ST, see page 3/26
14 XMLP pressure transmitters, see page 3/27
15 Humidity probes TM1SH, see page 3/26
16 TeSys GV2 + TeSys D, see page 6/8

3

Hardware control platform
Modicon M171/M172 controllers

Applications		**M171 optimized** logic controllers for simple and compact machines		**M171 performance** logic controllers for complex and BMS connectable machines		**M172 performance** logic controllers for large and connected machines
		■ Air/water-cooled chiller ■ Rooftop unit ■ Heat pump ■ Compressor rack ■ Ventilation unit		■ Air/water-cooled chiller ■ Rooftop unit ■ Heat pump ■ Precision air conditioner ■ Booster station ■ Compressor rack ■ Heat recovery unit		
Programming software		SoMachine HVAC V1.0 or higher		SoMachine HVAC V1.0 or higher		SoMachine HVAC V2.0 or higher
Maximum number of I/O with expansion modules		44	28	351	327	366
Generic programmable inputs	Digital input	6 digital inputs	2 digital inputs	9 digital inputs	–	8 or 12 digital inputs
	analog input	5 configurable analog inputs	5 configurable analog inputs	6 configurable analog inputs	3 configurable analog inputs	8 or 12 analog inputs
Generic programmable outputs	Digital output	6 digital outputs	4 digital outputs	7 digital outputs	–	12 digital outputs
	analog output	5 analog outputs	5 analog outputs	5 analog outputs	–	4 or 6 analog outputs, 8 or 12 digital outputs
Communication	Embedded communication port	□ 1 wired connector for LAN expansion bus □ 1 wired connector for Modbus SL master/slave for TM171O●M●●●		□ 1 removable connector for CAN expansion bus □ 1 removable connector for Modbus SL master/slave	□ 1 removable connector for CAN expansion bus □ 1 removable connector for Modbus SL master/slave or BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (WebVisu) (1)	□ 2 removable connectors for Modbus SL master/slave (Only 1 Master) or 1 BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (Webvisu) □ 1 removable connector for CAN expansion bus
	Optional communication	None except with a gateway		With **TM171A●●●** communication modules: □ Modbus TCP (WebVisu) □ Modbus SL □ BACnet MS/TP (B-AAC profile) □ BACnet IP (B-AAC profile) (Webvisu) □ CAN bus □ RS 232 □ Profibus □ LonWorks (FFT-10)	None except with a gateway	With **TM171A●●●** communication modules: □ Modbus SL □ BACnet MS/TP (B-AAC profile) □ BACnet IP (B-AAC profile) (Webvisu) □ CAN bus □ RS 232 □ LonWorks (FFT-10)
	USB port	No (program can be downloaded with the TM171AMFK programming stick and TM171ADMI programming cable)		Yes: 1 USB-A and 1 USB-Mini-B	No	Yes: 1 USB-A and 1 USB-Mini-B
	Services	Remote download through Modbus SL		□ Remote download □ File management (virtual FTP) □ Text e-mail □ Datalogging		
Power supply		∿ 12-24 V or ⎓ 24 V for all, ∿ 12-24 V for TM171O●●22S	∿ 100...240 V, isolated	⎓ 24 V or ⎓ 48 V		⎓ 24 V
Display	Built-in	Yes, on TM171OD●22●	Yes	Yes, on TM171ODM14R	Yes, on TM171PDM27● controllers	Yes	Yes, on TM172PDG●●● controllers
	Remote	Yes, with TM171DLED, TM171DLCD, and TM171DWAL2● displays Or with HMI Magelis offer (see page 6/4 or our web site: www.schneider-electric.com)			Yes, with TM171DGRP display Or with HMI Magelis offer (see page 6/4 or our web site: www.schneider-electric.com)		
Mounting		35 mm /*1.38 in.* ⌐ rail	Flush mounting	35 mm/*1.38 in.* ⌐ rail	35 mm/*1.38 in.* ⌐ rail	Flush mounting	35 mm/*1.38 in.* ⌐ rail, or on panel with an accessory
Product certifications		C€, cURus, CSA, EAC		C€, cURus, CSA, EAC		C€, cURus (2), CSA (3), EAC (3)
Logic controller reference		TM171O●●22● TM171OFM22R	TM171OF22R TM171OD14R	TM171PDM27● TM171PBM27R	TM171PFE03●●	TM172P●G27● TM172P●G42●
			TM171O●M14R			
Page		3/12 and 3/13		3/16 and 3/17		3/18 and 3/19

(1) On the same port at the same time.
(2) November 2015
(3) Pending

Hardware control platform
Modicon M171/M172 logic controllers
M171 optimized logic controllers

3

The **M171 optimized** logic controllers comprise 10 models that can be used to control from 14 up to 22 embedded I/Os (digital and analog).

- 2 types of power supply are available:
  □ ∿ 100-240 V
  □ ∿ 12-24 V or ⎓ 24 V

- 2 types of housing:
  □ with built-in display
  □ with remote display that can be added through the LAN expansion bus.

- 2 types of mounting:
  □ Flush mounting: controllers to be mounted on a cabinet door
  □ 35 mm/*1.38 in.* ⊐ rail mounting: controllers to be mounted inside a cabinet

- Optimized logic controllers embed up to 2 communication ports (depending on the model):
  □ 1 optional Modbus SL bus
  □ 1 LAN expansion bus

- The **M171 optimized logic controllers are** certified CE, cURus, CSA, EAC.
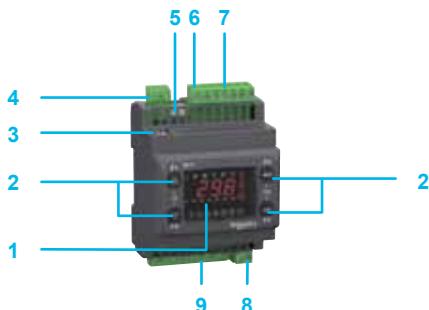
Description

35 mm/*1.38 in.* ⊐ rail mounting optimized controllers

TM171O●14R optimized logic controllers *(1)*
1 Display
2 4 navigation keys for setting controller parameters
3 Programming port (TTL)
4 Removable terminal block for RS 485 serial port (TM171O●M14R)
5 Wired connector for LAN expansion bus
6 Mounting clip for 35 mm/*1.38 in.* ⊐ rail mounting
7 Removable terminal block for digital outputs
8 Removable terminal block for ∿ 100…240 V power supply
9 Removable terminal block for I/Os
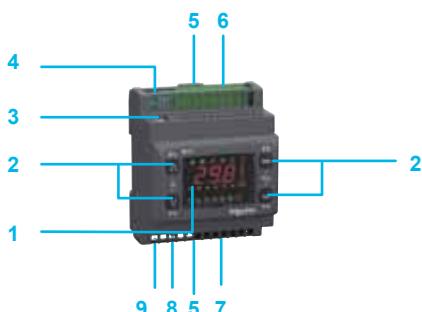
TM171O●22R● optimized logic controllers *(1)*
1 Display
2 4 navigation keys for setting controller parameters
3 Programming port (TTL)
4 Wired connector for RS 485 serial port (TM171O●M14R)
5 Mounting clip for 35 mm/*1.38 in.* ⊐ rail mounting
6 Removable terminal block for outputs
7 Wired connector for ∿ 12-24 V or ⎓ 24 V power supply, and for low voltage I/Os
8 Wired connector for analog output
9 Wired connector for LAN expansion bus

Flush mounting controllers

TM171OF●22R● optimized logic controllers *(1)*
1 Display
2 4 navigation keys for setting controller parameters
3 Wired connector for RS 485 serial port (TM171OF●M22R)
4 Wired connector for analog outputs
5 Wired connector for LAN expansion bus
6 Programming port (TTL)

(1) Connectors to be ordered separately, see page 3/15.

Schneider Electric

References

Hardware control platform
Modicon M171/M172 logic controllers
M171 optimized logic controllers

TM171OBM14R

TM171OD14R

TM171ODM14R

TM171OB22R

TM171OBM22R

TM171OD22R

TM171ODM22R

TM171ODM22S

TM171OF22R

TM171OFM22R

M171 optimized logic controllers

Power supply: ∿ 100-240 V

35 mm/1.38 in. ⌐ rail mounting optimized controllers

No. of I/Os	Number and type of channels		Display	Embedded communication	Reference	Weight kg/lb
	Inputs	**Outputs**				
14	**2 digital inputs:** 2 open collector or digital inputs *(1)* **5 configurable analog inputs:** □ 2 NTC, PT1000, or digital inputs □ 2 NTC, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs □ 1 NTC, PT1000, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs	**4 digital outputs:** □ 3 SPST (2 A, ∿ 230 V) with the same common □ 1 SPDT (2 A, ∿ 230 V) **5 analog outputs:** □ 2 open collector *(1)* for 12 V PWM/PPM or digital inputs □ 2x 0-10 V □ 1x 4-20 mA	Remote display (optional)	□ 1 wired connector for Modbus SL (master/slave) □ 1 wired connector for LAN expansion bus	**TM171OBM14R**	0.190/ *0.420*
			Built-in display	□ 1 wired connector for LAN expansion bus	**TM171OD14R**	0.190/ *0.420*
				□ 1 wired connector for Modbus SL (master/slave) □ 1 wired connector for LAN expansion bus	**TM171ODM14R**	0.190/ *0.420*

Power supply: ∿ 12-24 V or ⎓ 24 V *(2)*

35 mm/1.38 in. ⌐ rail mounting optimized controllers

No. of I/Os	Number and type of channels		Display	Embedded communication	Reference	Weight kg/lb
	Inputs	**Outputs**				
22	**6 digital inputs:** □ 6 volt-free in 1 group **5 configurable analog inputs:** □ 3 NTC or digital inputs □ 2 NTC, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs	**6 digital outputs:** □ 3 SPST (2 A, ∿ 230 V) with the same common □ 2 SPST (2 A, ∿ 230 V) with independent common □ 1 open collector **5 analog outputs:** □ 2 open collector for 12 V PWM/PPM □ 3x 0-10 V	Remote display (optional)	□ 1 wired connector for LAN expansion bus	**TM171OB22R**	0.190/ *0.420*
				□ 1 wired connector for Modbus SL (master/slave) □ 1 wired connector for LAN expansion bus	**TM171OBM22R**	0.190/ *0.420*
			Built-in display	□ 1 wired connector for LAN expansion bus	**TM171OD22R**	0.190/ *0.420*
				□ 1 wired connector for Modbus SL (master/slave) □ 1 wired connector for LAN expansion bus	**TM171ODM22R**	0.190/ *0.420*
		6 digital outputs: □ 3 SPST (2 A, ∿ 230 V) with the same common □ 2 SSR (3 A, ∿ 230 V) □ 1 open collector **5 analog outputs:** □ 2 open collector for 12 V PWM/PPM □ 3x 0-10 V	Built-in display	□ 1 wired connector for Modbus SL (master/slave) □ 1 wired connector for LAN expansion bus	**TM171ODM22S**	0.190/ *0.420*

Flush mounting optimized controllers

No. of I/Os	Number and type of channels		Display	Embedded communication	Reference	Weight kg/lb
22	**6 digital inputs:** □ 6 volt-free in 1 group **5 configurable analog inputs:** □ 3 NTC or digital input □ 2 NTC, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs	**6 digital outputs:** □ 3 SPST (2 A, ∿ 230 V) with the same common □ 2 SPST (2 A, ∿ 230 V) with independent common □ 1 open collector **5 analog outputs:** □ 2 open collector for 12 V PWM/PPM □ 3x 0-10 V	Built-in display	1 wired connector for LAN expansion bus	**TM171OF22R**	0.164/ *0.360*
				1 wired connector for Modbus SL (master/slave) 1 wired connector for LAN expansion bus	**TM171OFM22R**	0.164/ *0.360*

Remote display for M171 optimized logic controllers

Remote displays	see page 3/15
Wall thermostats	see page 3/15

## Connection accessories for M171 optimized logic controllers

(1) The 2 I/Os are the same. On the same channel: 2 digital inputs or 2 analog outputs (depending on the configuration).
(2) Except for for TM171ODM22S: ∿ 12-24 V

Hardware control platform
Modicon M171/M172 logic controllers
M171 optimized logic controllers
Remote display
Wall thermostats

3

TM171DLED (1)

TM171DLCD2U

TM171DWAL2U

TM171DWAL2L

Remote display for M171 optimized logic controllers

The two available remote displays for the M171 optimized logic controllers offer, are distinguished by technology and mounting.
□ Technology: LED display or LCD display
□ Mounting: flush mounting – can be mounted on a cabinet door
The remote displays are connected to the LAN expansion bus which provides the power supply.

Reference			
Type	**Description**	**Reference**	**Weight kg/*lb***
Remote displays With realtime clock	■ LED display: 4 digits,7 segments ■ Keyboard: 4 buttons ■ Flush mounting ■ Communication port: 1 for LAN expansion bus – with wired connector *(1)* or screw terminal blocks	**TM171DLED**	0.042/ *0.090*
	■ LCD display (with segments) ■ Keyboard: 7 buttons ■ Flush mounting ■ Communication port: 1 for LAN expansion bus – with screw terminal blocks ■ 2 analog inputs □ 1 NTC or digital input □ 1 NTC or 4-20 mA or digital input	**TM171DLCD2U**	0.170/ *0.370*
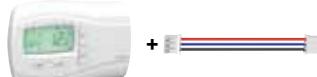
Wall thermostats for M171 optimized logic controllers

The two types of electronic wall thermostats available for the M171 optimized logic controllers offer are delivered with ot without backlight.
The wall thermostats have a realtime clock.

Reference			
Type	**Description**	**Reference**	**Weight kg/*lb***
Wall thermostats	Without backlight	**TM171DWAL2U**	0.143/ *0.320*
	With backlight	**TM171DWAL2L**	0.143/ *0.320*

*(1) Supplied with LAN expansion bus connector **TM171ACB4OLAN***

Presentation,
references

Hardware control platform
Modicon M171/M172 logic controllers
M171 optimized logic controllers
Connection accessories

Connection accessories (1) for M171 optimized logic controller (rail mounting): TM171OB22R, TM171OBM22R, TM171OD22R, TM171ODM22R, and TM171ODM22S
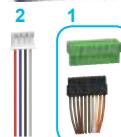
Connection accessories (1) for M171 optimized logic controller (flush mounting): TM171OF22R, and TM171OFM22R
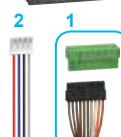
Connection accessories (1) for M171 optimized logic controller (rail mounting): TM171OBM14R, TM171OD14R, TM171ODM14R

Nota: terminal blocks are supplied with TM171OBM14R, TM171OD14R, and TM171ODM14R

Connection accessories for M171 optimized logic controllers
To be ordered separately

Type	Item	Description	Cable length (m/*ft.*)	Unit reference	Weight kg/*lb*
Low voltage connector **Sold in lots of 5**	1	Screw terminal block and a cordset equipped with a 20-pin connector on one end	1/*3.3*	**TM171ACB4OI1M**	0.575/ *1.270*
			2/*6.6*	**TM171ACB4OI2M**	1.120/ *2.470*
analog output connector (0-10 V outputs) **Sold in lots of 5**	2	Cordset equipped with a 4-pin connector on one end	1/*3.3*	**TM171ACB4OAO1M**	0.075/ *0.170*
			2/*6.6*	**TM171ACB4OAO2M**	0.125/ *0.280*
Modbus SL connector **Sold in lots of 5**	3	Cordset equipped with a 3-pin connector on one end	1/*3.3*	**TM171ACB4ORS485**	0.052/ *0.110*
LAN expansion bus connector **Sold in lots of 5**	4	Cordset equipped with a 3-pin connector at each end	2/*6.6*	**TM171ACB4OLAN**	0.060/ *0.130*

(1) Minimum set for operating controllers.

3

Hardware control platform
Modicon M171/M172 logic controllers
M171 performance logic controllers

Presentation

The **M171 performance** logic controllers comprise 5 models that can be used to control from 3 up to 27 embedded I/Os (digital and analog).

■ Power supply: ⏦ 24 V or ⎓ 48 V

■ 2 types of housing:
□ with built-in display
□ without display
Each controller includes a connection (through the CAN expansion bus or through Modbus) for a remote display, available in the catalog.

■ 2 types of mounting:
□ 35 mm/*1.38 in.* ⊐ rail mounting: controllers to be mounted inside a cabinet
□ Flush mounting: controllers to be mounted on a cabinet door or wall-mounted using the wall support accessory, see page 3/17.

■ **M171 performance** logic controllers embed up to 3 communication ports:
□ On 35 mm/*1.38 in.* ⊐ rail mounting version:
 - 1 Modbus SL master/slave
 - 2 USB
 - 1 CAN expansion bus
□ On flush-mounting version:
 - 1 Modbus SL master/slave
 - 1 Modbus TCP and BACnet IP (B-AAC profile) (WebVisu)
 - 1 CAN expansion bus

■ **M171 performance** logic controllers are certified CE, cURus, CSA, EAC

Description

35 mm/*1.38 in.* ⊐ rail mounting performance controllers

TM171P●M27● performance logic controllers *(1)*
1 Connector for removable terminal block for digital inputs
2 Connector for removable terminal block for analog inputs
3 Connector for removable terminal block for Modbus SL
4 Connector for removable terminal block for CAN expansion bus
5 4-position DIP switches for address selection
6 5 command keys for setting controller parameters
7 Connector for removable terminal block for power supply (⏦ 24 V, ⎓ 48 V)
8 Connector for removable terminal block for fast digital input (high speed counter)
9 Connector for removable terminal block for digital outputs
10 Connector for removable terminal block for analog outputs
11 Mounting clips for 35 mm/*1.38 in.* ⊐ rail mounting
12 On TM171PDM27●: display
On TM171PBM27R: 6- and 10-position DIP switches, behind a front panel
Behind the removable protective cover: 13 and 14
13 USB mini-B port to link a PC
14 USB-A port for USB stick
15 Connector for communication modules
16 3 status LEDs
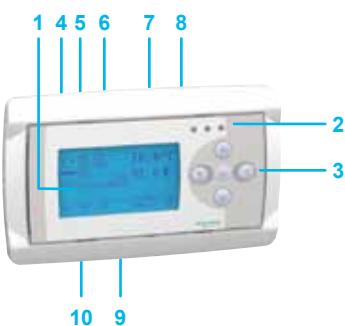
Flush mounting performance controllers

TM171PFE03R●●● performance logic controllers *(2)*
1 Display
2 3 status LEDs
3 5 command keys for setting controller parameters
On the rear side of the controller
4 Terminal block for power supply (⏦ 24 V or ⎓ 48 V)
5 Terminal block for CAN expansion bus
6 Terminal block for Modbus SL
7 Terminal block for analog input
8 RJ45 connector for Ethernet
9 Built-in NTC sensor (analog)
10 Built-in humidity sensor (analog) (on TM171PFE03HR)

(1) TM171ASCTB27 removable terminal blocks to be ordered separately (see page 3/17).
(2) Terminal blocks supplied with flush-mounting version of performance controllers.

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References

Hardware control platform
Modicon M171/M172 logic controllers
M171 performance logic controllers

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TM171PBM27R

TM171PDM27R

TM171PDM27S

TM171PFE03

TM171PFE03HR

TM171ABKPB

TM171ABKPG

TM171ASCTB27

TM171DGRP

M171 performance logic controllers

Power supply: ~ 24 V, --- 48 V

35 mm/*1.38 in.* ⊔ rail mounting performance controllers

No. of I/Os	Number and type of channels		Display	Embedded communication port	Reference	Weight kg/*lb*
	Inputs	Outputs				
27	**9 digital inputs (8 + 1):** □ 2 groups of 4 digital inputs, ~ 24 V or --- 48 V □ 1 fast digital input or high speed counter, volt-free	**7 digital outputs:** □ 2 SPDT (8 A, ~ 230 V) with independent common □ 5 SPST (5 A, ~ 230 V) with independent common	Remote display (optional)	□ 1 removable connector for Modbus SL (master/ slave) □ 1 removable connector for CAN expansion bus	**TM171PBM27R**	0.385/ *0.850*
	6 configurable analog inputs: □ 2 NTC or digital input □ 4 NTC, PT1000, 4-20 mA, 0-5 V, 0-10 V, 0-30 kΩ/0-5 kΩ variable resistor, or digital inputs	**5 analog outputs:** □ 3x 0...+10 V or 4-20 mA □ 2x 0...+10 V, or 4-20 mA, or digital output open collector	Built-in display 128 x 64 LCD with backlight	□ 1 removable connector for Modbus SL (master/ slave) □ 1 removable connector for CAN expansion bus	**TM171PDM27R**	0.385/ *0.850*
		7 digital outputs: □ 2 SPDT (8 A, ~ 230 V) with independent common □ 3 SPST (5 A, ~ 230 V) with independent common □ 2 SSR (1 A, ~ 230 V) outputs	Built-in display	□ 1 removable connector for Modbus SL (master/ slave) □ 1 removable connector for CAN expansion bus	**TM171PDM27S**	0.385/ *0.850*
		5 analog outputs: □ 3x 0...+10 V or 4-20 mA □ 2x 0...+10 V, or 4-20 mA, or digital output open collector				

Flush mounting performance controllers (to be used with the wall support accessory – see below)

No. of I/Os	Number and type of channels		Display	Embedded communication port	Reference	Weight kg/*lb*
	Inputs	Outputs				
3	**3 configurable analog inputs:** □ 1 built-in NTC □ 1 NTC or digital input □ 1x 4-20 mA or 0-10 V	–	Built-in display	□ 1 removable connector for Modbus SL (master/ slave) or BACnet MS/ TP (B-AAC profile) □ 1 removable connector for CAN expansion bus □ 1 RJ45 for Modbus TCP and BACnet/IP	**TM171PFE03**	0.320/ *0.710*
	3 configurable analog inputs: □ 1 built-in NTC □ 1 NTC or digital input □ 1 built-in humidity sensor	–	Built-in display	□ 1 removable connector for Modbus SL (master/ slave) □ 1 removable connector for CAN expansion bus □ 1 RJ45 for Modbus TCP and BACnet IP (B-AAC profile) and MS/TP (B-AAC profile)	**TM171PFE03HR**	0.350/ *0.770*

Accessories for M171 performance logic controllers
To be ordered separately

Designation	Use		Reference	Weight kg/*lb*
Screw terminal blocks	For TM171PBM27R, TM171PDM27R, and TM171PDM27S		**TM171ASCTB27**	0.100/ *0.220*

Designation	Use	Description	Reference	Weight kg/*lb*
Wall support for flush mounting performance logic controllers	For TM171PFE03 and TM171PFE03HR	White	**TM171ABKPB**	0.015/ *0.030*
		Grey	**TM171ABKPG**	0.015/ *0.030*

Remote display, HMI

Type	Description	Reference	Weight kg/*lb*
Remote display	128 x 64 LCD, with backlight Use for **M171** and **M172 performance** logic controllers	**TM171DGRP**	0.197/ *0.430*
HMI Magelis STU/STO	See page 6/14		

Hardware control platform
Modicon M171/M172 logic controllers
M172 performance logic controllers

Presentation

The **M172 performance** logic controllers comprise 6 models that can be used to control from 28 up to 42 embedded I/Os (digital and analog).

■ Power supply: ⏦ 24 V

■ 2 types of housing:
□ with built-in display
□ without display
Each performance controller type TM172P includes a connection (through the CAN expansion bus or through Modbus) for a remote display, available in the catalog.

■ 2 types of mounting:
□ 35 mm/*1.38 in.* ⎍ rail mounting: controllers to be mounted inside a cabinet
□ on panel with an accessory: each M172 performance controller can be mounted on a panel with the **TM172AP12PM** fixing accessory.

■ **M172 performance** logic controllers embed up to 4 communication ports:
□ 2 for Modbus SL (master/slave) (only 1 master) or 1 for BACnet MS/TP (B-AAC profile)
□ 1 for Modbus TCP and BACnet IP (B-AAC profile) (RJ45)
□ 1 for CAN expansion bus,
□ plus a communication module connector.

■ The **M172 performance** logic controllers are certified CE, cURus *(1)*, CSA *(2)*, EAC *(2)*.

Micro SD card

A slot for a micro SD memory card is available on the front face of each Modicon M172 performance controllers.
The micro SD card is used for:
□ Data-logging
□ Webserver storage

Description

M172 performance controllers logic controllers *(3)*
1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile)
2 Connector for removable terminal block for digital outputs
3 Connector for removable terminal block for power supply (⏦ 24 V)
4 Connector for removable terminal block for analog inputs
5 Connector for removable terminal block for digital intputs
6 Connector for removable terminal block for fast digital input (high speed counter)
7 Connector for removable terminal block for analog outputs
8 Connector for removable terminal block for RS485-1 (Modbus SL or BACnet MS/TP)
9 Connector for removable terminal block for RS485-2 (Modbus SL or BACnet MS/TP)
10 Connector for removable terminal block for CAN expansion bus
11 Slot for micro SD card
12 Slot for battery (behind the front flap)
13 On TM172PDG●●●: Built-in display, 4 status LEDs and 5 command keys for setting controller parameters
On TM172PBG●●●: 4 status LEDs and 5 command keys for setting controller parameters, behind a front panel
14 Connector for communication modules
15 USB mini-B port to link a PC
16 USB-A port for USB stick
17 Mounting clips for 35 mm/*1.38 in.* ⎍ rail mounting
18 2 Slots for the **TM172AP12PM** fixing accessory

(1) November 2015
(2) Pending
(3) TM172ASCTB28 and TM172ASCTB42 removable terminal blocks to be ordered separately (see page 3/19).

Schneider
Electric

References

Hardware control platform
Modicon M171/M172 logic controllers
M172 performance logic controllers

3

TM172PBG●●●

TM172PDG●●●

TM172ASCTB28

TM172ASCTB42

TM172AP12PM

TM171DGRP

M172 performance logic controllers

Power supply: ⎓ 24 V

35 mm/*1.38 in.* ⎍ **rail mounting performance controllers, and Panel mounting with accessory**

No. of I/Os	Number and type of channels		Display	Embedded communication port	Reference	Weight kg/*lb*
	Inputs (1)	Outputs				
28	**8 digital inputs:** □ 6 ∼ or ⎓ 24 V □ 2 high speed counters, dry contact **8 analog inputs, configurable by pair:** 8 NTC, or PT1000 (- 200 °C to + 850 °C/ *-328 to +1562 °F*), or PTC, or 0-20 mA , or 4-20 mA, or 0-5 V, or 0-10 V, or digital input	**8 digital outputs:** □ 1 SPDT Relay 1 A □ 3 SPST with the same common □ 2 SPST with the same common □ 2 SPST with independent common □ Optional 2 SSR with independent common for **TM172PDG28S** only **4 analog outputs:** □ 2x 0-10 V, or 4-20 mA, or PWM (2 kHz, ⎓ 24 V) □ 2x 0-10 V	Remote display (optional)	□ 2 removable connectors for Modbus SL (master/ slave) (only 1 master), or 1 for BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (RJ45) □ 1 removable connector for CAN expansion bus	**TM172PBG28R**	0.300/ *0.661*
			Built-in display 128 x 64 LCD with backlight	□ 2 removable connectors for Modbus SL (master/ slave) (only 1 master), or 1 for BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (RJ45) □ 1 removable connector for CAN expansion bus	**TM172PDG28R**	0.300/ *0.661*
					TM172PDG28S	0.300/ *0.661*
42	**12 digital inputs:** □ 10 ∼ or ⎓ 24 V □ 2 high speed counter, dry contact **12 analog inputs, configurable by pair:** □ 12 NTC, or PT1000 (-200° C to 850° C/ *-328 to +1562 °F*), or PTC, or 0-20 mA, or 4-20 mA, or 0-5 V, or 0-10 V, or digital input	**12 digital outputs:** □ 2 SPDT relay 1 A □ 3 SPST with the same common □ 3 SPST with the same common □ 2 SPST with the same common □ 2 SPST with independent common □ Optional 2 SSR with independent common for **TM172PDG42S** only **6 analog outputs:** □ 2x 0-10 V, or 4-20 mA, or PWM (2 kHz, ⎓ 24 V) □ 4x 0-10 V	Remote display (optional)	□ 2 removable connectors for Modbus SL master/slave (only 1 Master), or 1 for BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (RJ45) □ 1 removable connector for CAN expansion bus	**TM172PBG42R**	0.385/ *0.849*
			Built-in display 128 x 64 LCD with backlight	□ 2 removable connectors for Modbus SL master/slave (only 1 Master), or 1 for BACnet MS/TP (B-AAC profile) □ 1 RJ45 connector for Modbus TCP and BACnet IP (B-AAC profile) (RJ45) □ 1 removable connector for CAN expansion bus	**TM172PDG42R**	0.385/ *0.849*
					TM172PDG42S	0.385/ *0.849*

Accessories for M172 performance logic controllers
To be ordered separately

Designation	Use	Reference	Weight kg/*lb*
Screw terminal blocks	For TM172P●●●28● performance logic controllers	**TM172ASCTB28**	0.100/ *0.220*
	For TM172P●●●42● performance logic controllers	**TM172ASCTB42**	0.150/ *0.331*
Fixing accessory: 12 clips-on lock for panel mounting	For mounting M172 performance logic controllers on panel	**TM172AP12PM**	0.050/ *0.110*

Remote display, HMI

Type	Use	Description	Reference	Weight kg/*lb*
Remote display	For M172 performance logic controllers	128 x 64 LCD, with backlight	**TM171DGRP**	0.197/ *0.430*
HMI Magelis STU/STO	See page 6/14			

Hardware control platform
Modicon M171/M172 logic controllers
I/O expansion modules

Presentation

5 I/O expansion modules are available, 2 of which are dedicated to **M171** and **M172 performance** logic controllers, and 3 of which are for **M171 optimized** logic controllers (see compatibility table below).

■ They are used to increase the number of I/Os:
☐ up to 44 on **M171 optimized** logic controllers
☐ up to 351 on **M171 performance** logic controllers
☐ up to 366 on **M172 performance** logic controllers

■ Expanded I/O types are digital and analog I/Os

■ They are connected:
☐ Via the LAN expansion bus on **M171 optimized** logic controllers
☐ Via the CAN expansion bus on **M171** and **M172 performance** logic controllers

Compatibility between logic controllers and I/O expansion modules

Logic controller type	Reference	Compatible I/O expansion module (reference)
M171 optimized	TM171OBM14R TM171OD14R TM171ODM14R	TM171EO14R
	TM171OB22R TM171OBM22R TM171OD22R TM171ODM22R TM171ODM22S TM171OF22R TM171OFM22R	TM171EO15R TM171EO22R
M171 performance	TM171PBM27R TM171PDM27R TM171PDM27S TM171PFE03 TM171PFE03HR	TM171EP14R TM171EP27R
M172 performance	TM172PBG28R TM172PDG28R TM172PDG28S TM172PBG42R TM172PDG42R TM172PDG42S	

Description

35 mm/*1.38 in.* ⌐ rail mounting I/O expansion modules

TM171EP27R expansion module *(1)*
1 Connector for removable terminal block for digital inputs
2 Connector for removable terminal block for analog inputs
3 Connector for removable terminal block for Modbus SL
4 Connector for removable terminal block for CAN expansion bus
5 4-position DIP switches for address selection
6 Connector for removable terminal block for power supply ($\sim$ 24 V, $---$ 48 V)
7 Connector for removable terminal block for fast digital input
8 Connector for removable terminal block for digital outputs
9 Connector for removable terminal block for analog outputs
10 Clip for 35 mm/*1.38 in.* ⌐ rail mounting
11 6- and 10-position DIP switches for address selection
12 3 status LEDs

TM171EP14R expansion module *(1)*
1 4-position DIP switches
2 Connector for removable terminal block for CAN expansion bus
3 Removable terminal block for digital outputs
4 Behind the removable protective cover: Service port (TTL)
5 Connector for low voltage I/Os
6 Clip for 35 mm/*1.38 in.* ⌐ rail mounting
7 Connector for removable terminal block for power supply ($\sim$ 24 V

TM171EO●●R expansion modules *(1)*
1 Service port (TTL)
2 Wired connector for removable terminal block for Modbus SL
3 Connector for removable terminal block for digital outputs
4 Wired connector for removable terminal block for power supply ($\sim$ 12-24 V or $---$ 24 V),
5 Wired connector for low voltage I/Os
6 Clip for 35 mm/*1.38 in.* ⌐ rail mounting
7 Wired connector for removable terminal block for analog outputs
8 Wired connector for removable terminal block for LAN expansion bus

(1) Removable terminal blocks to be ordered separately, except for TM171EO14R, see page 3/21.
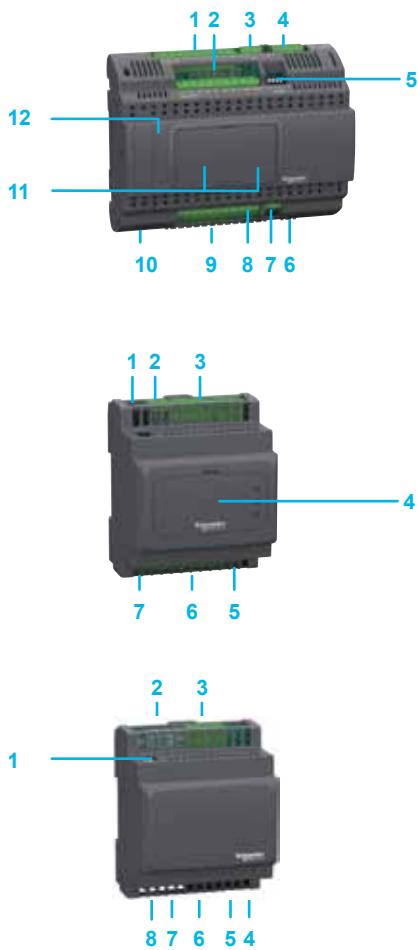
Hardware control platform
Modicon M171/M172 logic controllers
I/O expansion modules

TM171EP14R

TM171EP27R

TM171EO14R

TM171EO15R

TM171EO22R

3

Connection accessories (2)
for expansion modules:
TM171EO15R, M171EO22R

TM171ASCTB14

TM171ASCTB27

I/O expansion modules for Modicon M171 and M172 performance logic controllers
35 mm/*1.38 in.* ⌐ **rail mounting expansion modules**

No. of I/Os	Number and type of channels		Compatibility with logic controller	Embedded communication connection	Reference	Weight kg/*lb*
	Inputs	**Outputs**				
14	**4 digital inputs:** ∿ 24 V or ⎓ 24V **4 analog inputs:** (configurable by pair) NTC, PT1000, PTC, 4-20 mA, 0-5 V, 0-10 V, or digital inputs	**4 digital outputs:** □ 1 SPDT (5 A, ∿ 230 V) with independent common □ 3 SPST (3 A, ∿ 230 V) with independent common **2 analog outputs:** 0-10 V	TM171P●●●● TM172P●●●●	□ 1 removable connector for CAN expansion bus	**TM171EP14R**	0.190/ *0.420*
27	**9 digital inputs (8 + 1):** □ 2 groups of 4 digital inputs, ∿ 24 V or ⎓ 48 V □ 1 fast digital input or high speed counter, volt-free **6 analog inputs:** □ 2 NTC or digital inputs □ 4 NTC, 4-20 mA, 0-10 V, or digital inputs	**7 digital outputs:** □ 2 SPDT (8 A, ∿ 230 V) with independent common □ 5 SPST (5 A, ∿ 230 V) with independent common **5 analog outputs:** □ 0-10 V, or 4-20 mA	TM171P●●●● TM172P●●●●	□ 1 removable connector for CAN expansion bus	**TM171EP27R**	0.385/ *0.850*

I/O expansion modules for Modicon M171 optimized logic controllers
35 mm/*1.38 in.* ⌐ **rail mounting expansion modules**

No. of I/Os	Number and type of channels		Compatibility with logic controller	Embedded communication connection	Reference	Weight kg/*lb*
	Inputs	**Outputs**				
14	**2 digital inputs:** 2 open collector or digital inputs *(1)* **5 configurable analog inputs:** □ 2 NTC, PT1000 or digital inputs □ 2 NTC, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs □ 1 NTC, PT1000, 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 0-1 V, or digital inputs	**4 digital outputs:** □ 3 SPST (2 A, ∿ 230 V) with the same common □ 1 SPDT (2 A, ∿ 230 V) **5 analog outputs:** □ 2 open collector for 12 V PWM/PPM or digital inputs *(1)* □ 2x 0-10 V □ 1x 4-20 mA	TM171OBM14R TM171OD14R TM171ODM14R	□ 1 wired connector for LAN expansion bus	**TM171EO14R**	0.190/ *0.420*
15	**6 digital inputs:** volt-free **3 analog inputs:** NTC or digital inputs	**4 digital outputs:** □ 3x 2 A, ∿ 250 V □ 1 open collector **2 analog outputs:** open collector (PPM/PWM)	TM171OB22R TM171OBM22R TM171OD22R TM171ODM22R TM171ODM22S TM171OF22R TM171OFM22R	□ 1 wired connector for LAN expansion bus	**TM171EO15R**	0.190/ *0.420*
22	**6 digital inputs:** volt-free **5 analog inputs:** □ 3 NTC or digital inputs □ 2 NTC, 0-20 mA, 4-20 mA, 0-10 V, or digital inputs	**6 digital outputs:** □ 5x 2 A, ∿ 250 V □ 1 open collector **5 analog outputs:** □ 2 open collector (PPM/ PWM) □ 2x 0-10 V □ 1x 0-20 mA/4-20 mA	TM171OB22R TM171OBM22R TM171OD22R TM171ODM22R TM171ODM22S TM171OF22R TM171OFM22R	□ 1 wired connector for LAN expansion bus	**TM171EO22R**	0.190/ *0.420*

Accessories for I/O expansion modules

Designation	Description	Cable length (m/*ft.*)	Unit reference	Weight kg/*lb*
Accessories – To be ordered separately				
analog output connector (0-10 V outputs) **Sold in lots of 5 (item 1)**	Cordset equipped with a 4-pin connector on one end	1/*3.3*	**TM171ACB4OAO1M**	0.075/ *0.170*
		2/*6.6*	**TM171ACB4OAO2M**	0.125/ *0.280*
Low voltage connector **Sold in lots of 5 (item 2)**	Screw terminal block and a cordset equipped with a 20-pin connector on one end	1/*3.3*	**TM171ACB4OI1M**	0.575/ *1.270*
		2/*6.6*	**TM171ACB4OI2M**	1.120/ *2.470*
Accessory – Supplied with each expansion module				
LAN expansion bus connector **Sold in lots of 5 (item 3)**	Cordset equipped with a 3-pin connector at each end	2/*6.6*	**TM171ACB4OLAN**	0.060/ *0.130*
Accessories – Supplied with TM171EP14R TM171EP27R				
Screw terminal blocks (inputs, outputs, and communication bus)	14 I/Os – For TM171EP14R	–	**TM171ASCTB14**	0.050/ *0.110*
	27 I/Os – For TM171EP27R	–	**TM171ASCTB27**	0.100/ *0.220*

(1) On the same channel: 2 digital inputs or 2 analog outputs (depending on the configuration).
(2) Minimum set for operating controllers.

Hardware control platform
Modicon M171/M172 logic controllers
Communication modules for M171 performance and
M172 performance logic controllers

Presentation

The communication module offer is dedicated to the 35 mm/*1.38 in.* ⌐ rail mounting
version of **M171 performance** and **M172 performance** logic controllers *(1)*.
The 8 optional modules provide specific connections:

■ To fieldbuses, including:
□ CAN bus
□ Modbus TCP
□ Profibus
□ Modbus SL (RS 485)
□ BACnet MS/TP (B-AAC profile)
□ BACnet IP (B-AAC profile)
□ RS 232 serial link
□ LonWorks (FFT-10)
□ Konnex (KNX) via Schneider Electric' spaceLYnk gateway, see page 5/5

■ To services, including:
□ Ethernet
□ WebVisu and remote download functions

■ They are mounted by simple interlocking on the left-hand side of an **M171
performance** or an **M172 performance** logic controller *(1)*.

■ Only one communication module can be added to a performance logic controller.
The communication module is powered by the controller.

■ Each communication module has its own type of connector, adapted to the bus
or communication network (see details in the reference table, page 3/23).

Description

35 mm/*1.38 in.* ⌐ rail mounting

TM171A●●●● I/O communication modules
1 Communication connector *(2)*
2 Locking device
3 Expansion connector to the performance controller type TM171P or TM172P *(1)*
4 Clip for 35 mm/*1.38 in.* ⌐ rail mounting
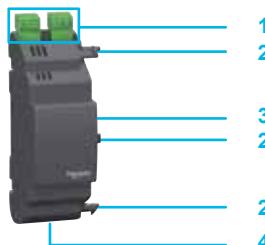
*(1) Compatibility between **M171** and **M172 performance** logic controllers and communication modules, see table below:*

Compatibility between performance logic controllers and communication modules		
Logic controller		Compatible communication modules
Type	**Reference**	
M171 performance logic controller	**TM171PBM27R** **TM171PDM27R** **TM171PDM27S**	**TM171ACAN** **TM171AETH** **TM171APBUS** **TM171AMB** **TM171ARS485** **TM171ARS232** **TM171AETHRS485** **TM171ALON**
M172 performance logic controller	**TM172PBG28R** **TM172PDG28R** **TM172PDG28S** **TM172PBG42R** **TM172PDG42R** **TM172PDG42S**	**TM171ACAN** **TM171AMB** **TM171ARS485** **TM171ARS232** **TM171ALON**

(2) Communication connector type depends on communication modules, see detail next page.

Schneider Electric

Hardware control platform
Modicon M171/M172 logic controllers
Communication modules for M171 performance and
M172 performance logic controllers

TM171ACAN

TM171AETH

TM171APBUS

TM171AMB

TM171ARS485

TM171ARS232

TM171AETHRS485

TM171ALON

Communication modules					
For M171 and M172 performance logic controllers (35 mm/*1.38 in.* ⌐ **rail mounting version**)					
Designation	**Compatibility with logic controller**	**Fieldbus, services access**	**Communication port**	**Reference** *(1)*	**Weight kg/*lb***
Communication modules	**M171 performance, M172 performance**	□ CAN	□ 2 screw terminal blocks *(1)*	**TM171ACAN**	0.077/ *0.170*
	M171 performance	□ Modbus TCP □ Ethernet □ BACnet IP (B-AAC profile) □ WebVisu and remote download functions	□ 1 RJ45	**TM171AETH**	0.077/ *0.170*
	M171 performance	□ Profibus	□ 1 SUB-D 9	**TM171APBUS**	0.077/ *0.170*
	M171 performance, M172 performance	□ Modbus SL (RS 485)	□ 2 screw terminal blocks *(1)*	**TM171AMB**	0.077/ *0.170*
	M171 performance, M172 performance	□ Modbus SL or BACnet MS/TP (B-AAC profile)	□ 2 screw terminal blocks *(1)*	**TM171ARS485**	0.077/ *0.170*
	M171 performance, M172 performance	□ RS 232 serial link □ Relay output	□ 1 SUB-D 9 for RS 232 □ 1 screw terminal block for relay output *(1)*	**TM171ARS232**	0.077/ *0.170*
	M171 performance	□ Modbus TCP and BACnet/IP □ Modbus SL or BACnet MS/TP (B-AAC profile) □ WebVisu and remote download functions □ Ethernet	□ 1 RJ45 for Ethernet □ 2 screw terminal blocks for RS 485 *(1)*	**TM171AETHRS485**	0.077/ *0.170*
	M171 performance, M172 performance	□ LonWorks (FFT-10)	□ 1 screw terminal block for LON bus	**TM171ALON**	0.077/ *0.170*

(1) Removable terminal blocks supplied with communication modules.

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Hardware control platform
Modicon M171/M172 logic controllers
Electronic expansion valve drivers

Presentation

Electronic expansion valve drivers

The 3 types of electronic expansion valve drivers are used to control the electronic expansion valve so as to control superheat after the evaporator.

■ They are compatible with each performance or optimized logic controllers.

■ They operate independently on measurement accessories such as:
□ NTC or PT1000 probes
□ Pressure transducers

■ The 3 available electronic expansion valve drivers are compatible with competing valve brands such as those given in the table below:

Electronic expansion valve drivers Brand and type	Expansion valves Brand and type
Schneider Electric TM171VEVA2, TM171VEVD4, TM171VEVM4	**ELIWELL™** SXVB
	ALCO™ EX4, EX5, EX6, EX7, EX8 EXM246/EXL246
	DANFOSS™ ETS50, ETS100
	SPORLAN™ SER(I) G, J, K,B, C, D SER1.5 to 20, SEI 30,50, SEH
	SANHUA™ DPF(Q)/DPF(T01)

Description

35 mm/*1.38 in.* ⊐ rail mounting

TM171V●● electronic expansion valve drivers *(1)*
1 Output terminal block and power supply connector (∿ 24 V)
2 Protective cover
3 3 status LEDs
Behind the removable protective cover:
4 6-position DIP switches
5 Status LED (for operation with TM171AMFK programming stick)
6 LAN serial port for connecting TM171DLED remote display
7 Terminal block for analog/digital inputs
8 Clip for 35 mm/*1.38 in.* ⊐ rail mounting
9 TTL programming port
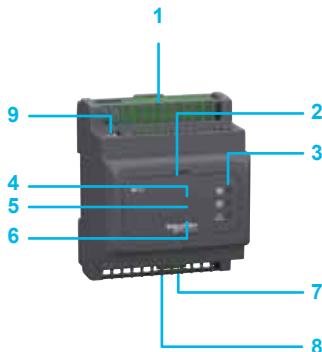
(1) TM171ASCTBVEV screw terminal block to be ordered separately.

Schneider Electric

References

Hardware control platform
Modicon M171/M172 logic controllers
Electronic expansion valve drivers

TM171VEVA2

TM171VEVD4

TM171VEVM4

3

Electronic expansion valve drivers

Application	Number and type of channels		Reference	Weight kg/*lb*
	Inputs	**Outputs**		
Actuator, convert 0-10 V or 4-20 mA in opening position contact	**1 analog input:** □ 1x 4-20 mA, 0-5 V, or 0-10V	**1 digital output:** □ 1 open collector (100 mA, ⎓ 12 V)	**TM171VEVA2**	0.190/ *0.420*
Autonomous, wired to manage On/Off contact	**2 digital inputs:** □ 2 volt-free **4 analog inputs:** □ 2 NTC (-50…+110 °C, -40…+150 °C /*-58…+203 °F, -40…+302 °F*), PT1000, 4-20 mA, 0-5 V, or 0-10 V □ 2 NTC (-50…+110 °C, -40…+150 °C /*-58…+203 °F, -40…+302 °F*), or PT1000 *(1)*	**2 digital outputs:** □ 1 open collector (100 mA, ⎓ 12 V) □ 1 SPST NO relay contact, 5 A, ∿ 250 V	**TM171VEVD4**	0.190/ *0.420*
Autonomous, managed by Modbus (RS 485)	**2 digital inputs:** □ 2 volt-free **4 analog inputs:** □ 2 NTC (-50…+110 °C, -40…+150 °C/ *-58…+203 °F, -40…+302 °F*), PT1000, 4-20 mA, 0-5 V, or 0-10 V *(1)* □ 2 NTC (-50…+110 °C, -40…+150 °C/ *-58…+203 °F, -40…+302 °F*), or PT1000 *(1)*	**2 digital outputs:** □ 1 open collector (100 mA, ⎓ 12 V) □ 1 SPST NO relay contact, 5 A, ∿ 250 V	**TM171VEVM4**	0.190/ *0.420*

Accessories for Electronic expansion valve drivers
To be ordered separately

Designation	For connecting	Reference	Weight kg/*lb*
Screw terminal block for electronic expansion valve drivers	Power supply, sensor power supply, digital and analog I/O, Modbus link	**TM171ASCTBVEV**	0.050/ *0.110*

TM171ASCTBVEV

(1) 2 PT1000 (-50…+99.9 ° C / -58… + 211.82 °F)

Hardware control platform
Modicon M171/M172 logic controllers
Measurement accessories

TM1SH3●4

TM1SH284

TM1STNTCRN615●●

TM1STNTCSF440●●

TM1STNTCSN620●●

TM1STNTCTN620●●

TM1STNTCRN520●●

TM1STNTCWN65605●●

TM1STNTCWN75750●●

TM1STPTTSN620●●

TM1STPTTSN520●●

Measurement accessories					
Application	**Description**	**Sold in lots of**	**Cable length m/*ft.***	**Unit reference**	**Weight kg/*lb***
Humidity & temperature probe	□ IP 65 □ 4-20 mA □ Wall mounting □ Measuring ranges: 0…100%, - 40…60 °C / *-40…140 °F*	–	–	**TM1SH314**	0.176/ *0.390*
Humidity probe	□ IP 65 □ 4-20 mA □ Wall mounting □ Measuring ranges: 0…100%	–	–	**TM1SH304**	0.170/ *0.370*
Humidity probe (sensor equipped with a cable)	□ IP 54 □ 4-20 mA □ Measuring ranges: 15…90%	–	3/*9.84*	**TM1SH284**	0.138/ *0.300*
NTC probes (sensor equipped with a cable)	□ IP 67 □ Sensor 6x 15 mm / *0,591 in.* □ -50…+110 °C/*-122…+230 °F* □ Grey	8	1.5/*4.92*	**TM1STNTCRN61515**	0.104/ *0.230*
		5	3/*9.84*	**TM1STNTCRN61530**	0.125/ *0.280*
		4	5/*16.40*	**TM1STNTCRN61550**	0.164/ *0.360*
	□ FAST IP 67 □ 4x 40 mm / *1.57 in.* □ -50…+110 °C/*-122…+230 °F* □ Grey	8	1.5/*4.92*	**TM1STNTCSF44015**	0.144/ *0.320*
		5	3/*9.84*	**TM1STNTCSF44030**	0.175/ *0.390*
	□ IP 68 □ 6x 20 mm / *0,79 in.* □ -50…+110 °C/*-122…+230 °F* □ Grey	8	1.5/*4.92*	**TM1STNTCSN62015**	0.144/ *0.320*
		5	3/*9.84*	**TM1STNTCSN62030**	0.175/ *0.390*
		4	5/*16.40*	**TM1STNTCSN62050**	0.232/ *0.510*
	□ IP 68 □ 6x 20 mm / *0,79 in.* □ TPE □ with strap □ Grey	8	1.5/*4.92*	**TM1STNTCTN62015**	0.152/ *0.340*
		5	3/*9.84*	**TM1STNTCTN62030**	0.180/ *0.400*
	□ IP 68 □ 5x 20 mm / *0,79 in.* □ -50…+110 °C/*-122…+230 °F* □ Grey	8	1.5/*4.92*	**TM1STNTCRN52015**	0.144/ *0.320*
		5	3/*9.84*	**TM1STNTCRN52030**	0.180/ *0.400*
		4	5/*16.40*	**TM1STNTCRN52050**	0.228/ *0.500*
NTC probes for air wall mounting	□ Outdoor mounting	–	–	**TM1STNTCWN65605**	0.050/ *0.110*
	□ Indoor mounting	–	–	**TM1STNTCWN75750**	0.050/ *0.110*
PT1000 probes	□ IP 68 □ 6x 20 mm / *0,79 in.* □ -50…+110 °C/*-122…+230 °F* □ Green	8	1.5/*4.92*	**TM1STPTTSN62015**	0.144/ *0.320*
		5	3/*9.84*	**TM1STPTTSN62030**	0.175/ *0.390*
	□ IP 68 □ 5x 20 mm / *0,79 in.* □ -50…+110 °C/*-122…+230 °F* □ Green	8	1.5/*4.92*	**TM1STPTTSN52015**	0.136/ *0.300*
		5	3/*9.84*	**TM1STPTTSN52030**	0.175/ *0.390*
		4	5/*16.40*	**TM1STPTTSN52050**	0.232/ *0.510*

Presentation

Hardware control platform
Modicon M171/M172 logic controllers
Measurement accessories

XMLP pressure transmitters
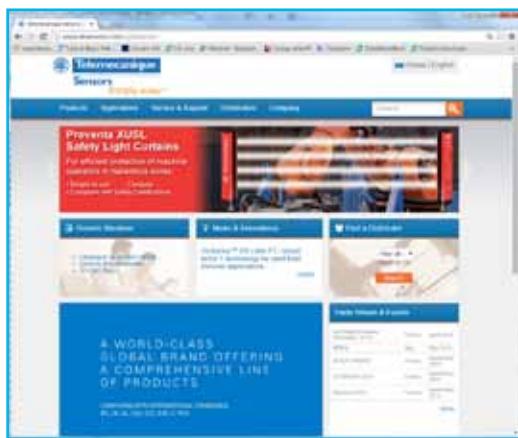
> Discover XMLP offer on the web site:
  http://www.tesensors.com/global
> Access to the catalog by product at this URL:
  http://www.tesensors.com/global/en/product/catalog/

Schneider Electric recommends his partner Telemecanique Sensors, which proposes a range of pressure transmitters: XMLP

Presentation

XMLP pressure transmitters are characterised by their "thin film" technology. The stainless steel capsule holding the sensing element is welded directly onto the transmitter's stainless steel body, which provides the following advantages:
> No gasket comes into contact with the fluid
> Compatibility with a large number of fluids:
  - Hydraulic oils
  - Air
  - Fresh water
  - Refrigeration fluids
  - All fluids or gases compatible with stainless steel AISI 304

XMLP pressure transmitters can control fluids from - 30 to 120°C / 86 to 248 °F. Their power supply depends on the type of analog output:
> 5 V +/- 5% for the 0.5…4.5 V ratiometric output
> 12 or 24 V (nominal), operating from 8 to 30 V for the 4…20 mA output
> 24 V (nominal), operating from 14 to 30 V for the 0…10 V output

Made of 304 stainless steel, XMLP pressure transmitters are compact and rugged. Their degree of protection varies according to the type of connector:
> IP 65 for versions with connector EN 175301-803-A
> IP 65 and IP 67 for Packard Metri-Pack connector versions
> IP 65, IP 67 and IP 69K for M12 connector versions

With typical precision better than 0.5% of the rating, these transmitters are particularly suitable for industrial applications such as:
> Machine tools
> Moulding presses
> Stamping presses
> Lifting gear
> Air-conditioning systems (HVAC)

Functions

XMLP pressure transmitters have an analog output which delivers a signal proportional to the measured pressure. This output can be one of the following types:
> 4…20 mA
> 0…10 V
> 0.5…4.5 V

The pressure ranges available are:
> 0…10 bar to 0…600 bar or
> 0…100 psi to 0…10,000 psi

The XMLP offer is available in three types of electrical connection:
> M12, 4-pin connector
> EN 175301-803-A connector (ex-DIN 43650)
> Packard Metri-Pack 150 connector

Several types of fluid connection are available:
> G1/4 A male
> SAE 7/16-20UNF-2A male
> SAE 7/16-20UNF-2B female (with Schrader pin)
> 1/4"-18 NPT male

Nota: XMLP pressure transmitters are sold individually or in lots of 40.

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Chapter **4**

Programming software

Contents

Modicon M171/M172 logic controllers for HVAC and Pumping solutions

4

Programming software
SoMachine HVAC programming software
for Modicon M171/M172 logic controllers

Presentation

Software solution

SoMachine HVAC programming software is compliant with IEC 61131-3. It can be used to develop, configure, and commission entire HVAC or Pumping solution systems.

SoMachine HVAC programming software

It includes:

■ Programming Modicon M171/M172 logic controllers (performance and optimized) and remote display units

■ Setting up expansion buses and networks

■ Creating the screen of the displays (built-in and displays of the M171/M172 logic controller offer)

■ Configuring BMS communication modules on BACnet MS/TP (B-AAC profile), Modbus SL, Modbus TCP, BAcnet MS/TP, BACnet IP (B-AAC profile), and LonWorks (FFT-10)

■ Dedicated libraries such as:
□ a library of application function blocks *(1)*
□ a library of Tested, Validated, and Documented Applications (TVDA)

■ Full simulation mode

General characteristics

Overview

Programming languages	■ ST (Structured Text) ■ FBD (Function Block Diagram) ■ LD (Ladder) ■ IL (Instruction List) ■ SFC (Sequential Function Chart)
Applications	■ Graphical and text-based languages: □ Adaptation to each developer background □ Library management □ Code debugging □ Parameter definition □ Simulation mode ■ Advanced programming: □ Vectors □ Pointers
System solutions management	■ Multi-target project ■ Management of Modbus data ■ Data exchange between several Modicon **M171/M172 performance** logic controllers
Graphical user interface	■ Graphic display: □ Multipage □ Buttons □ Edit box □ Static text □ Images □ Animations □ Bars □ Lists of data (parameters/variables/alarms) ■ Configurable buttons ■ Multilanguage ■ Automatic documentation
Communication bus configurators	■ Control networks: Modbus TCP, Modbus SL, Profibus ■ Expansion bus fieldbus: CAN expansion bus ■ BMS connectivity: BACnet MS/TP (B-AAC profile), BACnet IP (B-AAC profile), LonWorks (FFT-10)
Advanced simulation options	■ Full simulation □ I/O emulation □ HMI □ IEC code □ Live debug □ Triggers □ Oscilloscope
Advanced debugging and simulation options	■ Remote control/download: □ Modbus SL & TCP □ CAN □ Modem ■ Parameter management ■ Status monitoring ■ Field test: □ Oscilloscope □ Debug window □ Export to Excel

(1) For more information about Application Function Blocks, see chapter 2.

Schneider Electric

Programming software
SoMachine HVAC programming software
for Modicon M171/M172 logic controllers

Product offer

SoMachine HVAC software is supplied on a DVD or can be downloaded from our web site: www.schneider-electric.com > Solutions > Systems > Machine Control > HVAC control.

The product version concerned offers the SoMachine HVAC functions associated with logic controllers.

References

System configuration:
- Processor: Pentium 1.6 GHz or higher
- RAM: 1 GB; 2 GB recommended
- Hard disk: 500 MB minimum
- OS: 32-bit Windows; XP Pro SP3 or Windows 7 (32-bit or 64-bit) or Windows 8
- Drive: DVD drive
- Display: SVGA video card; 800×600, 128 MB; 1024×768, 256 MB recommended
- Peripheral device: A mouse or compatible pointing device
- Peripheral device: USB interface

**Local programming, download** - M171 & M172 performance - through USB port

Remote programming - M171 performance
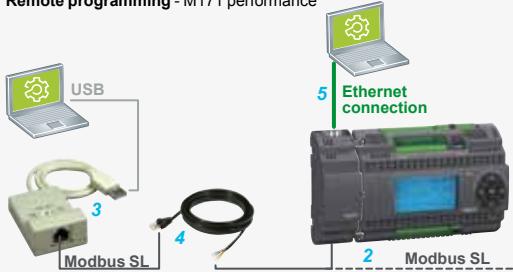
Remote programming - M172 performance

Local programming, download - M171 optimized - through TTL port

Remote programming - M171 optimized

SoMachine HVAC programming software

Application	Reference	Weight kg/*lb*
M171 optimized logic controllers, **M171 performance** logic controllers, and **M172 performance** logic controllers	**TM171SW**	0.050/ *0.110*

Programming accessories for M171 and M172 performance logic controllers

- The USB cable is recommanded for local programmation.
- Ethernet port is recommanded for remote download or remote programmation.

Description	Characteristics and use	Length m/*ft.*	Reference	Weight kg/*lb*
Programming through USB port				
Programming cables (*1*)	From the PC USB-A port to the USB mini-B port on M171 (*2*) and M172 performance logic controllers (*2*)	3/*0.98*	**TCSXCNAMUM3P** (*1*)	0.065/ *0.143*
		1.8/*5.90*	**BMXXCAUSBH018**	0.065/ *0.143*
Programming through Modbus SL and/or Ethernet				
USB to RS485 converter (*3*)	To be used on M171 (*2*) and M172 performance logic controllers (*2*) Equipped with 1 RJ45 connector on the controller side and 1 USB-A connector on the PC side	0.4/*1.31*	**TSXCUSB485**	0.144/ *0.320*
Connection cable for Modbus serial link (*4*)	Equipped with 1 RJ45 connector at one end and flying leads at the other end	3/*9.84*	**VW3A8306D30**	0.250/ *0.550*
Ethernet connection cable				
Ethernet ConneXium cable - shielded twisted pair straight cord (*5*) CE compatible	For connection to terminal devices (DTE) Equipped with 1 RJ45 connector at each end	2/*6.56* (*2*)	**490NTW00002**	–

(1) Unshielded cable without grounding. To be used only for temporary connections. For permanent connections, use the reference BMXXCAUSBH018.
(2) Other length available: 5 m/16.40 ft, 12 m/39.37 ft, 40 m/131.23 ft, and 80 m/262.47 ft, see page 5/4.

Programming accessories for M171 optimized logic controllers
Programming through TTL programming port

Description	Characteristics and use	Reference	Weight kg/*lb*
Programming cable (*6*)	To be used between a PC and the TTL programming port of M171 optimized logic controllers (*8*)	**TM171ADMI**	0.157/ *0.350*
Programming stick (*7*)	To be used to transfer parameters from one M171 optimized logic controller (*8*) to another, or to download the program	**TM171AMFK**	0.010/ *0.020*
Programming through USB port			
USB to RS485 converter (*3*)		See above	
Connection cable for Modbus serial link (*4*)		See above	

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Chapter 5
Connectivity

Contents

Modicon M171/M172 logic controllers for HVAC and Pumping solutions

5

MachineStruxure architectures	Easy integration into Building Management System (BMS)

Your customers demand comprehensive solutions that include enterprise-wide management of power, IT, HVAC, Pumping, and security and with a level of efficiency that includes system dynamics across segments, platforms, and providers. That's why MachineStruxure™ architectures can be easily integrated.

Building Management System

CyberStation BACnet/IP: Operator workstation + Server

Server

Mobile phone

Web interface

Smart device

HVAC machine control solutions
- Modbus TCP & BACnet/IP router controller
- Modbus TCP, BACnet MS/TP & BACnet/IP
- Modicon M171/M172, Logic controllers for Air Handling Unit
- Modicon M171/M172, Logic controllers for chiller
- Altivar 61 variable speed drive for pumps and fans

HVAC building control solutions
- BACnet MS/TP router controller
- BACnet MS/TP
- Third-Party interfaces via Modbus SL, BACnet/IP, proprietary protocols
- Modicon M171 logic controller
- Terminal controller
- System controller
- Variable air volume controller
- Local controller
- Local controller
- Fan coil controller
- Power controller

Building access control solutions
- Access controller >>> 2...8 doors
- InfiNet or Wireless InfiNet
- Third-Party interfaces via Modbus SL, BACnet/IP, proprietary protocols
- Automatic gates and doors

Building video control solutions
- Network camera
- Digital Sentry and Video Management Systems
- Video cameras

Pumping booster control solutions
- Modbus TCP & BACnet/IP router controller
- Modbus TCP, BACnet MS/TP & BACnet/IP
- Modicon M171/M172, logic controllers for booster stations
- Altivar 61 variable speed drive for pumps and fans

Your benefits
> Modicon M171/M172 makes it easy to integrate your machines into your customers' BMS architectures
> Compliance with open BMS standards:
  > BACnet/IP, BACnet MS/TP (B-AAC profile), Modbus TCP, Modbus RTU, and LonWorks
  > BACnet/IP & Modbus TCP Ethernet modules offering easy maintenance through embedded data logging, text e-mail, and web server
> Maintenance and monitoring efficiency
  > Provided on Ethernet modules, offering embedded data logging, e-mail notification, and web server capabilities
> Late-point configuration with Modicon M171/M172 interchangeable communication plug-in

BACnet

Modbus

BTL
(Pending)

Connectivity
Modicon M171/M172 logic controllers
Communication modules for Modicon M171 and M172
performance logic controllers

Communication modules

TM171A●●●
communication module

M171 performance
logic controller

TM171A●●●
communication module

M172 performance
logic controller

Compatibility between M171 and M172 performance logic controllers and TM171A●●● communication modules	
Performance logic controllers	**Compatible communication modules**
TM171PBM27R **TM171PDM27R** **TM171PDM27S**	**TM171ACAN** **TM171AETH** **TM171APBUS** **TM171AMB** **TM171ARS485** **TM171ARS232** **TM171AETHRS485** **TM171ALON**
TM172PBG28R **TM172PDG28R** **TM172PDG28S** **TM172PBG42R** **TM172PDG42R** **TM172PDG42S**	**TM171ACAN** **TM171AMB** **TM171ARS485** **TM171ARS232** **TM171ALON**

Presentation

TM171A●●● communication modules are dedicated to the 35 mm (*1.38 in.*) ⊔ rail mounting version of **M171 performance** logic controllers**,** and **M172 performance** logic controllers (please refer to the comptability table).

They allow specific connections to fieldbuses (CAN bus, Modbus TCP, Profibus, Modbus SL (RS 485), BACnet MS/TP (B-AAC profile), BACNet IP (B-AAC profile), RS 232 serial link and LonWorks), and services (Ethernet, WebVisu, and remote download functions).

They are mounted by simple interlocking on the left-hand side of an **M171** or **M172 performance** logic controller.

■   Only one communication module can be added to an **M171 performance** or **M172 performance** logic controller. It is powered by the controller.

■   Each communication module has its own type of connector, adapted to the bus or communication network (see table below).

References

Fledbus or services access	Communication port type	Reference
■ CAN	□ 2 screw terminal blocks *(1)*	 **TM171ACAN**
■ Modbus TCP ■ Ethernet ■ BACnet IP (B-AAC profile) ■ Web Visu and remote download functions	□ 1 RJ45	 **TM171AETH**
■ Profibus	□ 1 SUB-D 9	 **TM171APBUS**
■ Modbus SL (RS 485)	□ 2 screw terminal blocks *(1)*	 **TM171AMB**
■ Modbus SL or BACnet MS/TP (B-AAC profile)	□ 2 screw terminal blocks *(1)*	 **TM171ARS485**
■ RS 232 serial link ■ Relay output	□ 1 SUB-D 9 for RS 232 □ 1 screw terminal block for relay output *(1)*	 **TM171ARS232**
■ Modbus TCP and BACnet/IP ■ Modbus SL or BACnet MS/TP (B-AAC profile) ■ WebVisu and remote download functions ■ Ethernet	□ 1 RJ45 for Ethernet □ 2 screw terminal blocks for RS 485 *(1)*	 **TM171AETHRS485**
■ LonWorks (FFT-10)	□ 1 screw terminal block for LON bus	 **TM171ALON**

(1) Removable terminal blocks supplied with communication modules.

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Connectivity
Modicon M171/M172 logic controllers
ConneXium - Connecting Ethernet devices
Shielded copper connection cables

Shielded copper connection cables

Presentation

ConneXium shielded connection cables are available in two versions to meet the requirements of the various current standards and approvals:

■ **EIA/TIA 568 shielded twisted pair cables for CE market**
These cables conform to:
□ EIA/TIA-568 standard, category CAT 5E
□ IEC ???11801/EN 50173-1 standard, class D
Their fire resistance conforms to:
□ NF C32-070 standard, class C2
□ IEC 322/1 standards
□ Low Smoke Zero Halogen (LSZH)
■ **EIA/TIA 568 shielded twisted pair cables for UL market**
These cables are:
□ CEC type FT-1
□ NEC type CM
A range of **ConneXium** fully shielded preassembled cables has been specially designed for use in harsh industrial environments. These cables combine a category 5E shielded cable and RJ 45 connectors reinforced with a metal profile.

490NTW000●●

5

TCSEC●3M3M●●S4

References

EIA/TIA 568 shielded twisted pair cables for CE market

Description	End fittings	Type	Length m (ft.)	Reference	Weight kg
Straight-through copper cables CE compatible	2 RJ 45 connectors For connection to terminal devices (DTE)	standard	2 (6.56)	**490NTW00002**	–
			5 (16.40)	**490NTW00005**	–
			12 (39.37)	**490NTW00012**	–
			40 (131.23)	**490NTW00040**	–
			80 (262.47)	**490NTW00080**	–
		ruggedised	1 (3.28)	**TCSECE3M3M1S4**	–
			2 (6.56)	**TCSECE3M3M2S4**	–
			3 (9.84)	**TCSECE3M3M3S4**	–
			5 (16.40)	**TCSECE3M3M5S4**	–
			10 (32.81)	**TCSECE3M3M10S4**	–

Shielded twisted pair cables for UL market

Description	End fittings	Type	Length m (ft.)	Reference	Weight kg
Straight-through copper cables UL compatible	2 RJ 45 connectors For connection to terminal devices (DTE)	standard	2 (6.56)	**490NTW00002U**	–
			5 (16.40)	**490NTW00005U**	–
			12 (39.37)	**490NTW00012U**	–
			40 (131.23)	**490NTW00040U**	–
			80 (262.47)	**490NTW00080U**	–
		ruggedised	1 (3.28)	**TCSECU3M3M1S4**	–
			2 (6.56)	**TCSECU3M3M2S4**	–
			3 (9.84)	**TCSECU3M3M3S4**	–
			5 (16.40)	**TCSECU3M3M5S4**	–
			10 (32.81)	**TCSECU3M3M10S4**	–

Do it Yourself copper cable and connectors

The **ConneXium** "Do it Yourself" offer consists of 2 connector references (M12 and RJ 45) and 1 cable reference - 300 m (*984.252 ft*) reel - enabling Ethernet 10/100 Mbps network cables to be made up in situ.
The maximum length of cables made up in this way is 80 m (*262.467 ft.*). They are assembled using only a knife and wire cutters (no special tool is required).

Description	Characteristics	Length m (ft.)	Reference	Weight kg
Ethernet copper cable 2 shielded twisted pairs 24 AWG	Conforms to the standards and approval listed above	300 (984.25)	**TCSECN300R2**	–
RJ 45 connector	Conforms to EIA/TIA-568-D	–	**TCSEK3MDS**	–

ConneXium unmanaged switches, 3, 4 and 5 ports, twisted pair and optical fibre

Description	Interfaces	Reference	Weight kg lb
ConneXium unmanaged switches	3 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors	**TCSESU033FN0**	0.113 0.249
	■ 4 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors ■ 1 x 100BASE-FX port (multimode optical fibre), duplex SC connector	**TCSESU043F1N0**	0.120 0.265
	5 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors	**TCSESU053FN0**	0.113 0.249

TCSESU053FN0

*Other wiring components are available, please consult the **ConneXium** offer on our website www.schneider-electric.com.*

Schneider Electric

*Presentation,
references*

Connectivity
Modicon M171/M172 logic controllers
spaceLYnk gateway
Universal automation WiFi interface

spaceLYnk gateway
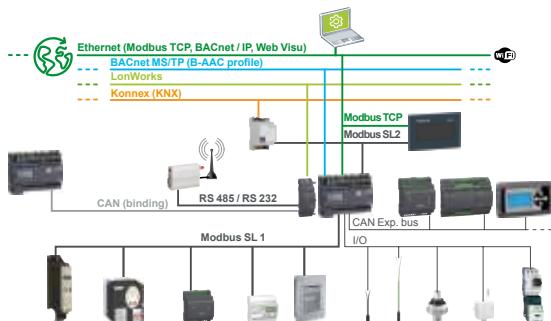
Presentation

spaceLYnk is designed to build a complete Building Automation Solutions for commercial segments :

> Complete Building Automation solution for Small and Medium building with a complete architecture including Light and Room Control (KNX, DALI Control), Metering (Modbus offer, Smartlink RTU and IP), and boiler management (SSL)
> Complete Building Automation solution for Large Building with a complete architecture managed by SBO (BMS from Schneider Electric) and including Light and Room Control (KNX, DALI Control) and Metering (Modbus offer, Smartlink RTU and IP)

spaceLYnk is compliance with the Modicon M171/M172 logic controller and allows to add KNX to the embedded protocols

spaceLYnk can be used in several ways:

> As a gateway to translate and enable communication between different products
> As an aggregator to stock, analyze, and send the data (.csv file for example)
> As an user interface to display relevant informations on mobile devices
> As an event controler that sends email in case of issues

Applications

> Cross-standard gateway between KNX and Modbus RTU/TCP
> Logical functions
> WEB SCADA visualization for PC and touch-devices
> BACnet Server (500 points)
> Integration with third party devices over RS 232 (IR, AV)
> Scheduling
> Camera streaming
> Data logger with trends

Technical feature

> Supply voltage: 24 V DC
> Interface: 1x KNX, 1x10BaseT/100BaseTX, 1x RS 485, 1x RS 232, 1x USB2.0

References

Designation	Communication port protocol	Reference
spaceLYnk logic controller	□ BACnet □ Modbus □ IP (Internet Protocol) □ KNX	 **LSS100200**

Universal automation WiFi Interface

Presentation

The universal automation Wifi interface TCSEGWB13FA0 is a communication accessory, giving a wireless access point to several equipment as PC, PLC, Variable speed drive, Smart phone, Tablet, and Phablet.

References

Designation	Description	Reference
universal automation Wifi Interface - IP20 - with RJ45 and USB connectors	□ For connection of WiFi equipment (PC, tablet, smartphone, etc.) □ Powered by internal rechargeable battery □ Provided with : USB cable, Battery, Quick start guide, Power adaptor, and Ethernet cable (RJ45/RJ45)	 **TCSEGWB13FA0**

WebVisu	WebVisu is embedded to simplify the web page creation and to create directly your page in SoMachine HVAC
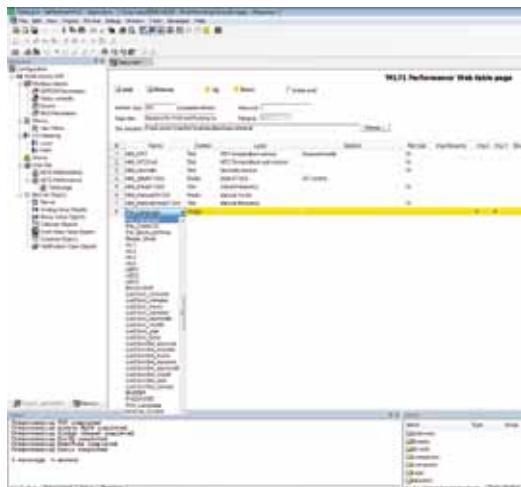
Web page creation with SoMachine HVAC software

SoMachine HVAC programming software is used to create in the webserver customized pages for viewing and monitoring devices.
These pages can also be accessed on any mobile device such as a tablet or smart phone with any operating system (iOS, Android, Windows).

External **HTML5 tool** can be also used to customize the pages with your logo and your company look and feel.
WebVisu (Web server) can allow to reduce solution cost !

How many time are you using an HMI for commissioning ?
if not more than twice a year, you can replace the HMI with a webserver and a WiFi access point (Universal automation WiFi interface, see page 5/5), allows you more features by using your smart phone to set, to check or to maintain the machine.

WebVisu is not displaying only ready values, you can write parameters or start/stop a device.
During maintenance, start and stop a device (fan, pump, compressor, coil,...) with a smart phone allows to stay close to this device. Maintenance is quicker and more efficient.

Result - Web page in classic browser

StruxureWare application

Start small and grow, and build on what you own

5/7

Discover StruxureWare Building Operation on our web site:
http://www.schneider-electric.com/sites/corporate/en/
solutions/struxureware/applications/building-operation.page

StruxureWare applications allow you to add additional applications incrementally, while a 'plug and play' design helps to ensure the applications will connect seamlessly. Additionally, open standards mean StruxureWare applications will work with virtually any software, hardware, or system that you are already using, so there is no need to start over.

StruxureWare Building Operation

Delivering energy efficient and effectively-managed facilities
StruxureWare Building Operation provides integrated monitoring, control, and management of energy, lighting, fire, and HVAC systems.
Part of a SmartStruxure solution, the application optimizes energy consumption, maintains a healthy and productive environment, updates aging facilities, and delivers anytime/anywhere access to building systems.

Benefits
> Personalize the modern, attractive interface for ease of use
> Simplify day-to-day operations
> Gain freedom of choice through embedded open protocols
> Receive actionable intelligence through one-click reporting
> Get the right information when, where, and how you want it

5

Chapter 6
Related products

6

*Presentation,
panorama*

Related products
Modicon M171/M172 logic controllers
SE8000 room controllers

Presentation

The SE8000 Series is a sophisticated addition to the Schneider Electric product portfolio of room controllers. With rich, customizable features, the SE8000 enables significant energy savings with accurate temperature control in any space, and can be easily integrated into most Building Management Systems (BMS).

Designed for new construction and retrofit projects, the SE8000 decreases project delivery costs by reducing installation, configuration and commissioning time.

No complex software or tools are required to customize functionality in order to meet your applications requirements. The SE8000 provides the advanced features and monitoring functions required by modern building automation systems, in a simple and compact enclosure.

Ethernet (Modbus TCP, BACnet/IP, Web Visu)
BACnet (B-AAC profile)
LonWorks (FFT-10)

Modbus TCP

CAN exp. bus

I/Os

Modbus SL

SE8000 room controllers

Fan coil
Heat pump
Roof top unit
Indoor Air Quality (IAQ)
Zone temperature

Common features
> Customizable colour digital touch screen interface
> Configurable sequence of operations
> Proportional integral control of HVAC equipment
> BACnet MS/TP (BTL certified) and Modbus RTU (slave) integration
> Each model supports over 100 configurable points/parameters
> Scheduler
> Upload custom standby screen images to higlight the brand or logo of your customers
> Programmable with **Lua4RC** to modify control sequences or override inputs and outputs
> Multi-language support (user interface): English, French, Spanish, Chinese, Russian, Arabic, Czech, Danish, Dutch, Finnish, German, Hungarian, Indonesian, Italian, Norwegian, Polish, Portuguese, Slovak, Swedish, and Turkish

Options
> Different models address different types of HVAC equipment (fan coil units, roof top units, heat pumps, indoor air quality applications, and zone temperature control applications). This includes extra inputs to integrate remote temperature, humidity, and CO_2 sensors, depending on the SE8000 model and application
> Optional on-board relative humidity sensor with dehumidification control sequence
> Optional on-board PIR motion sensor with occupancy-based control sequence (modes: occupied, standby, unoccupied)

Uploader SE8000
> The Firmware of the SE8000 can be ugraded using the Uploader SE8000. This free downloadable tool also enables the upload of standby screen images and scripts

Panorama

Series	SER8300 with SC3000 relay pack	SE8300	SE8600
Application	**Line voltage fan coil units**	**Low voltage fan coil units**	**Rooftop units, heat pumps and indoor air quality**
Description	□ Requires SC3000 relay pack □ Fan speed and sequence of operation □ Two pipes □ Four pipes	□ Fan speed and sequence of operation □ Two pipes □ Four pipes	□ Economizer □ CO2 sensor input □ Fresh Air Station input
		Mixed voltage fan coil units	**Configurable stages**
		□ Requires SC1300/SC2300 relay pack	□ 1 heat/1 cool □ 2 heat/2 cool □ Modulation heat/2 cool □ 3 heat/2 cool
		Zone control	
		□ Cooling only VVT zone with reheat □ Fin-tube radiators □ Cabinet heaters □ Radiant panel heaters □ Electric re-heat zones □ Pressure dependent VAV system □ Terminal reheat	
Voltage	**SER8000**:6.5 - 28 VDC or 20 - 28 VAC, 50/60Hz / 2.4 W Min. **SC3000**: 90-277 VAC universal, 50/60Hz	6.5 - 28 VDC or 20 - 28 VAC, 50/60Hz / 4 VA + Output Load (64 VA Max.)	28 VDC or 20 - 28 VAC, 50/60Hz / 4 VA + Output Load (64 VA Max.)
Communication	□ Modbus SL □ BACnet MS/TP	□ Modbus SL □ BACnet MS/TP	□ Modbus SL □ BACnet MS/TP

More information on Room controllers,Please visit our web site:
https://ecobuilding.schneider-electric.com/room-controllers

Related products
Modicon M171/M172 logic controllers
SE8000 room controllers

SE8000 room controllers - References

Description	RH sensor & control	PIR motion sensor	Fascia and Casing color	Reference
Line voltage fan coil controller	–	–	Silver	**SER8300A0B00**
	☑	–	Silver	**SER8350A0B00**
	–	☑	Silver	**SER8300A5B00**
	☑	☑	Silver	**SER8350A5B00**
	–	–	White	**SER8300A0B11**
	☑	–	White	**SER8350A0B11**
	–	☑	White	**SER8300A5B11**
	☑	☑	White	**SER8350A5B11**
Low voltage fan coil controller	–	–	Silver	**SE8300U0B00**
	☑	–	Silver	**SE8350U0B00**
	–	☑	Silver	**SE8300U5B00**
	☑	☑	Silver	**SE8350U5B00**
	–	–	White	**SE8300U0B11**
	☑	–	White	**SE8350U0B11**
	–	☑	White	**SE8300U5B11**
	☑	☑	White	**SE8350U5B11**
Heat pump & indoor air quality controller	–	–	Silver	**SE8600U0B00**
	☑	–	Silver	**SE8650U0B00**
	–	☑	Silver	**SE8600U5B00**
	☑	☑	Silver	**SE8650U5B00**
	–	–	White	**SE8600U0B11**
	☑	–	White	**SE8650U0B11**
	–	☑	White	**SE8600U5B11**
	☑	☑	White	**SE8650U5B11**

Dimensions
Height: 12 cm / 4.72 in - Width: 8.6 cm / 3.38 in - Depth: 2.5 cm /1 in

SC3000 relay packs - References

The SC3000 relay pack is part of a two component retrofit option for line-voltage fan coil units. The relay pack is combined with SER8300 room controllers.
The SC3000 relay pack features an onboard universal voltage power supply and line-voltage relays which directly drive fractional horsepower fan motors and valves. This eliminates the need to install and wire costly pilot relays and transformers. No previous building automation training is required for the installation and commissioning process.

Applications	Fan control	Monitoring inputs	Control types	Reference
2 pipes 2 pipes with reheat 4 pipes	Up to 3 speed	None	On-Off line switched valve output control □ 1 heat / cool output □ 1 cool output □ 3 fan outputs	**SC3500E5045**
		4 FCU remote inputs	On-Off line switched valve output control □ 1 heat / cool output □ 1 cool output □ 3 fan outputs	**SC3504E5045**
			On-Off line switched valve output control □ 1 heat / cool output □ 1 cool output □ 3 fan outputs □ Occupancy output (7VDC)	**SC3514E5045 (with occupancy output)**
2 pipes 2 pipes with modulating pulsed reheat	Up to 3 speed	None	On-Off line switched valve output control □ 1 heat / cool output □ 1 Modulating pulsed Vdc output for SSR electric reheat control □ 3 fan outputs	**SC3400E5045**
		4 FCU remote inputs	On-Off line switched valve output control □ 1 heat / cool output □ 1 Modulating pulsed Vdc output for SSR electric reheat control □ 3 fan outputs	**SC3404E5045**
Slave fan control only	Up to 3 speed	None	Slave fan control only 3 fan outputs	**SC3300E5045 (slave fan unit)**

Dimensions
Height: 12.2 cm / 4.80 in - Width: 8.0 cm / 3.15 in - Depth: 3.3 cm /1.30 in

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Related products
Modicon M171/M172 logic controllers
Operator dialog terminals: Magelis™ Small panels

Applications		**Display of graphic pages**	

Type of terminal		**Small panels with monochrome or color touch screen**	

Display	Type	Monochrome STN LCD (200 x 80 pixels), backlit - Green, orange, and red, or - White, pink, and red	Color TFT LCD (480 x 272 pixels)
	Capacity	3.4" (monochrome)	4.3" (color)

Data entry		Via touch screen	

Memory capacity	Application	16 MB Flash	32 MB Flash
	Expansion	–	

Functions	Maximum number of pages	Limited by internal FLASH EPROM memory capacity	8999
	Variables per page	Unlimited	384
	Representation of variables	Alphanumeric, bitmap, bargraph, gauge, curves, buttons, LEDs	
	Recipes	32 groups of 64 recipes	max Ingredients 8192
	Curves	Yes, with log	
	Alarm logs	Yes	
	Real-time clock	Access to the PLC real-time clock	Option: RTC battery set
	Alarm relay	–	
	Buzzer	Yes	

Communication	Asynchronous serial link	RS 232C/RS 485 *(1)* RS 232C using Zelio protocol *(2)*	RS 232C/RS 485 *(1)* RS 232C *(2)*
	Downloadable protocols	Uni-TE, Modbus and for PLC brands: Allen-Bradley, Omron, Mitsubishi, Siemens	
	Printer link	USB for serial or parallel printer	–
	USB ports	1 host type A and 1 device type mini-B	
	Networks	1 Ethernet TCP/IP port (10BASE-T/100BASE-TX) *(3)*	

Development software		Vijeo Designer (on Windows XP Professional and Windows 7 Business 32-bit and 64-bit)	Vijeo XD (on Windows 7 and Windows 8)

Operating system		Magelis	

References		**HMISTO5●●**	**HMISTO7●5 (▲)**

(1) Only HMISTO511, HMISTO512, HMISTO715
(2) Only HMISTO501, HMISTO705
(3) Only HMISTO531, HMISTO532, HMISTO735
▲ Available 1st quarter 2016

Display of graphic pages	

Small panels with color touch screen	

Color QVGA TFT LCD (320 x 240 pixels)	
3.5" (color)	5.7" (color)

Via touch screen	

32 MB Flash	
–	

Limited by internal FLASH EPROM memory capacity	
Unlimited	
Alphanumeric, bitmap, bargraph, gauge, curves, buttons, LEDs	
32 groups of 64 recipes	
Yes, with log	
Yes	
Access to the PLC real-time clock	
–	
Yes	

RS 232C/RS 485	
Uni-TE, Modbus and for PLC brands: Allen-Bradley, Omron, Mitsubishi, Siemens	
USB for serial or parallel printer	
1 host type A and 1 device type mini-B	
1 Ethernet TCP/IP port (10BASE-T/100BASE-TX)	

Vijeo Designer (on Windows XP Professional and Windows 7 Business 32-bit and 64-bit)	

Magelis	

HMISTU655 **HMISTU655W**	**HMISTU855** **HMISTU855W**

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Related products
Modicon M171/M172 logic controllers
Variable speed drives for compressors

Application	Type of machine controlled	Compressor				
	Number of phases	1		3		
	Type of motor	Asynchronous	Synchronous (PM)	Asynchronous	Asynchronous and Synchronous for scroll	Synchronous (PM)
Compressor size	**0.18 kW** / *0.25 HP*	**Altivar 12**	**Altivar 32**	–	–	–
	0.37 kW / *0.5 HP*			**Altivar 312**	–	–
	0.75 kW / *1 HP*				**Altivar 212**	**Altivar 32**
	2.2 kW / *0.25 HP*					
	7.5 kW / *10 HP*	–	–			
	15 kW / *20 HP*	–	–			
	75 kW / *100 HP*	–	–	**Altivar 61**		–

Compatible range of variable speed drives

Related products
Modicon M171/M172 logic controllers
Variable speed drives for fans or pumps

Application	Type of machine controlled	Fan or pump	
	Number of phases	1	3
Fan or pump size	**0.18 kW** / *0.25 HP*	**Altivar 12**	–
	0.37 kW / *0.5 HP*		–
	0.75 kW / *1 HP*		**Altivar 212**
	2.2 kW / *0.25 HP*		
	7.5 kW / *10 HP*	–	
	15 kW / *20 HP*	–	
	75 kW / *100 HP*	–	
	> 75 kW / *> 100 HP*	–	**Altivar 61**

Compatible range of variable speed drives

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Schneider Electric

Related products
Modicon M171/M172 logic controllers
Variable speed drives for asynchronous and synchronous motors

Application	Variable speed drives	
	For material handling (small conveyors), packing and packaging (small labeling machines or bagging machines), suction pumps, centrifugal pumps, circulating pumps, air or smoke extractor fans, plastic film making machines, ovens, boilers, etc.	For material handling (small conveyors), hoists, packing and packaging (small labeling machines or bagging machines), special machines (mixers, kneaders), textile machines, pumps, compressors, fans, etc.
Power range for 50…60 Hz (kW) line supply	**0.18…4/0.25…5**	**0.18…15/0.25…20**
Single-phase 100…120 V (kW/*HP*)	0.18…0.75/0.25…1	–
Single-phase 200…240 V (kW/*HP*)	0.18…2.2/0.25…3	0.18…2.2/0.25…3
Three-phase 200…230 V (kW/*HP*)	–	–
Three-phase 200…240 V (kW/*HP*)	0.18…4/0.25…5	0.18…15/0.25…20
Three-phase 380…480 V (kW/*HP*)	–	–
Three-phase 380…500 V (kW/*HP*)	–	0.37…7.5/0.5…10
Three-phase 500…600 V (kW/*HP*)	–	–
Three-phase 525…600 V (kW/*HP*)	–	0.75…15/1…20
Three-phase 500…690 V (kW/*HP*)	–	–
Degree of protection	IP 20	IP 21
Type of cooling	Heatsink or base plate	Heatsink
Drive system — Output frequency	0.1…400 Hz	0.1…500 Hz
Type of control — Asynchronous motor	Standard (voltage/frequency) Performance (sensorless flux vector control) Pump/fan (Kn^2 quadratic ratio)	Standard (voltage/frequency) Performance (sensorless flux vector control). Energy saving ratio
Synchronous motor		
Transient overtorque	150…170% of the nominal motor torque	170…200% of the nominal motor torque
Functions (number)	40	50
Safety functions — Integrated	–	–
Available as an option	–	–
Number of preset speeds	8	16
Number of I/O — Analog inputs	1	3
Logic inputs	4	6
Analog outputs	1	1
Logic outputs	1	–
Relay outputs	1	2
Communication — Integrated	Modbus	Modbus and CANopen
Available as an option	–	CANopen Daisy Chain, DeviceNet, PROFIBUS DP, Modbus TCP, Fipio
Bluetooth link®	–	–
Options	–	–
Dialog tools	IP 54 or IP 65 remote terminal	IP 54 or IP 65 remote terminal IP 54 remote graphic display terminal
Configuration — Setup software	SoMove	SoMove
Configuration tools	Simple Loader, Multi-Loader	Simple Loader, Multi-Loader
Standards and certifications	IEC 61800-5-1 IEC 61800-3 (environments 1 and 2, categories C1 to C3)	
	C€, UL, CSA, C-Tick, NOM, GOST	C€, UL, CSA, C-Tick, NOM, GOST, DNV
Variable speed drive range	**Altivar 12**	**Altivar 312**

Application	Variable speed drives without sensor (velocity control)	Variable speed drives	
	For material handling (conveyors), transfer machines, packaging machines, hoisting, special machines (textile, transfer), wood-working or metal processing machines, etc.	For pumps, fans, and HVAC applications	For pumps, fans, and industrial applications
Power range for 50…60 Hz (kW) line supply	**0.18…15/0.25…20**	**0.75…75/1…100**	**0.37…800/0.5…900**
Single-phase 100…120 V (kW/*HP*)	–	–	–
Single-phase 200…240 V (kW/*HP*)	0.18…2.2/0.25…3	–	0.37…5.5/0.5…7.5
Three-phase 200…230 V (kW/*HP*)	–	–	–
Three-phase 200…240 V (kW/*HP*)	–	0.75…30/1…40	0.75…90/1…125
Three-phase 380…480 V (kW/*HP*)	–	0.75…75/1…100	0.75…630/1…900
Three-phase 380…500 V (kW/*HP*)	0.37…15/0.5…20	–	–
Three-phase 500…600 V (kW/*HP*)	–	–	2.2…7.5/3…10
Three-phase 525…600 V (kW/*HP*)	–	–	–
Three-phase 500…690 V (kW/*HP*)	–	–	2.2…800/3…800
Degree of protection	IP 20	IP 21	IP 20
Type of cooling	Heatsink		Heatsink or water-cooled system
Drive system — Output frequency	0.1…599 Hz	0.5…200 Hz	0.1…500 Hz for the entire range 0.1…599 Hz up to 37 kW/*50 HP* at 200…240 V ∿ and 380…480 V ∿
Type of control — Asynchronous motor	Voltage/frequency ratios: U/f and 5-point U/f Sensorless flux vector control ratio Kn^2 quadratic ratio (pump/fan). Energy saving ratio	Sensorless flux vector control Voltage/frequency ratio (2 points) Energy saving ratio	Sensorless flux vector control Voltage/frequency ratio (2 or 5 points) Energy saving ratio
Synchronous motor	Ratio for synchronous motor without sensor	–	Vector control without speed feedback
Transient overtorque	170…200% of the nominal motor torque	120% of the nominal motor torque	120% of the nominal motor torque for 60 seconds
Functions (number)	150	50	> 100
Safety functions — Integrated	1: STO (Safe Torque Off)	–	–
Available as an option	3: SLS (Safe Limited Speed), SDI (Safe Direction Information), SS1 (Safe Stop 1)	–	–
Number of preset speeds	–	7	8
Number of I/O — Analog inputs	3	2	2…4
Logic inputs	6	3	6…20
Analog outputs	1: Configurable as voltage (0-10 V) or current (0-20 mA)	1	1…3
Logic outputs	1	–	0…8
Relay outputs	2	2	2…4
Communication — Integrated	Modbus and CANopen	Modbus, METASYS N2, APOGEE FLN, BACnet	Modbus and CANopen
Available as an option	DeviceNet, PROFIBUS DP V1, EtherNet/IP, Modbus TCP, EtherCat	LONWORKS	Modbus TCP Daisy Chain, Modbus/Uni-Telway, EtherNet/IP (RSTP), DeviceNet, PROFIBUS DP V0 and V1, INTERBUS, CC-LINK, LONWORKS, METASYS N2, APOGEE FLN, BACnet, Profinet, EtherCAT, POWERLINK
Bluetooth link®	Integrated	–	
Options	Filters, braking resistors, line chokes	–	I/O expansion cards, "Controller Inside" programmable card, multi-pump cards, encoder interface cards
Dialog tools	IP 54 or IP 55 drive navigator IP 54 or IP 55 remote graphic display terminal	IP 54 or IP 65 remote graphic display terminal	
Configuration — Setup software	SoMove	PCSoft for Altivar 212	SoMove
Configuration tools	Simple Loader, Multi-Loader	Multi-Loader	Simple Loader, Multi-Loader
Standards and certifications	IEC 61800-5-1, IEC 61800-3 (environments 1 and 2, category C2), UL508C, EN 954-1 category 3, ISO/EN 13849-1/- 2 category 3 (PL e), IEC 61508 (parts 1 & 2) SIL 3 level, draft standard EN 50495E, IEC 60 721-3-3 classes 3C3 and 3S2	EC 61800-5-1 IEC 61800-3 (environments 1 and 2, categories C1 with option to C3)	IEC 61800-5-1 IEC 61800-3 (environments 1 and 2, categories C1 to C3), IEC 61000-4-2/4-3/4-4/4-5/4-6/4-11
	C€, UL, CSA, C-Tick, NOM, GOST	EN 55011: Group 1, class A and class B with option card. C€, UL, CSA, C-Tick, NOM	C€, UL, CSA, DNV, C-Tick, NOM, GOST
Variable speed drive range	**Altivar 32**	**Altivar 212**	**Altivar 61**

Selection guide

Related products
Modicon M171/M172 logic controllers
Soft starters for asynchronous and synchronous motors

Presentation

Related products
Modicon M171/M172 logic controllers
Control panel technical guide

Application	Soft starter	Soft start/soft stop unit	Soft start/soft stop unit
	For conveyors, conveyor belts, pumps, fans, compressors, automatic doors, small gantries, belt-driven machines, etc.		For centrifugal pumps, piston pumps, fans, screw compressors, conveyors, agitators, mixers, centrifugal machines, etc.
Power range for 50…60 Hz (kW) line supply	**0.37…11**	**0.75…15**	**4…400**
Single-phase 110…230 V (kW)	0.37…2.2	–	–
Three-phase 200…240 V (kW)	–	0.75…7.5	–
Three-phase 200…480 V (kW)	0.37…11	–	–
Three-phase 208…600 V (kW)	–	–	4…400
Three-phase 208…690 V (kW)	–	–	–
Three-phase 230…415 V (kW)	–	–	–
Three-phase 230…440 V (kW)	–	–	4…355
Three-phase 380…415 V (kW)	–	1.5…15	–
Degree of protection	IP 20		
Drive system Number of controlled phases	1	2	3
Type of control	–	–	Configurable voltage ramp
Operating cycle	–		Standard
Functions (number)	1 Bypass		
Safety functions Integrated	–		
Available as an option	–		
Number of preset speeds	–		
Number of I/O Analog inputs	–		1 PTC probe
Logic inputs	–		3
Analog outputs	–		–
Logic outputs	–		–
Relay outputs	–		2 ("N/C"/"N/O")
Communication Integrated	–		Modbus
Available as an option	–		–
Dialog tools	–		Remote display terminal (option)
Configuration Setup software	–		SoMove
Standards and certifications	IEC/EN 60947-4-2		IEC/EN 60947-4-2, EMC class A
	C€, UL, CSA, C-Tick, CCC		C€, UL, CSA, C-Tick, GOST, CCC
Type of soft starter	**ATS01N1●●●●**	**ATS01N2●●●●**	**ATS22●●●●**

Control panel technical guide for HVAC & R equipment

The guide that can help you optimize your motor starter solutions

Why this guide?

This technical guide has been specially designed to assist customers in the selection of the appropriate contactor-based motor starter solutions for their installation of HVAC & R equipment.
2 kind of solutions are involved:
> "standard" solutions for general purpose applications
> "HVAC & R adapted" solutions for definite purpose applications
Each solution of this guide combines:
> thermal magnetic protection
> control by contactors

For which applications?

This 24-page guide is intended for 3 types of application:
> compressors
> fans
> pumps

How can we help you?

This guide includes a table containing information on how to:
> Select your HVAC & R machine
> Find the motors that should be embedded
> Access the corresponding motor starters selection pages

Availability

You will find this document in PDF format available to download from our website: www.schneider-electric.com.

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Related products

Modicon M171/M172 logic controllers
Motor starter solutions with 1, 2, or 3 products

Advantages	■ Simple manual motor starter ■ Fast wiring ■ Compact size	■ Conventional solution for pushbutton or automated motor control ■ Easy maintenance (contactor replacement) ■ Broad offer (e.g. connections, motor rating, etc.)		■ Advanced motor protection provided by dedicated components ■ Easy maintenance (selective replacement) ■ Broad offer (e.g. protection type, etc.)

Separate components

1-product solution

Motor circuit breaker

GV2   GV3   GV7

Up to 110 kW

2-product solution

Motor circuit breaker

GV2 and   GV3   GV7
Compact NSX

+ Contactor

LC1 K   LC1 D   LC1 F
and LC1 B

Up to 110 kW

3-product solution

Magnetic circuit breaker

GV2   GV3   Compact NSX

+ Contactor

LC1 K   LC1 D   LC1 F
and LC1 B

+ Thermal relay   **Controller**

LRD   LTM   LUTM

LR2K
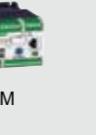
Up to 110 kW

Fused disconnect switch

GS2

+ Contactor

LC1 K   LC1 D   LC1 F
and LC1 B

+ Thermal relay   **Controller**

LRD   LTM   LUTM

LR2K
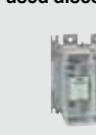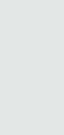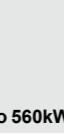
Up to 560kW

**Pre-assembled:
Ready to incorporate
in the panel**

-

Pre-assembled:
Ready to incorporate

Pre-assembled
motor
circuit breaker   or
+ contactor

Up to 15 kW   **GV2ME••K1•• GV2DP**

-

**Enclosed:
Ready to mount on the
machine**

Enclosed: Ready to mount

V•F
VCFN
V•FY

Up to 45 kW

GV2MC
GV2MP
GV2PC
GV3PC
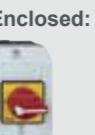
Up to 30 kW

Enclosed: Ready to mount

GV2ME   LE1D
LE1M
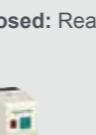
Up to 37 kW
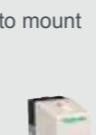
All in one: TeSys U

Up to 33 kW   **LUB12, LUB32**

Basic to extended functionalities
● Short circuit, overload protection
● Overload indication and alerts
● Status, remote control via
  communication bus

Advantages
● Fast wiring
● Compact motor starter
● Flexibility: last minute customization
● Electrical coordination

Compliant standards   CE   Ex   CCC   SP   UL LISTED

Legends

Switch-
disconnector

Thermal
relay

Circuit breaker with
short-circuit protection

Fuse switch-
disconnector

Circuit breaker with
short-circuit and
overload protection

Relay,
contactor

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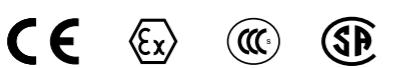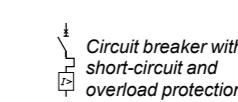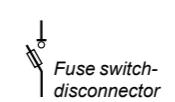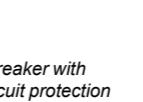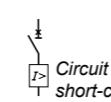
Related products
Modicon M171/M172 logic controllers
Short-circuit and overload protection

Applications		DC circuit protection and disconnection: DC power supplies, generators, batteries, etc.		AC circuit protection and disconnection of machines, electrical distribution in buildings	
		Acti 9	Multi 9	Acti 9	Multi 9
Description		Miniature circuit breaker	Miniature circuit breaker	Miniature circuit breaker	Miniature circuit breaker
Characteristics	Voltage	60 V DC/pole	250 V DC/pole	230/400 V AC	
	Number of poles	1 or 2		1, 2, 3, and 4	
	Nominal current (A)	1 to 63			63 to 125
	Breaking capacity (kA)	6		10	
	Load type/Tripping curve (1)	B, C, D	C	B, C, D	
	Width	18 mm (0.71 in.)/pole			27 mm (1.07 in.)/pole
	Product reference — IEC	Acti 9 iC60N	Acti 9 C60H-DC	Acti 9 iC60N	Acti 9 C120N
	IEC/UL	Multi 9 C60N	Multi 9 C60H-DC	Multi 9 C60N	–

(1) Tripping curve:
B (3 In < Im < 5 In) standard
C (5 In < Im < 10 In) inrush current
D (10 In < Im < 14 In) electronics or long cable length

Applications	Protection and disconnection of electrical circuits				Protection of operators against electrical shocks in event of direct or indirect contact with live equipment	Protection of operators against electrical shocks in event of direct or indirect contact with live equipment	Protection of operators against electrical shocks in event of direct or indirect contact with live equipment	Protection of sensitive equipment against voltage surges due to lightning, high power switching, etc.
	TeSys DF				Acti 9	Multi 9	Acti 9	Multi 9
Description	Fuse holder				RCBO (3)	RCBO (3)	RCCB (4)	Surge arrester
Voltage	500 V AC	690 V AC			230/400 V AC			
Number of poles	–				1P+N	2, 3, and 4P		
Nominal current (A)	25	32	50	25	6 to 32		25 to 63	–
	8 x 32 mm (0.32 x 1.26 in.)	10 x 38 mm (0.39 x 1.5 in.)	14 x 51 mm (0.5 x 2 in.)	22 x 58 mm (0.87 x 2.28 in.)				
Breaking capacity (kA)	20	120			–	–	–	20
Load type/Tripping curve (1)	–				C class A 30 or 300 mA		C class A 30 or 300 mA	Type 2
Width	–				36 mm (1.42 in.)	27 to 63 mm (1.06 x 2.48 in.)	36 to 72 mm (1.42 x 2.84 in.)	72 to 120 mm (2.84 x 4.72 in.)
Product reference — IEC	–				Acti 9 DPN Vigi	Acti 9 Vigi iC60 blocks (2)	Acti 9 RCCB ID	Quick PRD 20r
IEC/UL	DF8	DF10	DF14	DF22	–	–	Multi9 GFP	–

Panorama

Related products
Modicon M171/M172 logic controllers
Incoming protection and switching

Applications	On-load switching of motors, resistive and inductive loads	Control and disconnection of electrical distribution circuits
	TeSys Vario	**Compact**
Description	Switch disconnectors Rotary switch with fully visible breaking	Switch disconnectors
Isolation and disconnection	☑	
Protection	–	
Characteristics — Rated operational current (A)	12 to 175	40 to 2,500
Number of poles	3 to 6	3 and 4
Short-circuit making capacity at 400 V Icm (kA)	0.5 to 3	50 to 220
Product name	V	INS
Embedded metering	–	–
Standards and certifications	IEC 60947-3 UL508	IEC 60947-3 UL508

Protection and switching of motors	Protection in industrial and tertiary applications	Feeder protection and circuit disconnection for multistandard motor circuit design	Power circuit protection and disconnection in industrial, infrastructure, and building applications
TeSys GS	**NG**	**Powerpact**	**Compact**
Fuse switch disconnector	Circuit breakers	Molded case circuit breakers with optional embedded communication and metering possibilities	
☑	☑		
☑	☑		
32 to 1,250	10 to 125	15 to 600	16 to 3,200
3 and 4			
5 to 90	10 to 50	18 to 65	25 to 150
GS	NG125	NH, NJ, NL	NSX/NS
–	–	Micrologic metering adapters	
IEC 60947-3	IEC 60947-2	IEC 60947-2 UL508	IEC 60947-2

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Related products
Modicon M171/M172 logic controllers
Regulated switch mode power supplies and function modules
Phaseo power supplies

Power supplies / Function modules	Regulated switch mode			Function modules *(Only compatible with Phaseo ABL8RP/ABL8WP power supplies)*			
	ABL8MEM, ABL7RM: 7 to 60 W - Mounting on rail / **ABL8REM, ABL7RP: 60 to 144 W - Mounting on rail**		**ABL8RPS/8RPM/8WPS: 72 to 960 W - Wide input voltage range Mounting on rail**	**ABL8DCC: converter modules ⎓ 24 V/⎓ 5-12 V**	**ABL8B: solutions to microbreaks and power outages**	**ABL8RED24400 : redundancy solution**	**ABL8PRP24100: solution for discriminating protection of the application**

	ABL8MEM, ABL7RM / ABL8REM, ABL7RP	ABL8RPS/8RPM/8WPS		ABL8DCC	ABL8B	ABL8RED24400	ABL8PRP24100
Input voltage	100...240 V~ / 120...250 V⎓	100...120 V~ and 200...500 V~ (1)	380...500 V~	24 V⎓	24 V⎓	24 V⎓	24 V⎓
Connection to world-wide line supplies — United States - 120 V (in phase-to-neutral) - 240 V (in phase-to-phase)	Single-phase (N-L1) or 2-phase (L1-L2) connection	Single-phase (N-L1) or 2-phase (L1-L2) connection	–	–	–	–	–
Europe - 230 V (in phase-to-neutral) - 400 V (in phase-to-phase)	Single-phase (N-L1) connection		3-phase (L1-L2-L3) connection	–	–	–	–
United States - 277 V (in phase-to-neutral) - 480 V (in phase-to-phase)	–		3-phase (L1-L2-L3) connection	–	–	–	–
IEC/EN 61000-3-2 conformity	Yes for ABL7RP, not for ABL8REM and not applicable for ABL8MEM and ABL7RM	Yes		–	–	–	–
Protection against undervoltage	Yes	Yes		–	–	–	–
Protection against overloads and short-circuits	Yes, voltage detection. Automatic restart on elimination on the fault	Yes, current limitation or undervoltage detection		Yes, current limitation	–	–	–
Diagnostic relay	–	Yes, depending on model			Yes	Yes	–
Compatibility — with function modules	–	Yes with buffer module, battery and battery control modules, redundancy module and discriminating downstream protection module		–	–	–	–
with power supplies	–	–		ABL8RP/8WP	ABL8RP/8WP	ABL8RP/8WP	ABL8RP/8WP
Power reserve (Boost)	1,25 to 1,4 In during 1 minute, depending on model (with ABL8MEM) / No	1,5 In during 4 secondes		No	–	–	–

Output matrix — page 6/18 (Regulated switch mode):

Output current	5 V⎓	12 V⎓	24 V⎓	48 V⎓
0.3 A			ABL8MEM24003	
0.6 A			ABL8MEM24006	
1.2 A			ABL8MEM24012	
2 A		ABL8MEM12020		
2.5 A			ABL7RM24025	ABL7RP4803
3 A			ABL8REM24030	
4 A	ABL8MEM05040			
5 A		ABL7RP1205	ABL8REM24050	
6 A				
10 A				
20 A				
40 A				

Output matrix — page 6/19 (Wide input voltage / Function modules):

Output current	24 V⎓	5 V⎓	7...12 V⎓	24 V⎓	24 V⎓	24 V⎓
0.3 A						
0.6 A						
1.2 A						
2 A			ABL8DCC12020			
2.5 A						
3 A	ABL8RPS24030					
4 A						
5 A	ABL8RPS24050					
6 A		ABL8DCC05060				
10 A	ABL8RPS24100					ABL8PRP24100
20 A	ABL8RPM24200 / ABL8WPS24200			ABL8BBU24200	ABL8RED24400	
40 A	ABL8WPS24400			ABL8BUF24400 / ABL8BBU24400	2x ABL8RED24400	

More information: Please consult our catalogue "Phaseo, Power supplies & Transformers", n° DIA3ED2131105EN

(1) Except ABL8RPM24200. ~ 100...120 V and ~ 200...240 V.

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Related products
Modicon M171/M172 logic controllers
Indication and metering

	Current transformers	Basic meters	
Applications	Current sensor: the current value is converted into a 0 to 5 A scale. To be used with ammeter, power meter, energy metering	Display of simple electrical values, volts, or amps Meters for mounting on DIN rails	Display of simple electrical values, volts, or amps Meters for mounting on front panels
	CT	iVLT iAMP	VLT AMP
Description	Current transformers	Voltmeter Ammeter	Voltmeter Ammeter
Electrical indications	–	I / U	I / U
Characteristics — Measurement accuracy	Class 0.5 to 3	Class 1.5	Class 1.5
Installation	On conductor (cable, bar, etc.) Double terminal blocks on type D provide alternative cabling possibility	DIN rail 4 x 18 mm (*0.16 X 0.71 in.*) modules	Flush-mounted 72 x 72 mm (*2.84 x 2.84 in.*)/ 96 x 96 mm (*3.78 x 3.78 in.*)
Voltage measurement	Maximum rated operational voltage: 720 V AC	VLT: 500 V AC direct or external VT	VLT: 500 V AC direct or external VT
Current measurement	Ranges from 40/5 A to 6,000/5 A	AMP: 30 A direct or external CT	AMP: external CT
Communication ports	–	–	–
I/O	–	–	–
Memory capacity	–	–	–

Selector switches for ammeter and voltmeter
• DIN rail/panel mounted 48x48
CMA   CMV

More technical information on www.schneider-electric.com

	Basic energy meters			Basic multi-function metering			
Applications	Recording and display of energy consumption The meters are mounted on a DIN rail			Simple indication of the current passing through a Compact NSX circuit breaker	Full indication of electrical values and energy metering of a circuit protected by a Compact NSX circuit breaker	Full indication of electrical values and energy metering of a circuit	
	iEM2000 iEM2010 IEM2000T	iME1	iEM3000 Series	Micrologic A trip unit	Micrologic E trip unit	PM3200 PM3210 PM3250 PM3255	PM5100 PM5300 PM5500
Description	Kilowatt-hour meters	Kilowatt-hour meters	Kilowatt-hour meters	Ammeter	Power meter	Metering & sub-metering Class 0.5S IEC 62053-22 Class 1 IEC 62053-21 Class 2 IEC 62053-23	Metering & sub-metering Class 0.5S IEC 62053-22 Class 0.2S (PM55●●) IEC 62053-22 Class 1/2 IEC 62053-24
Electrical indications	E			I	I, U, F, P, Q, S, PF, E	I, U, F, P, Q, S, PF, E (Power demand and current demand)	I, U, F, P, Q, S, PF, E (Power demand and current demand)
Characteristics — Measurement accuracy	Class 1			Current: Class 1	Current: Class 1 Voltage: 0.5% Power: Class 2	Class 0.5	Class 0.2S (PM55●●) Class 0.5S
Installation	DIN rail 1.2 or 4 x 18 mm (*0.05 or 0.16 x 0.71 in.*) modules			Embedded into circuit breaker, remote LCD display available	Embedded into circuit breaker, remote LCD display available	DIN rail	Flush-mounted 96 mm x 96 mm
Voltage measurement	400 V AC direct				690 V AC	50 V to 330 V AC (Ph-N) 80 V to 570 V AC (Ph-Ph) up to 1 MV AC (ext. VT)	20 V L-N/35 V L-L to 277 V L-N/480 V L-L/ 600 V L-L
Current measurement	40 to 63 A direct or external CT			0.2 x In...1.2 x In of circuit breaker	0.2 x In...1.2 x In of circuit breaker	External CT	External CT
Communication ports	–			1	1	1	2
I/O	–			–	–	–	4 I/O 6 I/O (PM55●●)
Memory capacity	–			–	–	–	256 KB 1.1 MB (PM55●●)

StruxureWare Power Monitoring Expert
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• Intuitive data formats to customize views
• Historical trending of any measurement
• Alarm and event notification and logging
• Comprehensive reporting

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Chapter **7**

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The Next Generation

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