Modular Room Control (MRC) Series Digital Thermostat

The MRC Digital Thermostat is an expandable, multi-purpose, high-quality Direct Digital Control (DDC) illuminated thermostat designed to control virtually any Fan Coil Unit (FCU) or Packaged Terminal Air Conditioning (PTAC) found in hotel guest rooms. The MRC comes standard with five relays and can be equipped with an onboard Infrared (IR) transceiver and Passive Infrared (PIR) motion detector. Coupled with a magnetic door switch (wired or wireless), the MRC becomes the brain of a highly effective Energy Management System (EMS) for guest rooms.

When connected to a Central Interface Network (CINET) with a pair of low voltage wires, a centrally controlled EMS package is created. The MRC is readily expandable to include functionality such as humidity control, outside temperature display, mini-bar access reporting, occupancy reporting to housekeeping, automatic control of lights, and much more. Use of infrared or low voltage wiring enables remote control of lights, occupancy reporting, and other functions.

Figure 1: MRC Digital Thermostat

Features and Benefits	
❑ **Centrally Controlled, with Multiple Services Integrated on a Common Platform**	Provides fully automated guest room control and a communication system for the lodging industry, with the ability to tie together the guest rooms and other systems within the hotel, including the Property Management and Building Automation System.
❑ **Passive Infrared (PIR) and Entry Door Access Detection Combined**	Provides reliable and automatic energy management by activating programmable temperature setbacks when the guest room is unoccupied.
❑ **Lighting Controls that Are Exceptionally Versatile and Designed Specifically for Hotel Guest Rooms**	Allows the guests to control their lighting environment remotely. In addition, the lighting controls can be programmed to turn on one or more selected lights when guests first enter the room, after check-in, creating a warm, welcoming guest room ambiance.
❑ **Infrared (IR) Technology**	Provides areas with high labor costs or restrictive electrical codes practically wireless installation with this unique IR capability.
❑ **Do-Not-Disturb/Make-Up-Room and Door Chime System**	Adds to the guests' amenities and eliminates the use of old-fashioned, outdated hanging cards and the need for staff to knock or yell through the door to guests. Guests can effortlessly interact with hotel staff and services.
❑ **Central Electronic Lock System (CELS)**	Provides hotel operational efficiency and greater guest security when the door locks are controlled via this wireless, real-time, on-line lock control system.

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Product Overview

The MRC as a Basic Direct Digital Control (DDC) Thermostat

In its most basic role, the MRC is a high-quality DDC thermostat. It is easily configurable to control virtually any FCU or other Heating, Ventilating, and Air Conditioning (HVAC) equipment found in hotel guest rooms. The MRC is programmable through the front keypad, allowing the thermostat to be configured to the specific equipment requirements (that is, 4-pipe; 2-pipe with reheat; 1, 2, or 3 speed fan). It provides precise temperature control and automatically determines proper valve and fan speed settings, eliminating the need for manual switching between heating and cooling modes.

The MRC as a Stand-Alone Energy Management System (EMS)

Following are the three items needed for stand-alone EMS:

- the MRC Digital Thermostat
- a motion sensor (PIR)
- a door switch (wired or wireless)

Including the optional onboard motion sensor on the MRC, the actual number of components can be reduced to two: the MRC and a door switch.

The concept of stand-alone energy management for guest rooms using the MRC is simple. The MRC controls the HVAC equipment in the guest room and can automatically execute a number of energy saving actions including:

- establishing minimum and maximum temperature settings (for example, 65°F [18°C] and 82°F [28°]) to prevent overcooling or overheating a room
- turning the HVAC equipment off when the entry door (or lanai/balcony door) is left open for an extended period of time
- allowing the temperature to drift up or down within a band when the room is not occupied. This is the most significant factor and typically results in energy savings of 15% or more.

It is important to note that all of the actions taken by the MRC are software programmable. All actions can be adjusted to best suit the needs of a particular hotel property.

A stand-alone energy management system can be quickly installed at a cost to the hotel or motel, which can provide a payback in 18 months or less.

The MRC as a Centrally Controlled EMS

Following are the four items needed for Centrally Controlled EMS:

- the MRC Digital Thermostat with motion sensor and door switch
- a Floor Bridge (MRC19-SFB-x or MRC19-DFB-x) on each floor (each bridge serving up to 50 rooms)
- a Riser Bridge (MRC19-DRB-x [serving up to 50 floors])
- a Central Interface Server (CIS) (serving up to 8 Riser Bridges) with associated Windows® Personal Computer (PC) display terminals

Stand-alone energy management in guest rooms is achieved principally by setting the temperature back (that is, allowing it to drift up or down within a programmable band) when the guest room is unoccupied.

Centrally controlled energy management significantly increases savings by adding a broader setback band when the guest room is not rented, resulting in an additional 10%-15% savings. Savings with centrally controlled EMS is usually more than 25%.

Additionally, the unoccupied setback band can now be automatically programmed above and below the last guest temperature setting. For example, if the guest's last setting was 70°F (21°C), the unoccupied setback might be programmed for +/- 3°F (-16°C) or 67°F (19°C) to 73°F (23°C). Since the guest typically enters the room from an external environment which is cooler or warmer than the unoccupied setback level, the small temperature difference is not noticeable, and the moment the entry door is opened, the MRC automatically adjusts the temperature to the last setting and displays that as SET temperature. After a few minutes, actual room temperature returns to the guest's last setting, as the MRC manages FCU operation to achieve that temperature.

The net result is a happier, more comfortable guest and greater energy savings for the hotel.

All the MRC setbacks are software programmable and, with central control, all can be remotely programmed from a Central Interface Terminal (CIT) with no need to visit each room. Once set, setbacks become automatic. This flexibility and system power are hallmarks of central control and contribute greatly to improved hotel operating efficiencies and lower operating costs.

Energy Savings

Calculating Energy Savings for EMS

There are many factors that affect energy consumption and cost, and no two properties are precisely the same. Here is a short list of the factors:

- climate (degree-days per year) and humidity
- type and age of HVAC equipment
- property type (deluxe, upscale, mid-level, limited service, and budget)
- guest demographics (resort gamblers, conventioneers, and business travelers)
- occupancy rates (during summer, winter, and shoulder seasons)
- guest room area vs. public area
- non-guest room facilities (in-house laundry, swimming pool, and restaurants)
- cost of electricity (per Kilowatt-Hour [KWH] plus additional demand charges, if applicable)
- as appropriate, cost of non-electric energy sources (oil, gas, and steam)
- local position of property (for example, wooded area, beach, and windy hill)
- orientation of property (for example, north or south)
- structural characteristics of guest rooms (for example, K-factor, and window area)
- quality and training of engineering and housekeeping staffs
- attitude of management

While stand-alone EMS is assuredly less expensive to install than centrally controlled EMS, the added savings of a centrally controlled system **coupled with** significant non-energy-related benefits to the property can frequently create an attractive system offering.

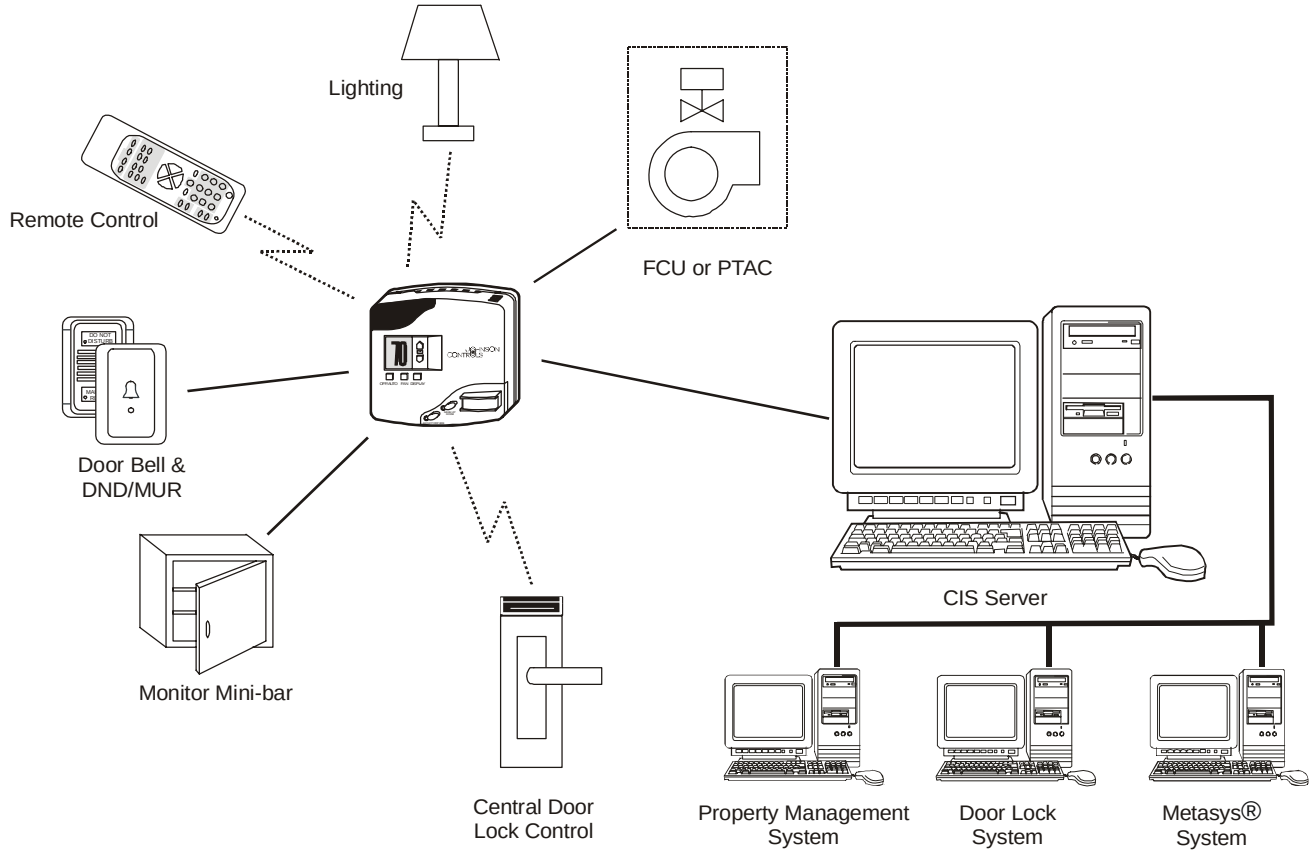

Figure 2: System Components

User Interface

Accurate, fingertip control of the room temperature is accomplished with this intuitive and attractive user interface (see Figure 3). The user interface is enhanced with the illuminated Liquid Crystal Display (LCD), making it possible to interact with the thermostat even in the dark.

The UP and DOWN buttons allow the user to change the desired temperature in 1°F or 0.5°C increments. The °F/°C button cycles between Fahrenheit and Celsius.

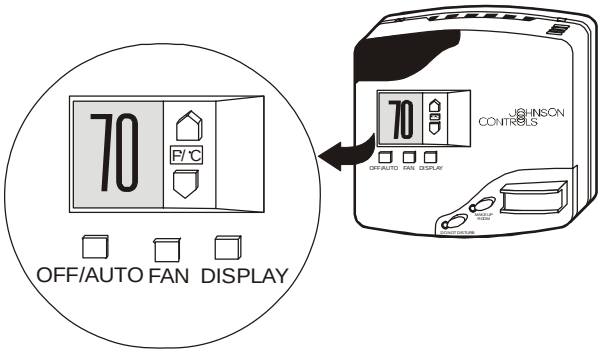

Figure 3: LCD Display and Control Buttons

The OFF/AUTO button cycles the MRC between OFF and AUTOMATIC modes. In AUTO mode, the MRC automatically determines optimum valve and fan speed settings needed to maintain the desired temperature. In the OFF mode, only the word OFF is displayed, and the MRC is no longer in control of the fan speed or valve settings, except for maintaining room temperature between programmed maximum and minimum limits.

The FAN button is only functional when the MRC is in AUTO mode. If pressed, the display first shows the current fan speed. If pressed again, fan speed cycles to the next higher speed, and that speed is displayed. After 10 minutes, operation reverts to full AUTO in which the MRC sets the fan speed best suited to maintain the desired temperature.

The DISPLAY button cycles between the desired temperature and the actual temperature. When the MRC is activated and in AUTO mode, the desired temperature is automatically displayed. The actual temperature is only displayed if the DISPLAY button is pressed AND then appears for only 5 seconds. Following that 5-second period, the display reverts to SET temperature.

Digital Thermostat Optional Equipment

Onboard Passive Infrared (PIR) Motion Sensor

For most applications in which the MRC is installed in a guest room, this is the most cost-effective solution. The built-in PIR has dual sensors and a field of coverage of 178° (see Figure 4). It is ordered with the thermostat and requires no external wiring or commissioning.

Onboard Infrared (IR) Transceiver

For areas with high labor costs or particularly restrictive electrical codes, installation can be practically wireless with the addition of an onboard Infrared (IR) transceiver (see Figure 4). With the addition of this capability, other components of the system can become wireless, such as the door or window switch.

It also expands the capabilities, when used with the IR remote control, to adjust the temperature from the bedside. If lighting is used and integrated, wireless lighting can be accomplished.

Do-Not-Disturb and Make-Up-Room

With the addition of the DND/MUR buttons on the MRC Thermostat (see Figure 4), guests can display their privacy and service needs conveniently and cost effectively. This capability can eliminate the unsightly and awkward doorknob tags. At the touch of a button, Do-Not-Disturb or Make-Up-Room is immediately displayed on the CIT or remotely displayed to housekeeping and other departments within the hotel.

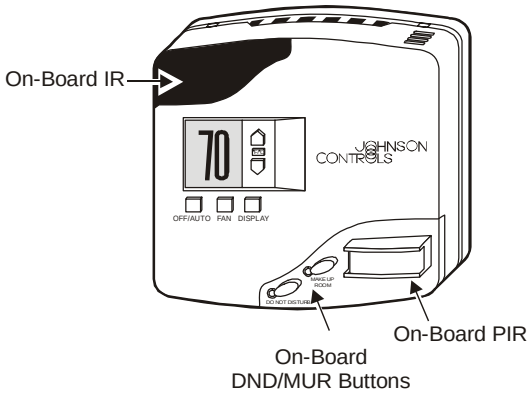

Figure 4: MRC Onboard Options

Humidity Control

There are a wide variety of strategies for effective humidity control, and selection of the most appropriate one depends upon the circumstances at any given property. Factors include: outside humidity and temperature conditions, make-up air supply method and the condition of such air, occupancy, and guest comfort.

One of the simplest methods, usually most appropriate in situations in which humidity is not a serious problem, is to simply cycle air conditioning equipment on at preset intervals and for preset periods of time. In the event that the guest room was rented and there was guest-activated use of air conditioning, such cycling would automatically be disabled, as it would not be necessary. The electronic intelligence of the MRC is readily able to handle such humidity cycling strategies.

As part of a more sophisticated strategy, the MRC can be ordered with a humidity sensor installed (see Figure 5) to execute a number of different strategies. One strategy is that the MRC could enable cooling when humidity exceeds a preset value. This strategy, of course, must be dealt with carefully in terms of possible negative impact on guest comfort. Another strategy, where allowed, is that the MRC could enable both heating and cooling simultaneously in order to maintain target temperature while keeping humidity below a maximum threshold.

When the humidity sensor is installed, the MRC can provide an on-demand relative humidity display. The display is not available to guests and can be activated only by special sequencing of the control buttons on the face of the MRC. This feature permits, for example, engineering staff at a property to selectively monitor humidity conditions in guest rooms.

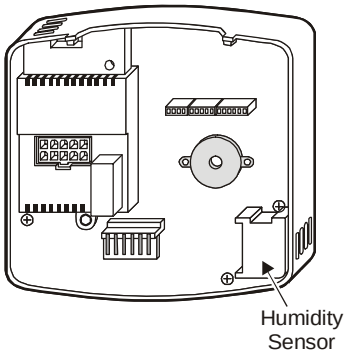

Figure 5: Humidity Sensor Location

Accessories

Passive Infrared (PIR) Motion Sensor

There are two alternative motion sensors, which may be used with the MRC thermostat, instead of the onboard version (see Figure 4). When using the externally mounted versions, the onboard version is not used.

Wall-Mounted PIR

The wall-mounted PIR is a 3-wire, 12 VDC device and is normally mounted in an upper corner of the guest room with a view of the bedroom area (see Figure 6). The field of coverage is 90° in a horizontal plane. Since the field of coverage in the vertical is 45°, it is best to mount the device at a downward angle of 15° to 20° for installation in smaller guest rooms.

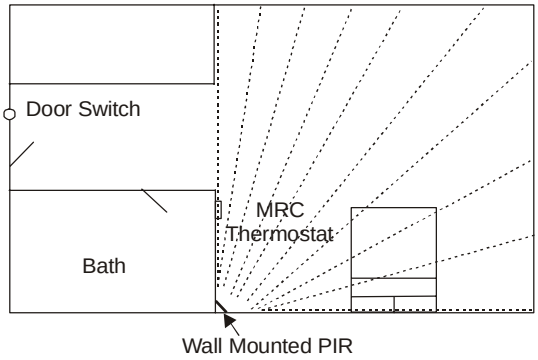

Figure 6: Wall Mounted PIR Field of Coverage

Ceiling-Mounted PIR

The ceiling-mounted PIR is a 3-wire, 12 VDC device and is normally mounted near the center of the bedroom ceiling (see Figure 7). The field of coverage is a 360° cone emanating downward and outward at a 45° angle from the eye at the center of the device.

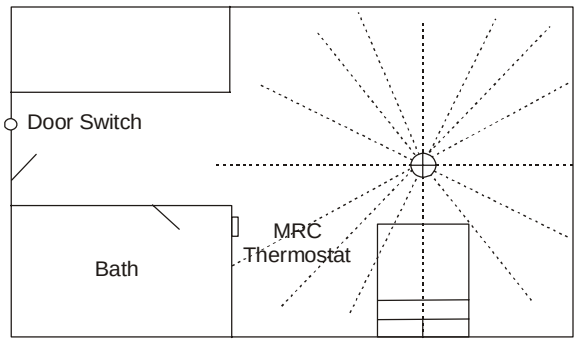

Figure 7: Ceiling Mount PIR Field of Coverage

Door Switches

The status of the door (open or closed) triggers the sequence of events that determines the occupancy of the room. When the door is opened, the MRC Thermostat and the PIR Motion Sensor look for motion within the room. Once motion is detected, the MRC Thermostat locks into the occupied mode. When the door is opened again, if no motion is detected for a period of time (default 15 minutes), then the MRC determines the room is unoccupied. This sequence operates each time the door is opened.

In addition, when central control is used, the door status can trigger alarms such as door ajar, if the door is left open or propped open.

There are two choices in adding a door switch input to the MRC for EMS.

Wired Magnetic Door Switch (MDS)

There are two parts to the MDS (see Figure 8): the wired cylindrical piece, which is installed in the door frame and wired to the MRC thermostat, and the non-wired cylindrical magnet, which is installed in the door in a location directly opposite the wired piece when the door is fully closed.

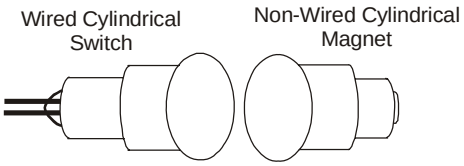

Figure 8: Low Voltage Wired Door Switch

Wireless Magnetic Door Switch (MDS)

The wireless MDS is designed for circumstances in which structural limitations or prohibitive cost make it impractical to use a wired switch. Using a wireless switch can significantly reduce installation time and cost, particularly where local code requires conduit for low voltage wiring. When the wireless door switch is used, the onboard IR transceiver option on the MRC thermostat is required (see Figure 4).

An IR transmitter is coupled with the wireless MDS (see Figure 9). The IR transmitter replaces the wiring between the MRC thermostat and the door switch. The transmitter communicates with the IR receiver in the MRC each time the door opens or closes. The IR transmitter is available in black or white.

Power is provided by two AAA batteries, supplied with the transmitter. A low battery signal will be sent to the Central Interface Terminal if the MRC is networked.

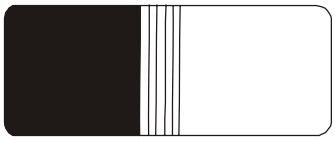

Figure 9: Wireless Door Switch Transmitter

Room System Monitoring

The ability to monitor other systems within the room adds value and efficiency to the hotel operation. The following are typical examples:

Guest Room Windows or Sliding Doors

With the installation of an MDS in the windows or sliding doors of a hotel room, the MRC can monitor their status and use this information to disable the HVAC if left open too long. If multiple windows or doors are present, then the switches can be wired in series to present a single window or door status. If the guest leaves the window or door open upon checkout, the situation can be quickly communicated to the hotel staff to prevent possible damage from rain or other outdoor conditions.

Mini-Bar

Approximately 20% of the hotel/motel rooms in the U.S. have mini-bars. Most of them are non-automated, honor system units in mid-to-upscale hotel properties. Usage statistics indicate that 60% of guests never open the mini-bar. Another 10% open it but take nothing, and about 30% actually remove and consume goods.

Checking mini-bar usage is problematic for both hotel operators and guests. For operators, it means having to check all rented rooms (even the 60% in which the mini-bar was not opened) to determine whether items were removed. And the mini-bar checking typically cannot be done early enough each day to determine and report usage before many guests check out, since a high percentage of check-outs are in the early morning. For guests, mini-bar checks by hotel staff are a nuisance. It means one more intrusive knock on the door.

A simple, yet highly effective, means of increasing staff efficiency is a periodic, real-time report of rented guest rooms in which the mini-bar has been opened. This eliminates the need to check the 60% of the rooms in which the mini-bar has not been opened and provides a specific listing of guest rooms in which it has been opened. It also improves guest comfort by reducing, by more than half, the number of guest room intrusions for mini-bar checks.

To create a real-time report, a low-cost magnetic switch is attached to the mini-bar door in an inconspicuous location. When the door is opened, the switch reports the opening to the MRC, which, in turn, reports it over the CINET to the Central Interface Server (CIS). Such data is then made available on CIT terminals to housekeeping or dedicated mini-bar staff. Of course, this feature is only possible in MRC installations that are centrally controlled.

Smoke Detector

IMPORTANT: Neither the MRC Series Thermostat, nor any component of it, is National Fire Prevention Association (NFPA) approved or designed for, or intended to be sold as, a primary fire safety system or component thereof.

The MRC Thermostat can be a valuable tool for secondary reporting of guest room smoke alarm activation.

Most local fire codes only require that hotel fire protection systems report guest room smoke detector activation by area, for example, 7th Floor, West Wing. Since a centrally controlled system has real-time communication with all guest rooms, it is well suited to be able to report smoke detector activation to security staff on a guest room-specific basis.

A smoke detector with a normally open contact is required to implement guest room-specific smoke detector annunciation. Such contact can be connected to the MRC Thermostat with a low voltage twisted pair of wires.

Other Binary Inputs

Additional binary events can be monitored, such as Water-on-the-Floor and SOS signal. These types of events require external input sources but could logically be added to any system and be monitored and reported at a central location.

Guest Convenience

Convenient interaction with the hotel and staff is a major concern for your guests. You can facilitate this communication through the MRC by integrating the following functions into the rooms. These functions can be used as separate systems or combined.

Do-Not-Disturb and Make-Up-Room

These functions can be integrated within the MRC thermostat, and provide the most cost effective solution for sending these important guest messages to the hotel staff (see Figure 10). When used with a Centrally Controlled System, housekeeping and other staff can be informed of the guest's requests.

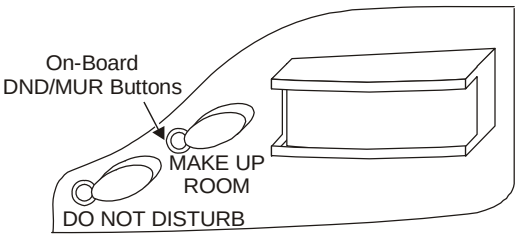

Figure 10: MRC with DND/MUR

INNtouch

INNtouch is a convenient, easy way for guests to display their privacy and service needs. INNtouch eliminates unsightly, awkward doorknob tags and provides a pleasing doorbell chime to announce staff and other guests. At the touch of a button, Do-Not-Disturb or Make-Up-Room is immediately displayed on the corridor wall plate (see Figure 11).

With the use of the motion detector inside the room, INNtouch allows the staff to determine the occupancy of a room without knocking or yelling through the door. This reduces embarrassing intrusions on the guest.

INNtouch operates on a stand-alone basis or seamlessly integrates in the Centrally Controlled System to remotely display guest room status to housekeeping and other departments within the hotel.

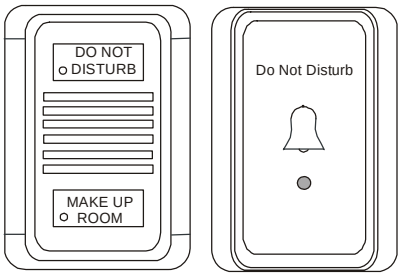

Figure 11: DND/MUR Package

Central Electronic Lock System (CELS)

Another important benefit of installing the MRC system is the ability to perform online lock control. By adding a small, infrared transceiver in the ceiling or on the wall near the entry door, two-way, real-time communication is established with each lock. The Central Interface Server (CIS) is then interfaced with the lock control PC, and a powerful, fail-safe central lock control system is established. The benefits are many, including:

- elimination of incorrect key card issuances
- simplified guest check-in procedures
- centralized staff and guest card cancellation
- real-time tracking of hotel employees
- detailed, unlimited access audit trail
- automatic time synchronization of all locks
- door ajar and forced entry alarms
- card cancellation upon checkout
- remote late check-out key card extension
- greater guest security

IMPORTANT: CELS capability requires the addition of an IR Transceiver to be added to the lock mechanism, by the lock manufacturer. SafeLoc and TimeLox are the two companies that have integrated with this system.

Expansion Capabilities

The MRC System has the ability to expand its input/output capabilities with the use of expansion boards. The expansion board allows the interface between the FCU or PTAC and MRC to be moved from the MRC Thermostat to a location that may better fit the specific needs of the hotel. For example, in a retrofit situation, there may not be enough existing wires between the original thermostat and the FCU. These wires could be used as the local bus between the MRC Thermostat and the expansion board, and the expansion board could be located within the FCU to control the outputs. Another possibility is using these boards as lighting controls.

The expansion boards communicate to the MRC Thermostat through a wired connection or wireless when used in conjunction with the IR transceiver.

5-Triac Expansion Board

The MRC19-EXP1 Triac Expansion Board is used to expand the functionality of the MRC Thermostat when 24 VAC triac operation is an option. It is used to control other compatible low voltage relays or low voltage loads, such as a valve. This expansion board also has two additional Binary Inputs that could be used to monitor the window, used with an Aquastat for seasonal changeover, or monitor the compressor alarm on a Heat Pump.

This expansion board is also used as the motherboard for the other expansion options.

6-Relay Expansion Board

The MRC19-EXP2 Relay Expansion Board has six Single-Pole, Single-Throw (SPST), 100-300 VAC 20 ampere relays onboard. Relays 5 and 6 can be configured to switch as a pair, allowing both legs of the circuit to be controlled. The expansion board is used where the use of triac switching on low voltage is not preferred, or when line voltage switching is required. Typical applications include line voltage switching in FCU or PTAC units or lighting controls.

Analog Expansion Boards

The MRC19-EXP3 and -EXP4 expansion boards with proportional control capabilities can be used to provide proportional control (0-10 VDC) capabilities for hot or cold water valves when required.

The MRC19-EXP3 combines the MRC19-EXP1 5-triac board with an additional Analog Output board.

The MRC19-EXP4 combines the MRC19-EXP2 6-relay board with an additional Analog Output board.

IR Transceiver (EYE)

The MRC19-EYE0 IR transceiver allows wireless communication from the MRC Thermostat to the expansion boards. It can be surface mounted underneath the PTAC/FCU or mounted within a J box, behind a Decora® style cover plate. Line of sight to the MRC thermostat is not required to communicate effectively. Power for the IR transceiver is provided by the expansion board.

Lighting Control

The lighting controls that accompany the MRC System add exceptional versatility to the guest room. With controls designed specifically for hotel guest rooms, standard lamps or existing circuits can be configured to work in conjunction with the MRC system. The MRC system also provides the guest the ability to remotely control the lighting environment, as well as provide other high-impact guest satisfaction value. For example, the MRC thermostat can be programmed to automatically turn on one or more selected lights when the guest first enters the room after check-in, creating a warm and welcoming guest room ambiance.

Additional benefits include:

- automatic bulb outage reporting
- extended light bulb life by use of soft on operation of lights at slightly less than maximum rated voltage
- repeater capability to relay IR commands to other devices not readily accessible

Lighting Module

The MRC19-LMP0 Lamp Module operates with a power supply that can be installed in an out-of-sight location. This device connects in the power line of the lamp and provides for local on/off control. It can also be controlled wirelessly through the IR transceiver.

Wireless Wall Switch

The MRC19-LMP1 light switch provides wireless control of an existing or new hard-wired light circuit. It replaces any existing light switch where the circuit consists of both a phase and neutral conductor. Standard Decora style cover plates can be used, so it can be easily integrated within the existing room design.

In addition to controlling the lighting, the light switch acts as a junction for other system components. It has an input connection available for the MRC19-MDS0 Magnetic Door Switch, eliminating the need for a separate transmitter. It can be ganged with other electrical switches or with other products such as the MRC19-PKG0 DND/MUR/Chime package. The built-in 12 VDC power supply is sufficient to provide power for the DND/MUR/Chime package and a remote PIR motion sensor, eliminating the need for a separate power supply or wiring from the MRC Digital Thermostat.

When combined with these other systems, this versatile light switch creates an attractive and cost effective solution to wiring multiple systems, while using wireless capabilities (see Figure 12).

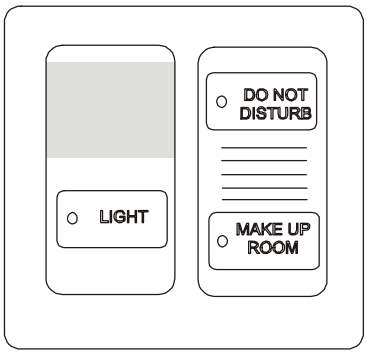

Figure 12: Wireless Wall Switch with DND/MUR Mounted Together

Lighting Circuits and Scenes

With the use of the lighting module, wireless wall switch and the expansion boards shown earlier, creative and guest-pleasing lighting control can be accomplished. Lighting scenes can be created to display a soft lighting feel when entering the room. The last level of lighting can be saved and reenergized upon subsequent returns to the room. Upon checkout, the lighting scenes can be reset to the original levels.

Upon checkout, all lights within the room can be de-energized, saving energy for the hotel, and extending the life of the light bulbs.

Additional Features

Handheld Infrared Temperature Control

The Handheld Remote Controller is a powerful, low-cost, guest amenity. It seamlessly integrates room control into an intuitively easy-to-use device.
In addition to controlling all standard TVs, including those used with pay-per-view systems, the handheld remote controller can provide guests with the ability to remotely control lighting, temperature settings, and automated draperies.

Ordering Information

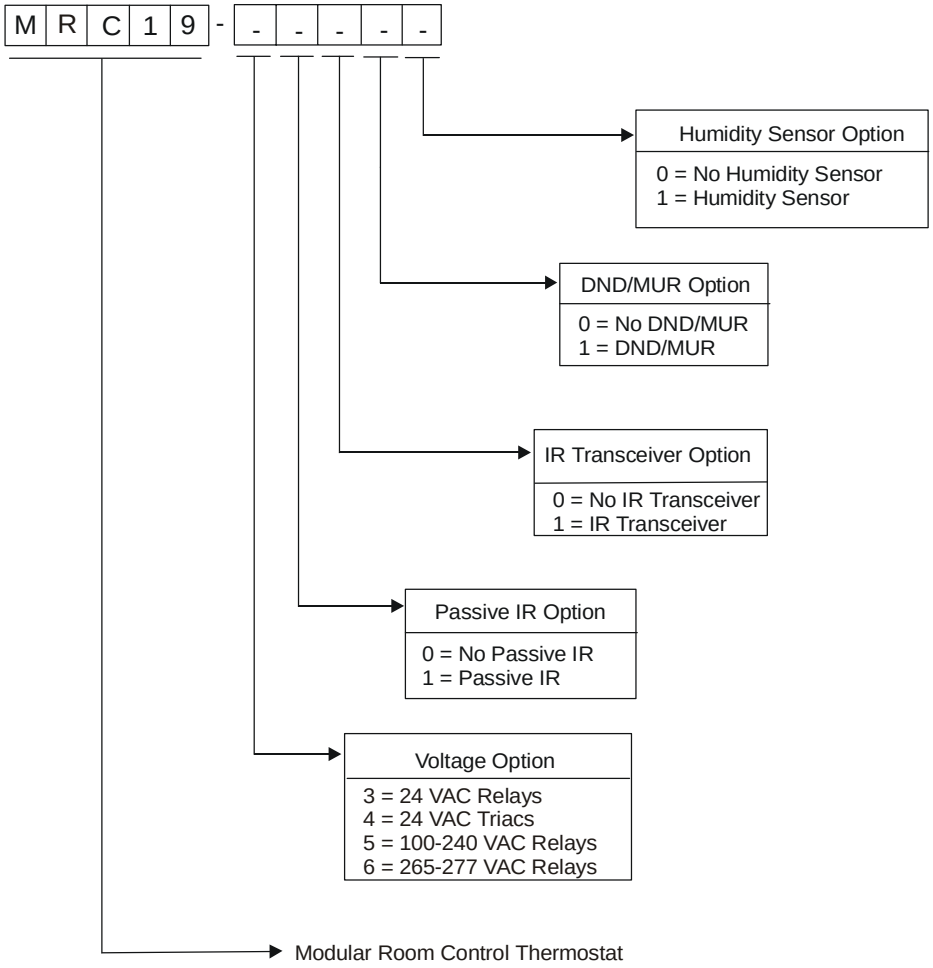

Figure 13: MRC Thermostat Ordering Information

Table 1: Accessories

Description	Part Number	Corresponding Literature
Expansion Boards		
Remote IR Transceiver for Expansion Boards	MRC19-EYE0	*Modular Room Control (MRC) Series Expansion Board Installation Instructions (Part No. 24-9778-30)*
5-Triac Expansion Board	MRC19-EXP1	
6-Relay Expansion Board	MRC19-EXP2	
5-Triac/2 AO expansion Board	MRC19-EXP3	
6-Relay/2 AO expansion Board	MRC19-EXP4	
Lamp and Lighting Control Devices		
IR Lamp Module - Non-Dimming	MRC19-LMP0	—
IR Wall Switch - Non-Dimming	MRC19-LMP1	
Remote Control Device		
TV Remote	MRC19-RTV1	—
Motion Sensors		
Passive IR Sensor, Wall Mounted	MRC19-PIRW	*Modular Room Control MRC19-PIR Series Motion Detector Sensors Installation Instructions (Part No. 24-9778-49)*
Passive IR Sensor, Ceiling Mounted	MRC19-PIRC	
IR Eyes		
Smart IR Eye to Communicate with Locks, Wall Mounted	MRC19-SIRW	*Modular Room Control Smart Infrared Transceiver (MRC19-SIRx) and Central Electronic Lock System (CELS) Installation Instructions (Part No. 24-9778-73)*
Smart IR Eye to Communicate with Locks, Ceiling Mounted	MRC19-SIRC	
Do-Not-Disturb/Make-Up-Room/Door Chime		
Packaged Set of DND/MUR/Chime Including Wiring Harnesses	MRC19-PKG0	*Do-Not-Disturb/Make-Up-Room/Door Chime Kit Installation Instructions (Part No. 24-9778-22)*
Peripherals		
Oversized Adapter Plate 6.25 in. x 6.25 in.	MRC19-PLT0	—
Magnetic Door Switch, Wired, Core Mount	MRC19-MDS0	*Modular Room Control (MRC) Series Digital Thermostat Installation Instructions (Part No. 24-9778-6)*
Magnetic Door Switch, Wired, Surface Mount	MRC19-MDS1	
IR Transmitter w/ MRC19-MDS0 (white)	MRC19-MDS2	
IR Transmitter w/ MRC19-MDS0 (black)	MRC19-MDS3	
IR Transmitter (white)	MRC19-MDS4	
IR Transmitter (black)	MRC19-MDS5	
Miscellaneous		
Demo Kit (Thermostat, DND/MUR/Door Chime Kit, and Magnetic Door Switch Simulator)	MRC19-KIT0	—

Technical Specifications

Product	MRC Series Digital Thermostat
Power Requirements	24 VAC at 50/60 Hz, 32 VDC Nominal, 2.4 VA (MRC19-3xxxx and MRC19-4xxxx) 100 to 240 VAC at 50/60 Hz, 2.4 VA (MRC19-5xxxx and MRC19-KIT0) 265 to 277 VAC at 50/60 Hz, 2.4 VA (MRC19-6xxxx)
Relay Contact Rating	240 VAC and 277 VAC, 2.2 FLA on low/medium fans, 3.6 FLA on high fan Heat/cool relay, pilot duty
Triac Contact Rating	50 mA minimum, 250 mA maximum
Recommended Wire Size	18 Gauge
Thermostat Measurement Range	33 to 99°F (1 to 37°C)
Outdoor Air Temperature Indication Range	0 to 99°F (-18 to 37°C)
Display Resolution	Setpoint: one decimal point; actual temperature zero decimal point for °F and one decimal point for °C
Minimum Deadband	2°F (1°C) between heating and cooling
°C/°F Conversion	Button located on front display
Ambient Operating Conditions	41 to 149°F (5 to 65°C) 0-95% RH noncondensing
Ambient Storage Conditions	33 to 149°F (1 to 65°C)
Dimensions (H x W x D)	4.7 x 4.7 x 1.2 in. (120 x 120 x 30 mm)
Shipping Weight	0.6 lb (0.27 kg)
FCC Compliance	This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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.

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Published in U.S.A.
www.johnsoncontrols.com