



techsystem

automatyka klimatyzacja wentylacja

▸ zapoznaj się z naszą ofertą

MD20 Master Display

The Master Display (MD20) is a supervisory controller of the Facility Explorer system.

The Master Display monitors and interacts with a network of Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) controllers to form a complete building or equipment control system and provides operating data to local and remote users and operators via a number of different media options.

The device has an integral graphic display along with a number of operating keys and indicators that present data to the user in a standard or customized way to view and acknowledge alarms, display historical trend data and to override the operation of the monitored equipment.

An embedded Web server enables you to access data from a Web browser by telephone line and modem or by direct connect to the Master Display. You can view current operating data, including active alarms, as well as trend logs and the event history file. You can also acknowledge alarms and send commands to the controlling devices using the user identification and password control on the Web page.

The Master Display can also send alarm messages by e-mail, by Short Message Service (SMS) to a mobile telephone, by fax, and to a printer for a local record of events as they occur.

The Master Display is freely programmable using the FX Tools Pro software package, and the functions include centralized control and management of distributed applications, as well as the display and communication features.



Figure 1: Master Display

Features and Benefits	
<input type="checkbox"/> Embedded Web Server	Allows remote user access to all the data available in the control system with a Web browser (Microsoft® Internet Explorer software Version 5.5 or later)
<input type="checkbox"/> Communication Services	Provides automatic reporting of important events by e-mail or fax, or by Short Message Service (SMS) with user acknowledgement
<input type="checkbox"/> Supervisory Options	Allows integration into an N2 Open compatible building automation system
<input type="checkbox"/> Monitoring and Control	Gathers data from multiple controllers and devices over a local network and provides interlocking of control systems with automatic and scheduled commands
<input type="checkbox"/> Distributed Application	Provides the ability to control complex systems by coordinating the activities of multiple controllers
<input type="checkbox"/> Onboard Trend and Event Logging	Provides information useful in analyzing the control system's performance
<input type="checkbox"/> Integral Display and Keyboard	Presents data clearly in text or graphic format with a menu-driven user interface to manage the control system
<input type="checkbox"/> Local Printer Option	Creates an easy to read permanent record of events and trends for non-technical personnel in remote buildings and for systems that are not centrally monitored
<input type="checkbox"/> Freely Programmable	Adapts to a wide range of HVAC or refrigeration system control applications using the flexible programming features of the FX Tools Pro software package

Integrated User Interface

The Master Display's integrated user interface includes a high-resolution display screen that presents the control data to the user in a text or graphic format. The user interface is driven by a menu system with an extensive use of icons to prompt the user in selecting the data or control points to be displayed or adjusted using the simple keypad. The display has a Main Menu page from which you can reach all other pages. The Home page allows you to view general building information.

The display page layout shows information such as the page title, time and date, and new alarms in dedicated locations. The Main Menu page provides links to active alarms, event history, trend logs, and system configuration data such as telephone numbers and communication setup parameters.

All the text on the screen is fully programmable and can be entered in up to five different languages using the translation table provided in FX Tools. The user then can select the preferred language from a screen menu when logging on to the system. This feature is designed for equipment manufacturers who export systems to many countries or for systems in areas with more than one spoken language.



Figure 2: Home Page

The Master Display presents control system information in a sequence of pages as a formatted list of data points, each with a text description. Each page has a name or title that users can access through the menu system. The Master Display can also embed data in a graphical representation of the monitored equipment or area. Status points and alarms can be represented by dynamic icons within the graphic diagram. You can add static text to the diagram as required to identify the plant and location.

In the edit mode, the Master Display highlights data values that users can change, such as temperature setpoints and the plant operating status. This feature is available to users with the appropriate level of password clearance. The Master Display identifies each user by a name and password at one of three levels.

The Master Display can display trended data in a graphic format with up to 100 values shown on the screen at one time. When there are more values in the requested time range, you can scroll the screen to the left and right. The operating panel includes the standard keys for screen cursor control, menu selection, data editing, event display cancellation, and alarm acknowledgement. The function of one key is programmable for a special or commonly used operation. A Light-Emitting Diode (LED) indicator on the panel shows the presence of an active alarm and further, two LED indicators are freely programmable.

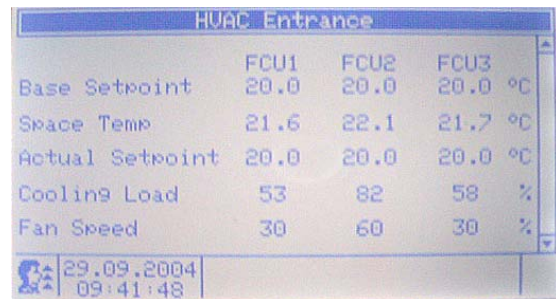


Figure 3: List of Data Values

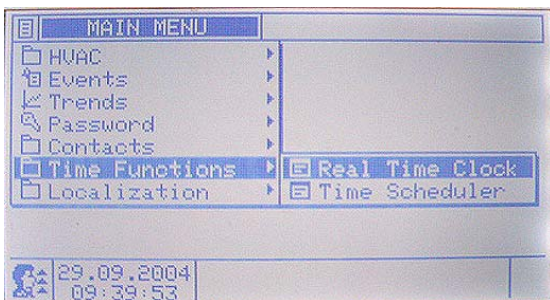


Figure 4: Main Menu

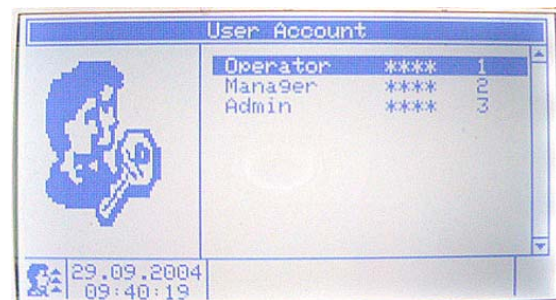


Figure 5: User Accounts

Local Monitoring and Control

The Master Display is not only a monitoring station but also a central controller for a network of devices that control HVAC and refrigeration equipment in a plant or building. Three interfaces are available for communicating with these field devices in the Master Display. You can program the Master Display to monitor or command any item of data in a device connected to one of the interfaces, display the information on its integral display screen, and make the information available for an internal control process or for a supervisory system. The Master Display can transmit data from one device to another on the same bus or to a device on another communication interface.

In addition the Master Display has binary inputs and outputs directly on board for the connection of signals from other control panels or alarm systems for display and process interaction.

Onboard Inputs and Outputs

Each Master Display has two digital inputs and either two or eight relay contact outputs, according to the model. You can use these inputs and outputs for simple, hard-wired connections to other local systems, to receive alarm signals, and to override commands. The inputs and outputs can also transmit signals to activate alarm systems or to switch equipment on and off.

Local Printer

Each model of the Master Display has a serial port for the connection of a printer using continuous fan-fold paper. The details of compatible printers are available from Johnson Controls. This type of printer prints alarms or events that require attention as they occur in a compact manner. The sequence of occurrence is secured by the continuous paper feed. The printer provides an easy-to-read permanent record of control system activity that is also easy to store and retrieve by non-technical personnel.

You can also use the printer to print out trend logs at regular intervals and set the time interval in the display.

Local Link N2 Bus

All models of the Master Display have the Local Link Bus to interface with other devices. It can concurrently support the following interfaces:

Expansion I/O

You can increase the input/output capacity of the Master Display by connecting up to four XT extension modules on its Local Link Bus. Expansion modules (XPs) provide input/output capability for the XT extension modules. The available connectable expansion modules include the following:

- XT91D00: Extension Module
- XP91D02: 6 Universal Analog Inputs (AIs) + 2 Analog Outputs (AOs)
- XP91D03: 8 Digital Outputs (DOs) (triacs)
- XP91D04: 4 Digital Inputs (DIs) + 3 DOs (triacs)
- XP91D05: 8 DIs
- XP91D06: 4 DOs (relays) 230 VAC (Europe only)
- XP91D07: 4 DOs (relays) 24 VAC (North America only)

You can use the data from these modules for display purposes or as additional inputs and outputs for control routines in the Master Display.

N2 Open Supervisory Control

With its Gateway Object, the Master Display provides supervisory type control over a small network of N2 Open devices, including:

- N2 Application Specific Controllers (ASCs) (for example, UNT, VAV, AHU)
- Sys 91 Controllers (for example, DX-9100, SC-9100)
- N2 Open Compatible Devices (VND)

You can configure the FX platform devices in the same way as other devices monitored and controlled by the Master Display.

Distributed Application

Up to 8 FX platform controllers can be connected to the Master Display's local link and incorporated into a distributed application.

A distributed application is a control strategy managed by the Master Display but executed concurrently in the Master Display and in the connected FX platform controllers. The communication between the controllers is defined by network variables in the distributed application. The Master Display executes the communication in the most effective way to maintain the performance of the entire control system.

You use distributed applications for the coordinated control of a central plant and the remote equipment that it serves. For example, a distributed application could be applied to an FX15 controlling an air handling unit and a number of FX05 controllers controlling zone temperature controllers. Distributed application can offer the ability to combine FX controllers that provide the required inputs and outputs for the physical equipment interface, and then to develop an application that is automatically distributed and executed in the individual controllers as a single control system.

Embedded Web Server and Web Page Access

The Master Display features an embedded Web server that enables a local or remote user to establish communication with the Master Display from a computer and to browse live control information, active alarms, recorded data, and configuration parameters. This feature provides an effective, low cost monitoring, and control system without the need for any special or proprietary supervisory software.

You can generate Web pages using the FX Tools Pro software package. You can build pages of data that are similar or completely different from the pages that you generate for the integral display. The Master Display can then store these pages in memory. You can access the Web pages using a direct serial line or telephone modem connection and the Point-to-Point Protocol (PPP) from any computer with Microsoft Internet Explorer as the Web browser.

The Master Display provides the formatting data for the requested pages starting with a Home Page (from which you can request other pages). Each page may contain graphic images and links to the other pages, as well as data windows for the display of live information from the control system. The active values are transmitted by the embedded Web server in the Master Display to the screen of the computer.

Typically, the Master Display continuously updates up to 16 values in one page. If necessary, you may adjust or override values on the screen. Access to the Web pages is protected by a password system to prevent unauthorized viewing of data and control actions.

From the Web browser, you can access the event history log, the list of active alarms, and acknowledge alarms in the Master Display.

You can also display the contents of the trend log table, and enable or disable trend collection.

In summary, the Web server interface provides the following features from any computer directly connected to the Master Display or with access to a telephone system.

- display live variables in the monitored control system
- adjust and command variables in the control system
- display and acknowledge active alarms
- display the event history log
- display trended values and copy/paste to Microsoft Excel spreadsheet for storage and further processing
- enable and disable trend logs
- read and modify communication parameters including e-mail addresses, and telephone numbers

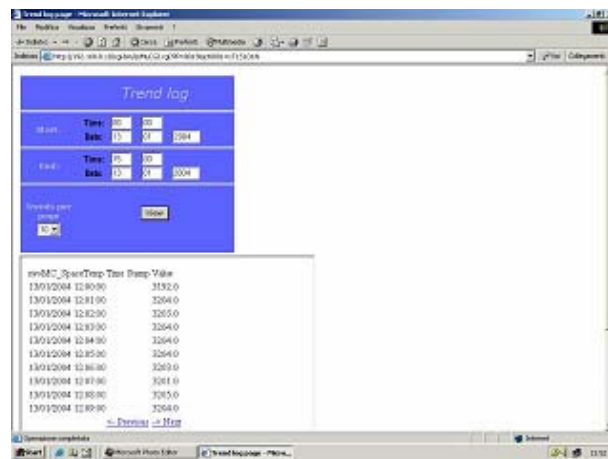


Figure 6: Web Page with Trend Data

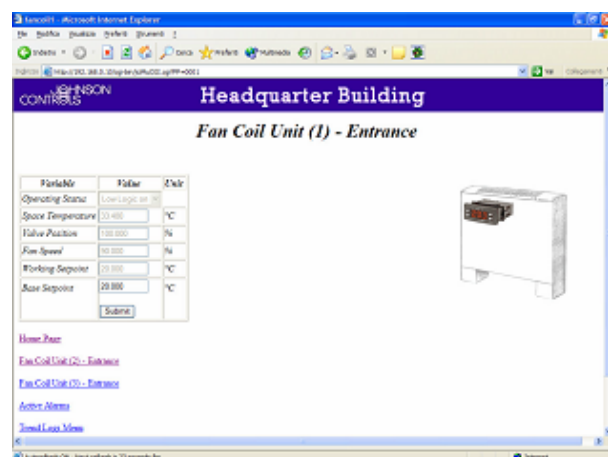


Figure 7: Web Page with Operational Data

Communication Services

You can program the Master Display to send out e-mail, SMS, and fax messages when connected to a modem and telephone line. E-mail messages are directed to an Internet Service Provider (ISP) that offers an e-mail forwarding service. The Master Display can send SMS messages to a Service Center or directly to a mobile telephone. The Master Display can also send fax messages to a fax machine connected to the telephone system.

The Master Display sends messages when an event goes into the active or alarm state. The messages are then directed to a prioritized list of destinations.

You can acknowledge alarms from a mobile telephone. You can also send commands by SMS to the Master Display to request that a summary of active alarms be sent to the mobile telephone, an e-mail address, or fax machine. Alternatively, if you have access to a personal computer with a Web browser and modem connection, you can view the control system on the Web pages generated in the Master Display.

Use the e-mail service to periodically send trend log data to a remote e-mail receiver for electronic storage and to prevent the loss of data in the Master Display when the trend buffer is full.

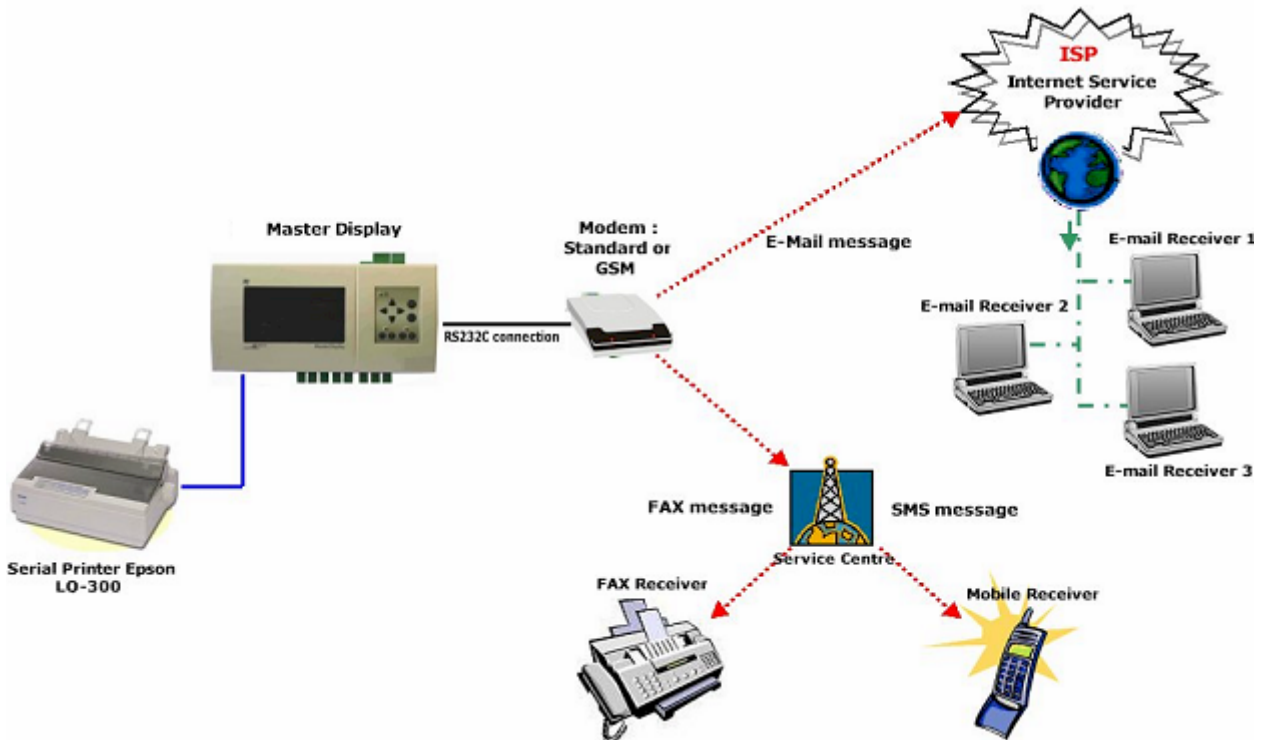


Figure 8: Communication Services

Alarm and Event Management

The Master Display manages and records events or errors the operating system generates and events or alarms associated with data points or variables in the control application.

System events indicate that the control system requires attention, such as:

- system power up
- trend buffer full
- communication message failure (e-mail, fax, SMS)
- device communication error
- application or display diagnostic error

Application events or alarms indicate that the controlled equipment requires attention or that the controlled conditions are not within the expected limits, such as:

- analog value is outside of a desired range
- status value represents a condition that is not normal

When an event goes into the active state, it is entered into the table of active events and the event history log with the time and date of occurrence, and a message window appears on the display screen. You can also configure an event to send a message to one or more of the following:

- local printer
- e-mail message server
- fax machine
- mobile telephone with SMS

If you configure active events to be acknowledged, the Master Display only removes the events from the active events table when a user acknowledges the events and the events have returned to an inactive or normal state. You can acknowledge events from the Master Display panel, a Web browser, or by SMS messages from a mobile telephone. You can view the table of active events and the event history log from the Master Display screen or Web browser. By an SMS message from a mobile telephone, you can transmit the table of active events to the telephone, an e-mail server, or fax machine.

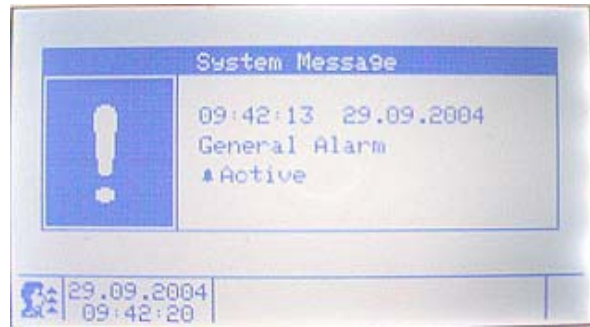


Figure 9: Event Message

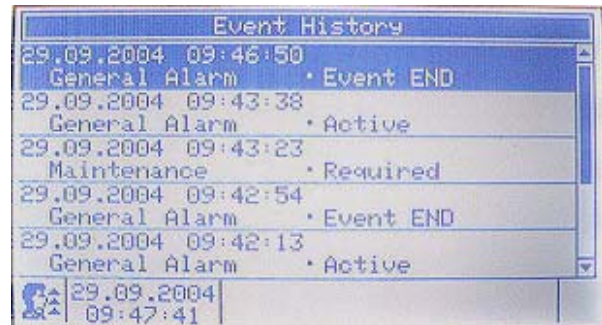


Figure 10: Event History

Data Trend Logging

You can configure the Master Display to record data samples at a defined interval from up to 16 variables within the control application. You can define a sample interval for each variable and set it from every minute to once per day. The on-board memory can hold, for example, a trend log of samples taken at 15-minute intervals for up to 20 days. You can view the trend data for each variable as a graph on the Master Display screen within a specified time range. The vertical axis of the graph is automatically set according to the maximum and minimum sample value in the trend log. The Master Display provides a scrolling feature to view trend logs that cannot fit on one screen.

You can also view the trend log buffer from a Web browser. You can copy and paste trend information into a spreadsheet application such as Microsoft Excel for further processing and electronic storage. The trend logs can also be transmitted at regular intervals from 1 hour to every day to the local printer or via the telephone modem connection to an e-mail server or to a fax machine.

The Master Display generates a system event message if the trend buffer is not configured in the circular recording mode and the buffer becomes full.

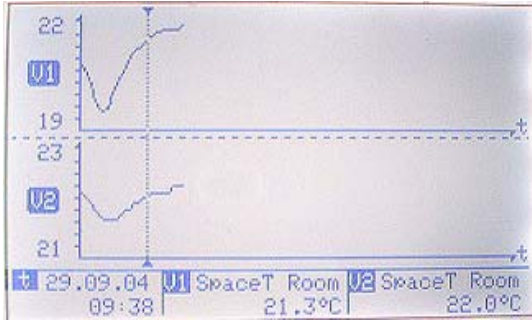


Figure 11: Graphic Trend Log

Time Scheduling

The Master Display has a real-time clock that supports all real-time functions including the display of time and date on the screen and the time stamping of each event. The real-time clock also enables the time scheduling of start and stop commands and setpoint changes to the monitored and controlled plant.

You can configure scheduled commands to execute on one or more days of the week. An exception day calendar allows for alternative time schedules on holidays or during special periods in the year. You can display and edit time schedules on the Master Display screen or in a Web browser.

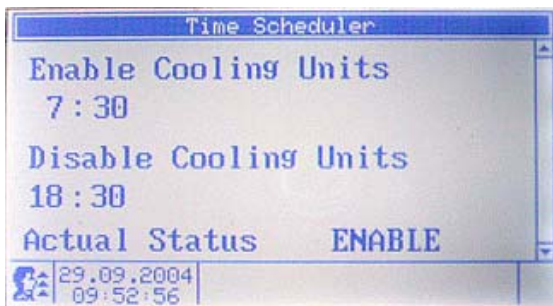


Figure 12: Time Schedule

FX Tools Pro

FX Tools Pro is a software suite used to program, download, test, and commission the FX devices, including the Master Display. FX Tools Pro consists of the following:

- FX Builder: Used to fully program the Master Display, including the control application, integrated user interface design, schedule and trend configuration, and web page design.
- FX CommPro N2: Used to download, test, and commission the Master Display.

Application Upload/Download

You can download the Master Display application to the controller via computer with the FX Tools Pro, or upload/download via the FX Programming Key.

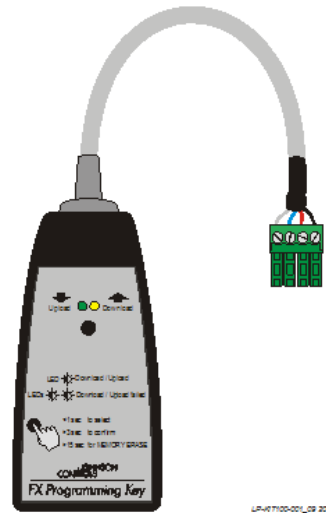


Figure 13: FX Programming Key

Supervisory Options

You can integrate the Master Display into a supervisory building automation system for continuous monitoring of the control system. The Master Display supports two methods of integration.

N2 Open

Use an RS-485 port that supports the N2 Open protocol to replace the modem port for communication services. You can then connect a supervisory system to the Master Display. This provides access to all the control system variables and parameters that were available to the Web server and other communication services.

LONWORKS Network

The second option is the Master Display with the LONWORKS® interface. Because the LONWORKS network uses the peer-to-peer LonTalk® protocol, the Master Display can monitor LONWORKS controllers and devices on the network and present the data on its integrated user interface, and, at the same time, be monitored itself by any LONWORKS compatible supervisory system.

This includes a building automation system with the LONWORKS Integration feature. In this configuration with a LONWORKS interface, the Master Display can also support a supervisory system on the RS-485 port or communication services on the modem port.

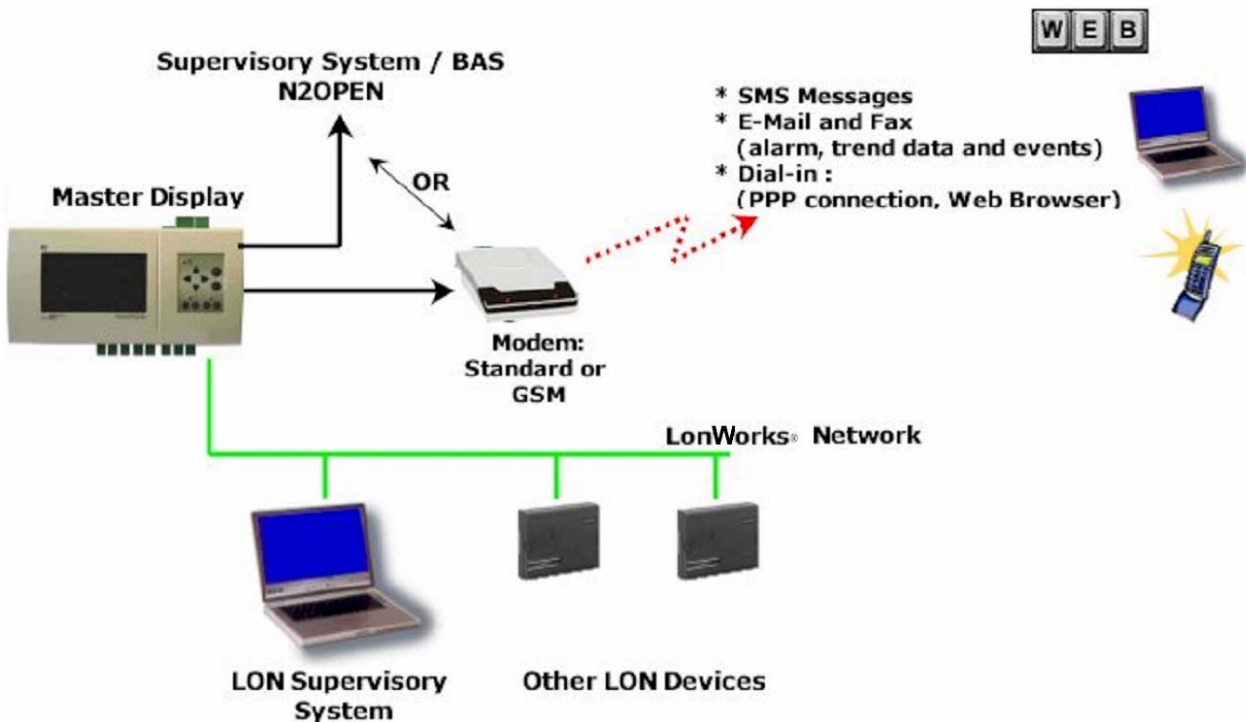


Figure 14: Master Display Supervisory Options

Dimensions

You should mount the Master Display in a cabinet front panel or door, or in a desktop console. Cable access for power, communications, and any local input and output wiring must be provided. Adequate ventilation to keep the unit within the specified ambient operating conditions must also be provided.

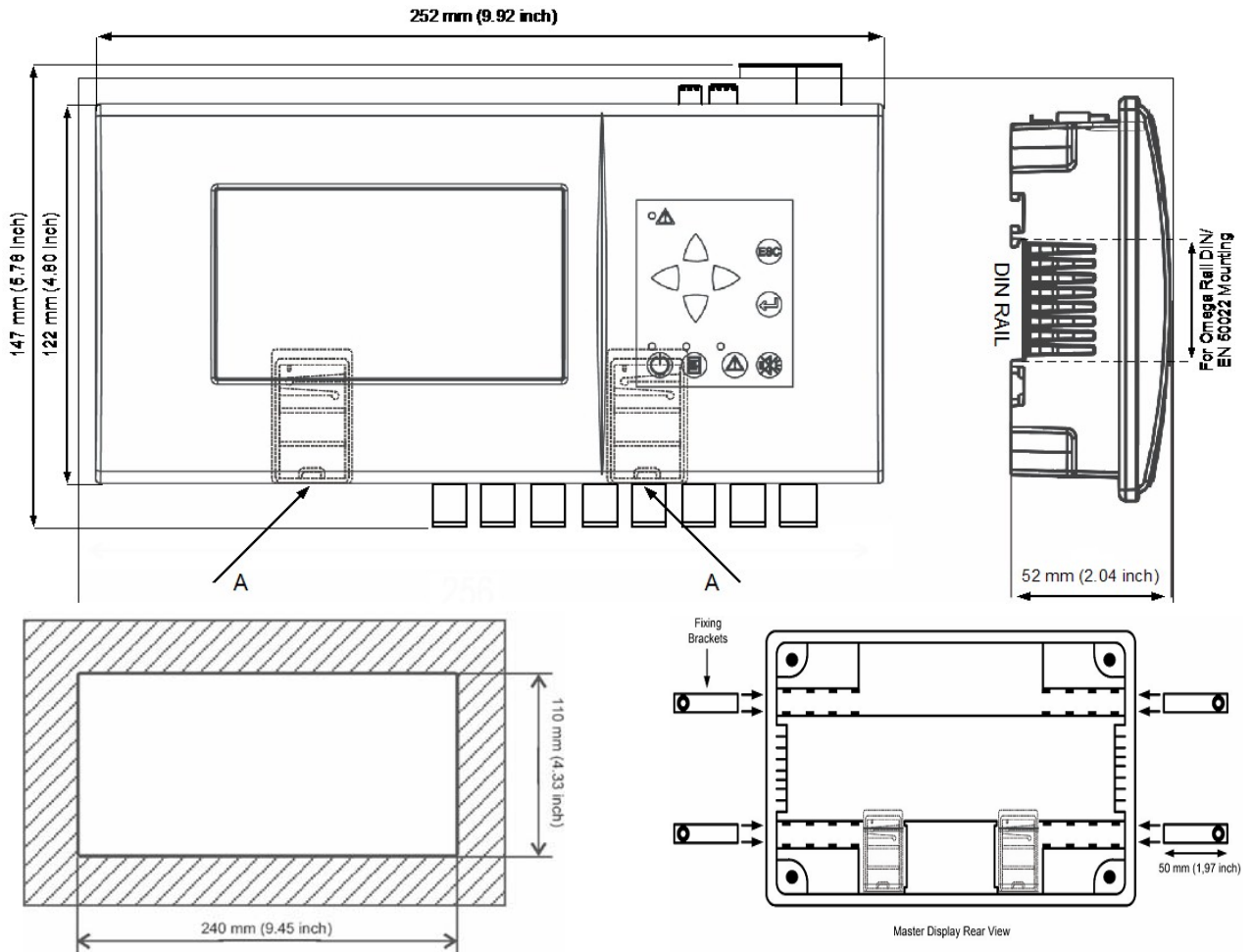


Figure 15: Master Display Dimensions and Panel Mounting Installation Cut-Out

Ordering Codes

Tables 1 through 4 contain ordering information for the MD20 Master Display.

Table 1: Master Display Models Ordering Information

Product Code Number	Description
LP-MD20D00-000C	Master Display: Includes RS-232 port for downloading and commissioning only and 2 relay DOs.
LP-MD20D01-000C	Master Display: Includes N2 slave interface and 8 relay DOs.
LP-MD20D02-000C	Master Display: Includes RS-232 port for downloading and commissioning only, LONWORKS interface, and 8 relay DOs.
LP-MD20D03-000C	Master Display: Includes RS-232 (for modem/computer only) and 8 relay DOs.
LP-MD20D04-000C	Master Display: Includes RS-232 port for modem and computer interface, LONWORKS interface, and 8 relay DOs.
LP-MD20D05-000C	Master Display: Includes N2 slave interface, LONWORKS interface, and 8 relay DOs.

Table 2: Accessories Available in Europe and North American Ordering Information

Product Code Number	Description
LP-KIT020-000C	Panel mount kit for master display
LP-KIT007-001C	Link cable for connection of MD20 to standard modem with DB9 connectors, 1.5 m (5 ft)
LP-KIT007-013C	Null Modem link cable: RS-232, 3 m (10 ft)
LP-KIT007-014C	Null Modem link cable: RS-232, 15 m (49 ft)
LP-KIT007-015C	Commissioning adapter
LP-KIT100-000C	FX Programming Key

Table 3: Accessories Available Only in Europe Ordering Information

Product Code Number	Description
LP-KIT090-000C	Modem GSM 900/1800 FastTrack
LP-KIT007-002C	Link Cable for connection of GSM modem to FX16 and Master Display
LP-KIT090-001C	GSM modem plug-in antenna
LP-KIT090-003C	GSM modem magnetic mount antenna – 2.5 m (8 ft) cable
LP-KIT090-004C	GSM modem panel mount antenna – 5 m (16 ft) cable
LP-KIT090-005C	Power adapter for GSM modem 230 VAC/12 VDC with central European plug

Table 4: Expansion Modules Ordering Information

Product Code Number	Description
LP-XT91D00-000C	Extension module
LP-XP91D02-000C	Expansion board: 6 AI, 2 AO
LP-XP91D03-000C	Expansion board: 8 DO (triacs)
LP-XP91D04-000C	Expansion board: 4 DI, 4 DO (triacs)
LP-XP91D05-000C	Expansion board: 8 DI
LP-XP91D06-000C	Expansion board: 4 DO (relays) 230 VAC (Europe only)
LP-XP91D07-000C	Expansion board: 4 DO (relays) 24 VAC (North America only)

Table 5: Software Ordering Information

Product Code Number	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON)

Technical Specifications

I/O Technical Details

Terminals	Channel	Type	Remark/Application
Binary Input (BI)			
21-24	BI1, BI2,	Voltage free contacts	Transition counter function: Minimum 10 ms on and 10 ms off for detection (50 Hz) Prescaler function: max division by 100
Power Supply			
31 32 33	Earth Ground 24~ Com 24~ Hot	24 VAC Power Supply	5x10 ⁴ or 50,000 operations
Digital Output (DO)			
1,2 3,4 5,6 7,8 9,10 11,12 13,14 15,16	BO1, BO2, BO3, BO4, BO5, BO6, BO7, BO8	SPST 5(1)A power relays	Max switching power: 1,250 VA, 150 W Rating (resistive): 5 A 250 VAC Expected electrical life: 5 A 250 VAC 5x10 ⁴ Dielectric strength: coil-contacts: 4000 Vrms for 1 min

MD20 Master Display

Table 6: MD20 Master Display

Product	MD20 Master Display	
Power Supply	24 VAC ±15% 50/60 Hz – Safety Extra Low Voltage (SELV) Class 2 in North America	
Power Consumption	15 VA maximum	
Enclosure Protection Class Enclosure Material	Front panel mounted: IP54 Rear of panel: IP30 - IEC529 Self-extinguishing to UL94 5VB	
Ambient Operating Conditions	-20 to 50°C (-4 to 22°F), 10 to 95% RH (noncondensing)	
Ambient Storage Conditions	-20 to 70°C (-4 to 158°F), 10 to 95% RH (noncondensing)	
Dimensions (H x W x D)	122 mm (4.80 in.) x 252 mm (9.92 in.) x 52 mm (2.04 in.)	
Weight (in delivery package)	1 kg (2.29 lb)	
Display Screen Resolution	240 x 128 Pixels	
Supervisory Port	RS-485 N2 Open Protocol at 9600 Baud	
Communications Port	RS-232C PPP Protocol at 9600 Baud for GSM Modem	
Printer Port Comm. Speed	9600 Baud	
LONWORKS Interface	FTT (Free Topology Transceiver) at 78 Kbps. MIP interface between Neuron® chip and controller microprocessor	
Local Link Bus	RS-485 N2 Open/N2 System91 Protocol at 9600 Baud	
I/O Expansion Bus	RS-485 N2 XT Bus Protocol at 9600 Baud	
Output Relay Contacts	SPST 250 VAC 5(1)A (Minimum closure time 100 ms)	
Input Binary Contacts	Voltage-free, 1k ohm maximum	
Power Supply and I/O Terminals	Screw terminal connectors for max 1.5 mm ² (AWG14) wire	
Communication Terminals	RS-485 (N2) and LONWORKS (FTT) – screw terminals for max 0.8 mm (AWG20) wire	
Compliance	Europe	– 89/336/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-1 – 72/23/EEC, Low Voltage Directive: EN 60730
	Canada	– UL Listed (PAZX7), CAN/CSA C22.2 No. 205, Signal Equipment – UL Recognized (XAPX8), CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment – Industry Canada, ICES-003
	United States	– UL Listed (PAZX), UL 916, Energy Management Equipment – UL Recognized (XAPX2), UL 873, Temperature Indicating and Regulating Equipment – FCC compliant to CFR 47, Part 15, Subpart B, Class A

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

Published in U.S.A and Europe