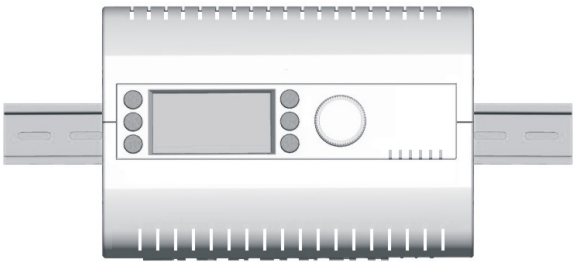
MultiValent Controller – MVC

HONEYWELL EXCEL 5000 OPEN SYSTEM

SPECIFICATION DATA



GENERAL

Honeywell's **M**ulti**V**alent **C**ontroller (MVC) provides a highly cost-effective solution for multivalent applications. It is available in different versions:

- without an integrated user interface;
- with an integrated user interface;
- with a variety of I/O mixtures.

For special versions, please contact Honeywell.

The MVC controller system can be enhanced with:

- the Excel Touch, a touch screen user interface;
- ZIO wall modules communicating via 2-wire Sylk bus;
- evotouch and CM700 / 900 wireless wall modules (868 MHz);
- communication between different controllers via C-Bus.

The versatile mounting concept (with patented panel-door mounting design and mechanism), removable terminals, and wiring test functionality minimize installation and commissioning effort and time.

The MVC is freely programmable and can be used for a wide variety of applications.

The MVC application can be easily adapted to specific scenarios and customer needs through the use of Honeywell's application library. The application library provides a wide range of energy management functions, including optimum start/stop, night purge, and maximum load demand as well as heating, cooling, ventilation, and air conditioning functions.

FEATURES

- I/O mix: 1 triac output, 8 relay outputs, 4 analog outputs, 4 binary inputs, 2 PT1000 inputs, and 8 universal inputs;
- Triac output supporting pump speed control;
- Optional user interface (see section "HMI" on pg. 5)
- Communication interfaces:
  - OpenTherm™ interface for wireless wall modules;
  - Sylk bus interface for 2-wire wall modules;
  - C-Bus interface;
  - Modbus RTU Master or Modbus RTU Slave interface(s);
  - Panel Bus interface (MVC-xxx-xPxxxx);
  - Interface for connection of PC or touch panel.
- **Flexible mounting options:** Fits into small housings and supports DIN-rail, wall, and panel/door mounting;
- Choice of removable terminal plugs, i.e., state-of-the-art push-in terminals or screw-type terminals;
- 2 LEDs / push buttons for customer / application-specific functionality and four additional status LEDs;
- Configurable safety position for outputs (in case of loss of communication with I/O modules);
- Configurable sensor safety value (in case of sensor short / sensor break);
- Real-time clock, run-time counter;
- Trend data buffer, alarm history buffer, clear-text alarms;
- 18-character user address;
- Super capacitor-buffered SRAM memory;
- Flash EPROM back-up on board.

MVC Controller Models

The MVC Controller family consists of five models, all with the same mix of I/Os (see section "Features") and LEDs.

Table 1. Overview of MVC Controller versions

OS no.	description
MVC-80H-CPSW1A	MVC (without HMI): B-port (RJ45), Modbus Master plus C-Bus or Modbus Master plus Panel Bus or Modbus Slave plus Panel Bus, Sylk (for 2-wire wall module), OpenTherm™ 2-wire connection (for RF bridge)
MVC-80M-CPSW1A	MVC (with HMI): B-port (RJ45), Modbus Master plus C-Bus or Modbus Master plus Panel Bus or Modbus Slave plus Panel Bus, Sylk OpenTherm™ 2-wire connection
MVC-40M-CPSW1A	MVC (with HMI): B-port (RJ45), Modbus Master plus C-Bus or Modbus Master plus Panel Bus or Modbus Slave plus Panel Bus, Sylk, OpenTherm™ 2-wire connection
MVC-80M-CMSW1A	MVC (with HMI): B-port (RJ45), Modbus Slave plus C-Bus, Sylk, OpenTherm™ 2-wire connection
MVC-40M-CMSW1A	MVC (with HMI): B-port (RJ45), Modbus Slave plus C-Bus, Sylk, OpenTherm™ 2-wire connection

CE

SYSTEM OVERVIEW

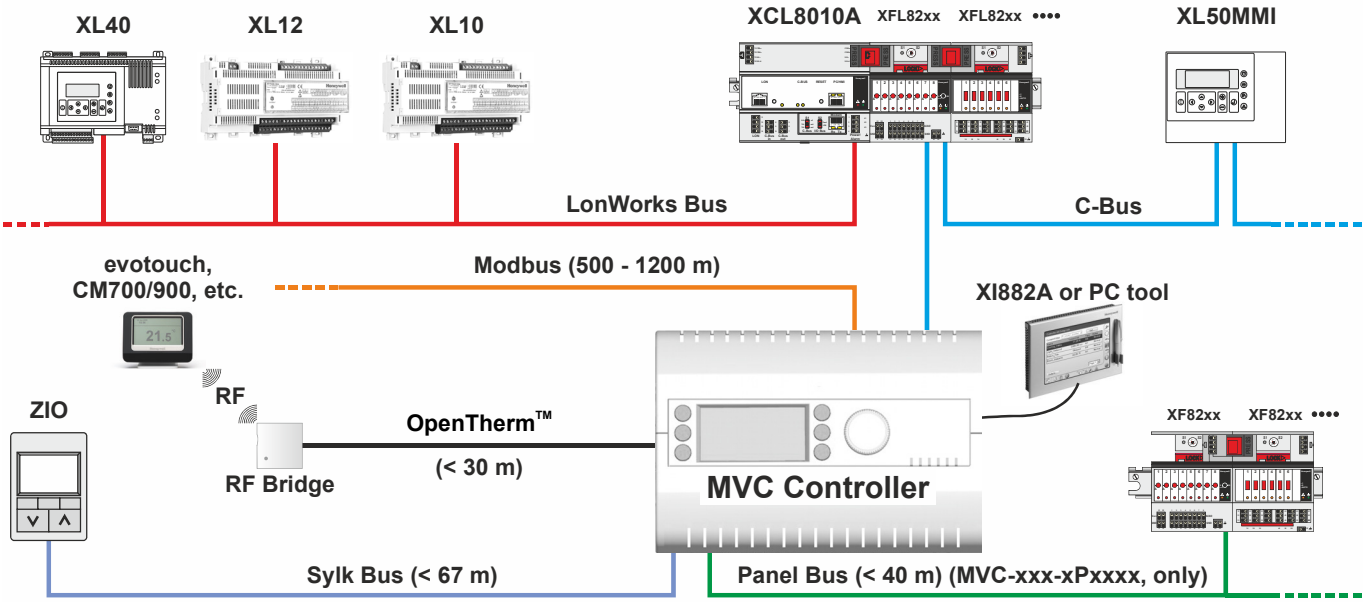
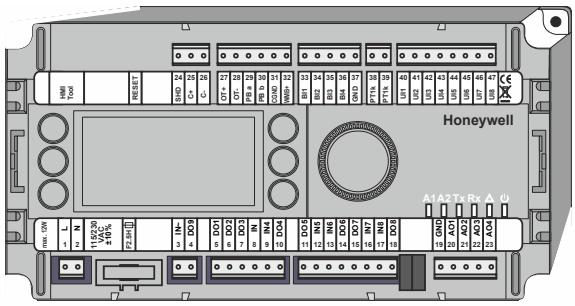
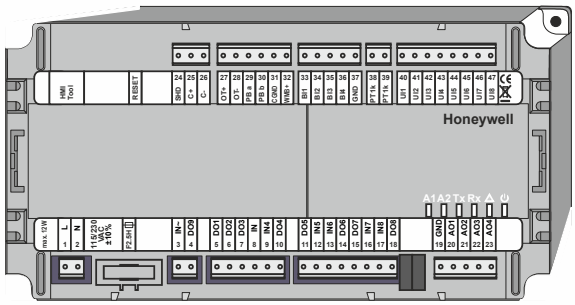


Fig. 1. MVC Controller within the Excel 5000 System architecture

General



MVC-80M-CPSW1A, MVC-80M-CMSW1A, MVC-40M-CMSW1A, MVC-40M-CPSW1A



MVC-80H-CPSW1A

Fig. 2. MVC Controller models

The MVC Controller can communicate with numerous other devices over a variety of buses (see Fig. 1). Via the Panel Bus, the MVC-xxx-xPxxxx can communicate with up to 16 Panel Bus I/O Modules (see also Fig. 16 and Table 12).

Electrical Specifications

Power Supply

The power supply is connected via terminals 1 and 2. The MVC Controller can be powered by a wide range of power supplies, from 115 Vac (-10%) to 230 Vac (+10%) at 50/60 Hz. Max. power consumption < 12 VA.

Memory

- 256 kB internal flash memory
- 32 kB internal SRAM
- 4 MB external flash memory
- 512 kB external SRAM / 72-hr buffer

Microprocessor

STM32F101ZC ARM 32-bit Cortex™-M3 CPU, 36 MHz

Memory and Real-Time Clock Backup

In case of power failure, the super capacitor saves SRAM content and real-time clock for 72 hours (environmentally friendly; no problems disposing of dead batteries).

Mounting

The MVC Controller is suitable for wall-mounting, door/panel-mounting, as well as for DIN rail mounting (see Fig. 3).

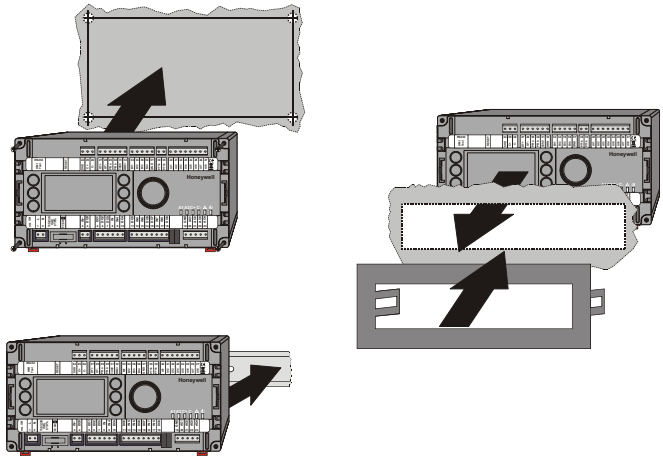


Fig. 3. Mounting options

Inputs/Outputs, User Interfaces

The MVC Controller family consists of five models, all with the same mix of inputs and outputs (1 triac output, 8 relay outputs, 4 analog outputs, 4 binary inputs, 2 PT1000 inputs, and 8 universal inputs) and LEDs, but with different complements of user interfaces.

Table 2. Specifications of internal inputs and outputs of the MVC Controller

type	parameter	value
eight analog inputs (universal)	resolution	12-bit
	accuracy	75 mV
	voltage	0 (2) … 10 V (software-controlled switches for high impedance)
	current	0 (4) … 20 mA (via external 499 Ω resistor)
	sensor	NTC 20kΩ for -50 … +150 °C or NTC 10kΩ for -50 … +150 °C (with reduced accuracy)
	slow binary input	max. 0.4 Hz
	remarks	Sensor offset calibration, sensor failure detection, and sensor safety value functionality supported.
two PT1000 inputs	resolution	12-bit
	sensor	PT1000-1 for -50 … +150 °C; PT1000-2 for 0 … +400 °C; NI1000TK5000 for -30 … +130 °C
	remarks	Also suitable for use as slow binary inputs. Sensor offset calibration, sensor failure detection, and sensor safety value functionality supported.
four binary inputs	use as totalizers	Suitable for use as totalizers for up to 20 Hz
	use as dry contacts	Open circuit: ≥ 3000 Ω (20 … 28 Vdc) Closed circuit: ≤ 500 Ω (short-circuit current = 1.6 … 2.0 mA)
four analog outputs (universal)	voltage	0 (2) … 10 V, max. 11 V, ±1 mA
	resolution	12-bit
	accuracy	±150 mV
	remarks	Analog output safety value supported.
eight relay outputs	contact type	normally open
	remarks	Relay output safety position supported.
	relays 1, 2, 3, 5, 6, 7, & 8	
	min. load	5 Vdc, 10 mA
	max. voltage	253 Vac
	max. load	3 (0.3) A
	lifetime	500,000 cycles at 253 Vac / 0.3 A resistive load 100,000 cycles at 253 Vac / 2 A resistive load
	relay 4	
	min. load	5 Vdc, 10 mA
	max. voltage	253 Vac
	max. load	10 (10) A at 253 Vac / 3 A at 30 Vdc
	lifetime	100,000 cycles at 253 Vac / 10 A resistive load
one triac	voltage	24 … 230 Vac / 50 Hz (input terminal 3; switched output terminal 4)
	current	Max. 1 A
	protection	Fuse F1.25 H250V
	remarks	Can be used as a standard binary output or for pump speed control. Triac output safety value supported.
NOTE: All inputs and outputs are protected against overvoltages of up to 24 Vac.		

Table 3. MVC Controller LEDs

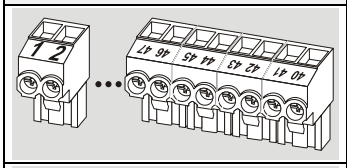
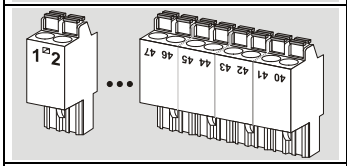
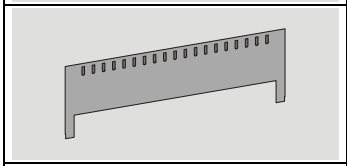
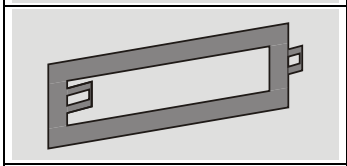
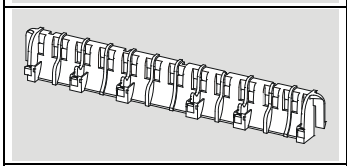
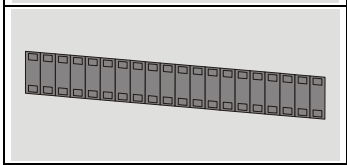
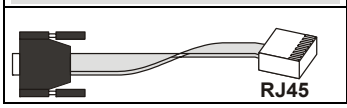
symbol	color	function	description
⏻	green	power LED	indicates whether the MVC Controller is receiving power
⚠	red	status LED	indicates sensor failure (blinks ON/OFF, followed by pause)
Tx	yellow	C-Bus transmit / Modbus transmit	indicates that the MVC Controller is transmitting on C-Bus/Modbus
Rx	yellow	C-Bus receive / Modbus receive	indicates that the MVC Controller is receiving on C-Bus/Modbus
A2	yellow	application-specific LED 2	programmable (e.g., to light up when in cooling mode)
A1	yellow	application-specific LED 1	programmable (e.g., to light up when in heating mode)

Table 4. Fast-action keys (except MVC-80H-CPSW1A)

icon	function	result
	HOME	Go to the uppermost level of the USER menus.
	application 1	Invoke application 1 (can be programmed, e.g., for chimney sweeper mode)
	application 2	Invoke application 2 (can be programmed, e.g., for chimney sweeper mode)
	SERVICE	Go to service menu.
	ALARM	Display alarm information.
	CANCEL	Escape to the previous screen / cancel incorrect entries.

Auxiliary and Spare Parts

Table 5. Overview of auxiliary and spare parts

	order number	description
	**MVC-80-TSC**	removable terminal plugs, screw-type; complete set of 11 plugs (for terminals 1 - 47)
	**MVC-80-TPU**	removable terminal plugs, push-in type; complete set of 11 plugs (for terminals 1 - 47)
	**MVC-80-AC1**	terminal cover; package of 20
	**MVC-80-AC2**	front door mounting accessory; package of 20
	**MVC-80-AC3**	strain relief; package of 10
	**MVC-80-AC4**	strip with terminal slot covers to cut-out and cover individual unused terminal slots; package of 20
	**XW885**	download cable

BUS AND PORT CONNECTIONS

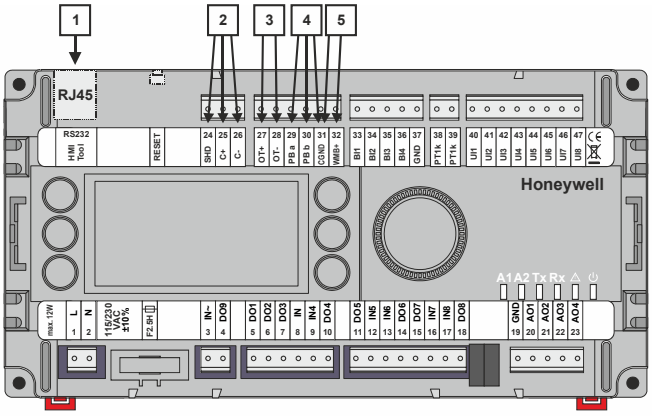


Fig. 4. Bus and port connections

Legend

1 RS232/RJ45 socket (for connection of HMI / PC tool)
2 C-Bus/Modbus (depending upon model, configuration)
3 OpenTherm™ connection
4 Panel Bus/Modbus (dep. upon model, configuration)
5 Sylk Bus connection

HMI

Those devices equipped with an HMI feature a dot matrix display (160 x 80 dots, 5 lines with 20 characters), a push-dial, and six push buttons for easy handling.

HMI / Tool Connection

The MVC Controller features an RS232/RJ45 socket (see Fig. 4) enabling it to be connected to the XI882A or to a PC (onto which XL-Online has been installed).

XI882A Operator Interface

The XI882A Operator Interface is an easy-to-operate and robust operator unit for the entire EXCEL 5000 range of plant controllers.

Fig. 5. The XI882A Operator Interface

The touch-panel operation screens allow for easy and self-explanatory operation by finger-tip or by touch-pen (supplied).

User-configurable fast-access lists can contain selected datapoints, time programs, and parameters, thus permitting plant-oriented and customer-oriented operation.

The XI882 can be connected to the HMI of the MVC using an XW882 cable. Graphic trending of datapoints is supported.

XL-Online

XL-Online is a local, PC-based operating and service software. It allows you to make major modifications (e.g., changing setpoint values and time program switching points), but also offers all service and commissioning functions.

XL-Online offers a graphic trend feature enabling trends downloaded from the controller to be graphically visualized.

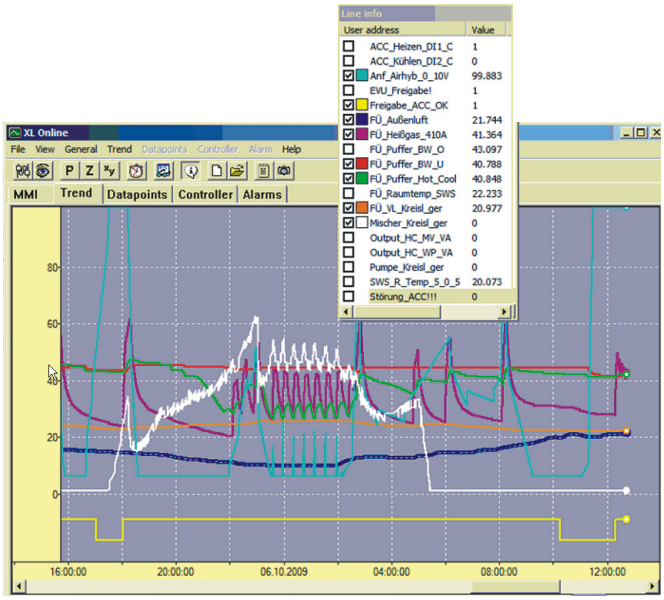


Fig. 6. Graphical trend feature

XL-Online can be operated at five different access levels, three of which are password-protected. A printer can be connected to the parallel interface of the PC to log alarms and error messages. The PC can be placed up to 15 m from the MVC. Line drivers allow distances of up to 100 m (328 ft.).

C-Bus Connection

The C-Bus can be connected to terminals 24 to 26 of the MVC-80x-xxxxx and to terminals 26, 31, and 32 of the MVC-40x-xxxxx. Communication rates of up to 76.8 Kbaud are supported.

The C-Bus interface of all MVC-80x-xxxxxx controllers is electrically isolated. Consequently, potential differences of more than ±7 V between the earth grounds of such MVC controllers (connected via C-Bus but installed, e.g., in different buildings) will not adversely affect operation.

In contrast, the C-Bus of all MVC-40x-xPxxxx controllers is not electrically isolated. Potential differences of more than ±7 V between the earth grounds of such MVC controllers (connected via the corresponding bus but installed, e.g., in different buildings) can adversely affect operation and/or result in damage.

The C-Bus of the MVC-40x-xMxxxx controller is likewise not electrically isolated, but as long as the maximum allowed cable length for the C-Bus is observed, adverse potential differences should not arise.

Depending upon the configuration of the specific system, the installation of an external termination resistor between Tx and Rx may be required. See following table and also MVC – Installation Instructions (EN1B-0477GE51).

Table 6. Termination requirements

communication rate	external termination resistor
9.6 Kbaud (all)	not required
76 Kbaud (mid)	not required, except for controllers ***not*** located at end of C-Bus
76 Kbaud (end)	required between Tx and Rx

OpenTherm™ Connection

Terminals 27 and 28 of the MVC Controller are reserved for connecting the controller to an OpenTherm™ device. The use of wireless wall modules (e.g., evotouch or CM 700/900 families) requires that an RF bridge (R8810A1018) be connected to the OpenTherm™ interface. The OpenTherm™ device provides communication and power to the RF bridge.

Sylk Bus Connection

Terminals 31 and 32 of the MVC Controller are reserved for the connection of ZIO 2-wire wall modules (e.g., TR70) capable of communicating via SYLK.

Modbus Connection

Depending upon the given model, the MVC controller can function as a Modbus Master or Modbus Slave. Depending upon the actual mixture of Modbus devices, certain termination requirements, max. cable lengths, and communication rates (bauds per sec = bps) then apply. See also the following tables.

NOTE: Use shielded cable (2 x 2 x 0.8 mm^2) and connect the Modbus to a noise-free earth ground (only once per Modbus connection).

Table 7. Modbus (with 150 Ω external termination resistor installed at end of bus opposite Master) with a 3rd-party Master and 3rd-party/MVC Modbus Slaves

Master	Slaves	# of Slaves	max. bus length (m)	max. comm. rate (bps)
3rd-party Master	3rd-party and/or MVC-xxx-xMxxxx	31	1200	76800
	MVC-xxx-xPxxxx via C-Bus or MVC-xxx-xPxxxx via C-Bus plus 3rd-party	15	1200	76800
		15	800	115000
	3rd-party and/or MVC-xxx-xMxxxx	31	800	115000
	MVC-xxx-xPxxxx via C-Bus or MVC-xxx-xPxxxx via C-Bus plus 3rd-party	31	500	115000

Table 8. Modbus (without external termination resistor installed at end of bus opposite Master) with an MVC Modbus Master and 3rd-party/MVC Modbus Slaves

Master	Slaves	# of Slaves	max. bus length (m)	max. comm. rate (bps)
MVC-xxx-xPxxxx via Panel-Bus	3rd-party or MVC-xxx-xPxxxx via C-Bus plus 3rd-party or MVC-xxx-xPxxxx via C-Bus plus MVC-xxx-xMxxxx	23	1200	9600
MVC-xxx-xPxxxx via C-Bus	MVC-xxx-xPxxxx via C-Bus or 3rd-party or MVC-xxx-xPxxxx via C-Bus plus 3rd-party or MVC-xxx-xPxxxx via C-Bus plus MVC-xxx-xMxxxx	31	1200	9600
		31	700	19200
MVC-xxx-xPxxxx via Panel-Bus	MVC-xxx-xPxxxx via C-Bus	31	700	19200
	3rd-party or MVC-xxx-xPxxxx via C-Bus plus 3rd-party or MVC-xxx-xPxxxx via C-Bus plus MVC-xxx-xMxxxx	31	500	19200

Modbus Master Connection

Alternatively to communication via either the Panel Bus or the C-Bus, the MVC-80H-CPSW1A, MVC-80M-CPSW1A, and MVC-40M-CPSW1A can be configured to communicate as Modbus Masters.

MVC-80H-CPSW1A and MVC-80M-CPSW1A as Modbus Master over Panel Bus

- D1 = terminal 29 / PBa
- D0 = terminal 30 / PBb
- Common = terminal 31 / CGND

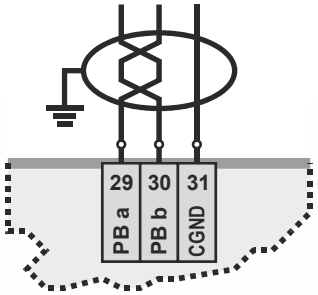


Fig. 7. Panel Bus configured as Modbus

MVC-40M-CPSW1A as Modbus Master over Panel Bus

- D1 = terminal 27 / B
- D0 = terminal 28 / A
- Common = terminal 26 / -

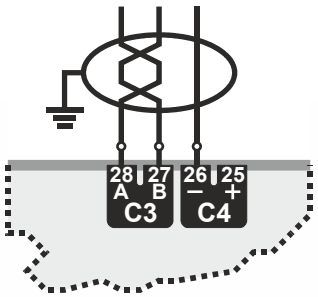


Fig. 8. Panel Bus configured as Modbus

MVC-80H-CPSW1A and MVC-80M-CPSW1A as Modbus Master over C-Bus

- D1 = terminal 25 / C+
- D0 = terminal 26 / C-
- Common = terminal 24 / SHD

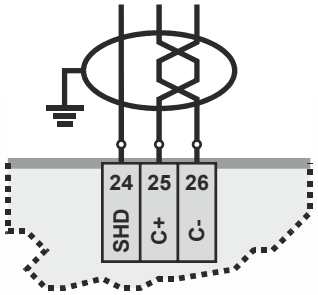


Fig. 9. C-Bus configured as Modbus

MVC-40M-CPSW1A as Modbus Master over C-Bus

- D1 = terminal 32 / C+
- D0 = terminal 31 / C-
- Common = terminal 26 / -

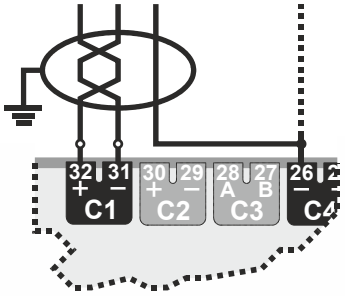


Fig. 10. C-Bus configured as Modbus

Modbus Slave Connection

MVC-80M-CMSW1A as Modbus Slave

- D1 = terminal 29 / Mod +
- D0 = terminal 30 / Mod -
- Common = terminal 31 (CGND)

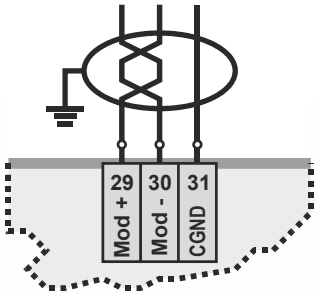


Fig. 11. Modbus Bus of MVC-80M-CMSW1A

MVC-40M-CMSW1A as Modbus Slave

- D1 = terminal 27 B (Fig. 12)
- D0 = terminal 28 B (Fig. 12)
- Common = terminal 26 / -

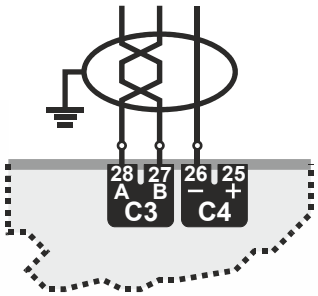


Fig. 12. Modbus Bus of MVC-40M-CMSW1A

MVC-80H-CPSW1A and MVC-80M-CPSW1A as Modbus Slaves

- D1 = terminal 25 / C+
- D0 = terminal 26 / C-
- Common = terminal 24 / SHD
- Modbus is line-polarized (1 kΩ pull-up / pull-down)
- Modbus termination resistor of 110 Ω is applied

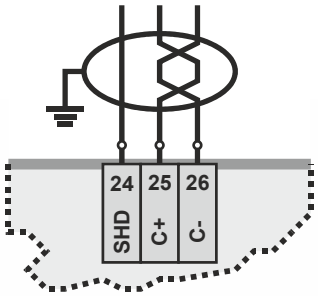


Fig. 13. C-Bus configured as Modbus

MVC-40M-CPSW1A as Modbus Slave

- D1 = terminal 32 / C+
- D0 = terminal 31 / C-
- Common = terminal 26 / -
- Modbus is line-polarized (1 kΩ pull-up / pull-down)
- Modbus termination resistor of 110 Ω is applied

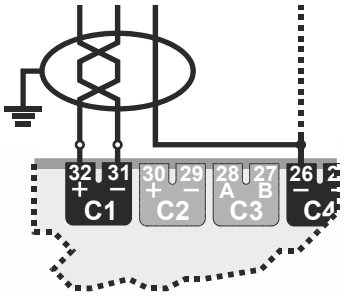


Fig. 14. C-Bus configured as Modbus

Panel Bus Connection (MVC-xxx-xPxxxx)

The Panel Bus can be connected to terminals 29, 30, and 31 of MVC-xxx-xPxxxx Controllers. Communication rates of up to 115 Kbaud are supported.

The Panel Bus interface is not electrically isolated. Consequently, potential differences of more than ±7 V between the earth grounds of different MVC-xxx-xPxxxx controllers (installed, e.g., in different buildings) can adversely affect operation.

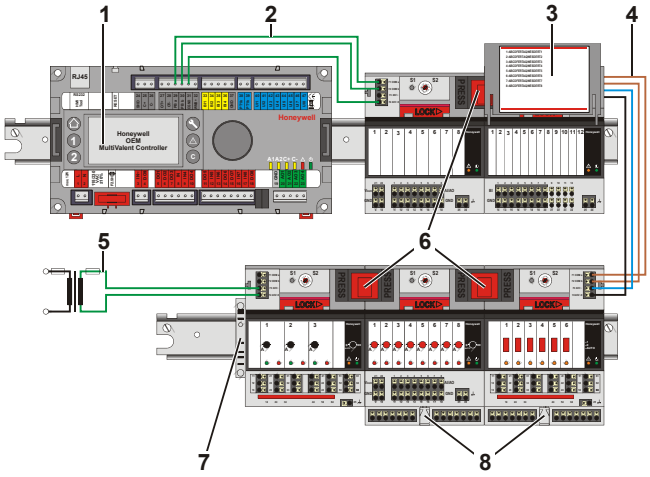


Fig. 15. MVC-xxx-xPxxxx and Panel Bus I/O Modules on DIN rails

Legend

1 MVC-xxx-xPxxxx Controller
2 Cable connection to Panel Bus I/O modules
3 Swivel label holder
4 Cable connection between Panel Bus I/O modules on separate DIN rails
5 Power supply
6 Bridge connectors between Panel Bus I/O modules on same DIN rail
7 Stopper (from 3rd-party supplier)
8 Auxiliary terminal packages

General

Up to 16 Panel Bus I/O modules (in any combination) may be connected to MVC-xxx-xPxxxx controllers.

The Panel Bus I/O modules are addressed manually by adjusting their HEX switches.

The MVC-xxx-xPxxxx and Panel Bus I/O Modules can be separated by up to 40 m. Firmware maintenance is automatically handled by the MVC-xxx-xPxxxx.

Power Consumption

Table 9. Power consumption of Panel Bus I/O modules

devices powered	supply voltage	
	24 Vac	24 Vdc
XF821A	130 mA	80 mA
XF822A, XFR822A	150 mA	90 mA
XF823A	180 mA	130 mA
XF824A, XFR824A, XFR825A	140 mA	80 mA
MVC-IO830A	200 mA	95 mA

Overvoltage Protection

Connected Panel Bus I/O Modules (together with field devices) must be powered by one or more external transformers.

All inputs and outputs of the Panel Bus I/O modules are protected against 24 Vac overvoltage as well as against short-circuiting.

Service LED

Each Panel Bus I/O Module is equipped with one green power LED and one yellow service LED (for easy diagnosis).

Microprocessor

Each Panel Bus I/O Module is equipped with its own microprocessor.

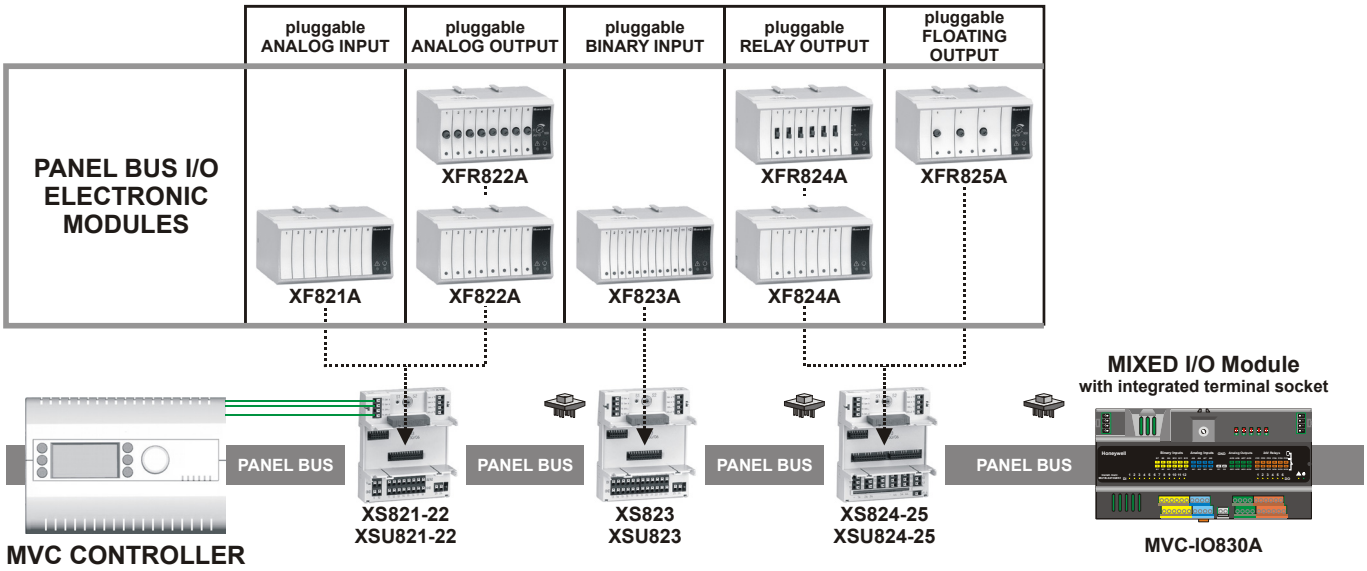


Fig. 16. Overview of MVC Controller and Panel Bus I/O Modules

Table 10. Pluggable Panel Bus I/O Module specifications

	AI module	AO modules	BI module	RO modules	FO module
order no.	XF821A	XF822A, XFR822A	XF823A	XF824A, XFR824A	XFR825A
no. of I/Os	8 analog inputs	8 analog outputs	12 binary inputs	6 relay outputs	3 floating outputs
characteristics	Linear Graph 0..10 Vdc with pull-up, 0(2)…10 Vdc without pull-up NTC20kΩ (-50…+150 °C, default) NTC10kΩ (-30…+100 °C) PT_{1000-1} (-50…150°C) PT_{1000-2} (0…400°C) NI1000TK5000 (-30…+130 °C) PT_{3000} (-50…150°C) $BALCO_{500}$ (-30…120°C) Also configurable as: ▪ binary inputs ▪ Linear graph (0…10 V with pull-up) **Features:** ▪ 16-bit resolution ▪ configurable offset per input ▪ auxiliary voltage: 10 Vdc, I_{max} = 5 mA	0…11 Vdc / ± 1 mA Also configurable as: floating outputs or binary outputs (0 V / 10 V) **Features:** ▪ 8-bit resolution (default) ▪ Safety position (remain, 0%, 50%, 100%) ▪ red LED per output ▪ light intensity follows output level in auto **Version with manual override (R):** ▪ 1 potentiometer per output ▪ auto feedback signal (mode + value) ▪ blinking in manual override position	static binary inputs (default: dry contact) Also configurable as: totalizers (20 Hz) **Features:** ▪ 1 LED per input ▪ Color mode can be set per input to OFF/yellow or green/red using CARE	relay outputs (default) **Features:** ▪ Changeover relays ▪ Voltage: 19…250 Vac, 1…29 Vdc, P>50 mW ▪ max. total current: 12 A ▪ current per relay: N.O.: 4(4) A ac. or 4(1) A dc, N.C.: 2(1) A ac or 4(1) A dc ▪ Safety position (remain, 0%, 100%) ▪ yellow LED per output **Version with manual override (R):** ▪ 1 switch per output ▪ auto feedback signal (mode + value) ▪ blinking in manual override position	floating outputs **Features:** ▪ 2 relays per floating output ▪ Voltage: 19…250 Vac, 1…29 Vdc, P>50 mW ▪ max. total current: 12 A ▪ current per relay: N.O.: 4(4) A ac or 4(1) A dc, N.C.: 2(1) A ac or 4(1) A dc ▪ 1 potentiometer per floating output ▪ 2 LEDs per output: green: relay 1 closed, red: relay 2 closed ▪ blinking in manual override position ▪ auto feedback signal (mode + value)

NOTE: All pluggable Panel Bus I/O Modules are protected against short circuit, 24 Vac +20% and 30 Vdc.

Manual Overrides as per EN ISO 16484-2:2004

The manual override switches and potentiometers of the output modules (…R822A, …R824A, and XFR825A) support direct operation as per EN ISO 16484-2:2004, section 5.4.3 "Local Priority Override/Indicating Units."

Specifically, the positions of the manual override switches and potentiometers directly control the outputs – independently of the MVC Controller and HMI. When a manual override switch or potentiometer is not in its default position ("auto"), the corresponding output LED will blink continuously, and the output module will send a feedback signal with the status "manual override" and the given override position to the MVC Controller (which will then also store this information in its alarm memory).

NOTE: When updating the firmware of output modules, their outputs are turned OFF – regardless of the position of their manual override switches and/or potentiometers.

Table 11. Mixed Panel Bus I/O module (MVC-IO830A) specifications

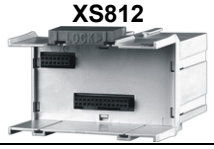
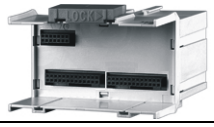
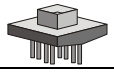
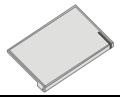
	analog inputs	analog outputs	binary inputs	relay outputs
no. of I/Os	8 analog inputs	8 analog outputs	12 binary inputs	6 relay outputs
characteristics	Linear Graph 0..10 Vdc with pull-up, 0(2)…10 Vdc without pull-up NTC20kΩ (-30…+110 °C, default) **Features:** ▪ 10-bit resolution ▪ configurable offset per input	0…11 Vdc / ± 1 mA, default Also configurable as: binary outputs (0 V / 10 V) **Features:** ▪ 10-bit resolution (default) ▪ Safety position (remain, 0%, 50%, 100%)	static binary input (default: dry contact) ON: < 1.6 kΩ OFF: > 90 kΩ Also configurable as: totalizers (15 Hz) **Features:** ▪ 1 yellow LED per input	relay outputs (default) **Features:** ▪ Voltage: 24 Vac/dc, P>50 mW ▪ max. total current: 3 A (ac or dc) ▪ current per relay: 500 mA ▪ normally-open contacts: P > 50 mW, voltage: 24 V (ac or dc) ▪ yellow LED per output

NOTE: All mixed Panel Bus I/O Modules are protected against short circuit, 24 Vac +20% and 30 Vdc.

Table 12. Overview of terminal sockets for pluggable Panel Bus I/O modules

Terminal Sockets (not needed for the MVC-IO830A)	
XS821-22	Push-in terminal socket for pluggable AI/AO modules (incl. Bridge Connector, Swivel Label)
XSU821-22	Screw-type terminal socket for pluggable AI/AO modules (incl. Bridge Connector, Swivel Label)
XS823	Push-in terminal socket for pluggable BI modules (incl. Bridge Connector, Swivel Label)
XSU823	Screw-type terminal socket for pluggable BI modules (incl. Bridge Connector, Swivel Label)
XS824-25	Push-in terminal socket for pluggable relay/floating output modules (incl. Bridge Connector, Cross Connector, Swivel Label)
XSU824-25	Screw-type terminal socket for pluggable relay/floating output modules (incl. Bridge Connector, Cross Connector, Swivel Label)

Table 13. Overview of auxiliary parts and spare parts for Panel Bus I/O modules

order number	description
XS812 	Manual Disconnector Module for AI/AO/BI Modules (for manual disconnection of individual signals; useful during start-up). Plugged between Terminal Socket and Electronic Module. For pluggable Panel Bus I/O modules, only.
XS812RO 	Manual Disconnector Module for Relay Output Modules (for manual disconnection of individual signals; useful during start-up). Plugged between Terminal Socket and Electronic Module. Not suitable for line voltage. For pluggable Panel Bus I/O modules, only.
XS814 	Ten Auxiliary Terminal Blocks (for distribution of signals/power). Each terminal block includes two groups with seven internally-connected push-in terminals. For pluggable Panel Bus I/O modules, only.
XS830 	Ten Auxiliary Terminal Blocks (for distribution of signals/power). Each terminal block consists of two groups of nine internally-connected push-in terminals. For the MVC Controller and MVC-IO830A, only.
XS831 	Ten Auxiliary Terminal Blocks (for connection of 0…20 mA signals). Each terminal block supports up to 8 current inputs. For the MVC Controller and MVC-IO830A, only.
XS815 	20 Cross-Connectors for connection of six relay commons. One Cross-Connector is included in the Terminal Socket package. For the XFR824, XF824, and XFR825, only.
XS817 	40 Cross-Connectors for connection of three relay commons (if voltage in relay block 1 is different from voltage in relay block 2). For the XFR824, XF824, and XFR825, only
XS816 	10 Bridge Connectors. One Bridge Connector is included in the Terminal Socket package / in the mixed Panel Bus I/O module package.
XAL10 	10 Swivel Labels Holders (for attaching the application-specific label printed with CARE). One Swivel Label Holder is included in each Terminal Socket package. For pluggable Panel Bus I/O modules, only.
XW882 	Adapter cable for connection of the MVC Controller to the XI882 Operator Interface.

APPLICATION PROGRAMS

The MVC Controller is available with applications as follows:

- with an already-downloaded pre-configured application (which can be customized in the configuration set-up).
- with a freely programmable application.

The freely programmable application can be engineered using Honeywell's CARE programming tool. A set of predefined applications is available in order to simplify programming.

Several languages are supported.

Data Point Description

Data points are the basis of the MVC Controller. They contain system-specific information such as values, status, limit values, and default settings. The user has easy access to data points and the information that they contain. The user can recall and modify information in the data points.

The software supports a total of 1,000 data-points (of all types, e.g., internal virtual data-points and hardware data-points). Typically, 60% of your data-points are virtual data-points. Thus, you can typically have up to 400 hardware data-points.

Information about the data-points can be accessed in the form of plain-text descriptions in several languages.

Operator Interface

See also MVC – User Guide (EN2B-0361GE51).

Time Program

The time program can be used to enter the setpoint or status at any time for any data-point. The following time programs are available:

- daily program,
- weekly program,
- annual program,
- special day list,
- exceptional time program override.

Daily programs are used to create a weekly program. The annual program is created automatically by multiplying the weekly program and then incorporating daily programs. Periods of special usage (e.g., “vacation”) can be defined in the annual program. The exceptional time program override allows direct changes to the switching program. It allows you to allocate a setpoint or status to the selected data-point for a defined period of time. This change takes effect as soon as it is entered, and remains in effect for the defined period.

Alarm Handling

The alarm handling facility offers system security. Alarm signals can, for example, alert the operator to scheduled maintenance work. All alarms that occur are stored in data files and reported immediately. If your system configuration allows, you can also list alarms on a printer or transmit alarms to higher-level devices via the local bus.

The alarm buffer can contain up to 200 alarms. There are two types of alarms, critical and non-critical. Critical alarms (e.g. system alarms caused by communication failures) have priority over non-critical alarms. To distinguish between alarm types, you can generate your own alarm messages or use pre-programmed system messages.

The following events all generate alarm messages:

- exceeding limit values,
- overdue maintenance work,
- totalizer readings,
- digital data-point changes of state.

Password Protection

The MVC System is also password-protected, thus ensuring that only authorized persons can access system data. There are four operator levels, each protected by its own password, which can be configured during CARE application engineering.

Trending

The MVC Controller provides controller-based trending, thus enabling it to store historical values. Both time-based or value-hysteresis-based trending are possible. Trend data can be uploaded to the PC using XL-Online.

APPROVALS, CERTIFICATIONS

- CE-approved
- Conforms to EN 60730-1:2005-12 and EN 60730-2-9:2005-10

Classification according to EN60730-1

Environmental conditions:	For use in home (residential, commercial, and light-industrial) environments
Pollution degree:	Class 2
Protection against shock:	Class 0 (without terminal covers) Class II (with terminal covers)
Software class:	Class A

Classification according to EN60529

(Degree of Protection Provided by Enclosures)

Classification:	IP20

Ambient Environmental Limits

Operating temperature:	0 … +50 °C at 5…93% r.H.
Storage temperature:	-20 … +70 °C at 5…93% r.H.
Humidity:	5 … 93% r.h. non-condensing

Mechanical

Housing Dimensions (H x W x D)

See section “Dimensions.”

Housing Material

Plastic, flame-retardant.

Calculated Lifetime of Weakest Components

MTBF ≥ 13.7 years (under typical operating conditions).

Applicable Literature

- Mounting Instructions (EN1B-0473GE51);
- Installation Instructions (EN1B-0477GE51);
- User Guide (EN2B-0361GE51);
- Modbus Troubleshooting Guide (EN1B-0381GE51).

MODBUS MASTER SPECIFICATIONS

Modbus Compliance

As per the Modbus standard, the MVC controller is a conditionally compliant “regular” Modbus device.

The MVC controller differs from an unconditionally compliant “regular” Modbus device in that it does not support communication rates of 1.2, 2.4, and 4.8 kBaud (because these communication rates are not market-relevant).

Physical Layer

2-wire serial line RS485 (EIA-485) (with additional common)

Communication rates: 9.6, 19.2, 38.4, 57.6, 76.8, and 115.2 kBaud supported.

Max. number of devices: 32

Cable and wiring specifications: See MVC – Installation Instructions (EN1B-0477GE51).

Communication Mode

Modbus Master.

Transmission Mode

RTU (Remote Terminal Unit)

Address Range

Modbus Slaves can have an address between 1 and 247.

Discrete Inputs, Coils, Input Registers and Holding Registers can have an address between 1 and 9999.

Function Codes

The following function codes are supported:

Table 14. Supported function codes

function code (hex)	function
02	Read Discrete Inputs
01	Read Coils
05	Write Single Coil
04	Read Input Register
03	Read Holding Register
06	Write Single Register

Exception Codes

Upon reception of any of the following exception codes, datapoints of the MVC application will show "no response."

Table 15. Supported exception codes

exception code (hex)	function
01	illegal function
02	illegal data address
03	illegal data value
04	slave device failure
05	acknowledge
06	slave device busy

Register Sizes

The following Register sizes are supported:

- 16-bit Registers for Discrete inputs, Coils, Input Registers, and Holding Registers
- 32-bit Registers for Input Registers and Holding Registers.

Data Types

The following data types are supported:

- Discrete Inputs:
  - BOOL
- Coils:
  - BOOL
- Input Registers:
  - BOOL
  - INT16, UINT16
  - INT32, UINT32
  - FLOAT
- Holding Registers:
  - BOOL
  - INT16, UINT16
  - INT32, UINT32
  - FLOAT

Byte and Word Order Transmission

- Most Significant Byte First (default)
- Lower Significant Byte First
- Most Significant Word first (default)
- Lower Significant Word first

Bit Unpack

The MVC allows direct reading of single bits of an Input Register or of a Holding Register into a data-point.

In typical situations in which several different status bits of a Modbus Slave’s Register need to be read and linked into the MVC application, this allows for very efficient application engineering.

Number of Stop Bits

One and two stop bits are supported.

Error Checking Mode

Parity checking: No parity, even parity, odd parity.

Frame checking: Cyclical redundancy checking (CRC).

Life Check of Modbus Slaves

The MVC checks the Modbus every 15 seconds for lost Modbus Slave devices.

Message Response Timeout

20 msec ... 5000 msec.

Modbus Slaves Scan Cycle

The scan cycle of all addressable Modbus Slaves is 250 msec. This cycle time is based upon the read cycle of the datapoint manager in the firmware.

MODBUS SLAVE SPECIFICATIONS

Modbus Compliance

As per the Modbus standard, the MVC controller is a conditionally compliant “regular” Modbus device.

The MVC controller differs from an unconditionally compliant “regular” Modbus device in that it does not support communication rates of 1.2, 2.4, and 4.8 kBaud (because these communication rates are not market-relevant).

Physical Layer

2-wire serial line RS485 (EIA-485) (with additional common)

Communication rates: 9.6, 19.2, 38.4, 57.6, 76.8, and 115.2 kBaud supported.

Max. number of devices: 32

Cable and wiring specifications: See MVC – Installation Instructions (EN1B-0477GE51).

Communication Mode

Modbus Slave.

Transmission Mode

RTU (Remote Terminal Unit)

Address Range

Between 1 and 247.

Holding Registers can have an address between 1 and 9999.

Function Codes

The following function codes are supported:

Table 16. Supported function codes

function code (hex)	function
03	Read Holding Register
06	Write Single Register

Exception Codes

Upon reception of any of the following exception codes, datapoints of the MVC application will show "no response."

Table 17. Supported exception codes

exception code (hex)	function
01	illegal function
02	illegal data address
03	illegal data value
04	slave device failure

Register Sizes

Depending upon the selected MVC application, either 16-bit Holding Registers or real 32-bit Holding Registers are supported.

Data Types

The following data types are supported:

- BOOL
- INT16
- UINT6
- INT32 (for real 32-bit Registers, only)
- UINT32 (for real 32-bit Registers, only)
- FLOAT (for real 32-bit Registers, only)

Byte and Word Order Transmission

- Most Significant Byte First (default)
- Most Significant Word first (default)

Number of Stop Bits

One and two stop bits are supported.

Error Checking Mode

Parity checking: No parity, even parity, odd parity.

Frame checking: Cyclical redundancy checking (CRC).

DIMENSIONS

MVC

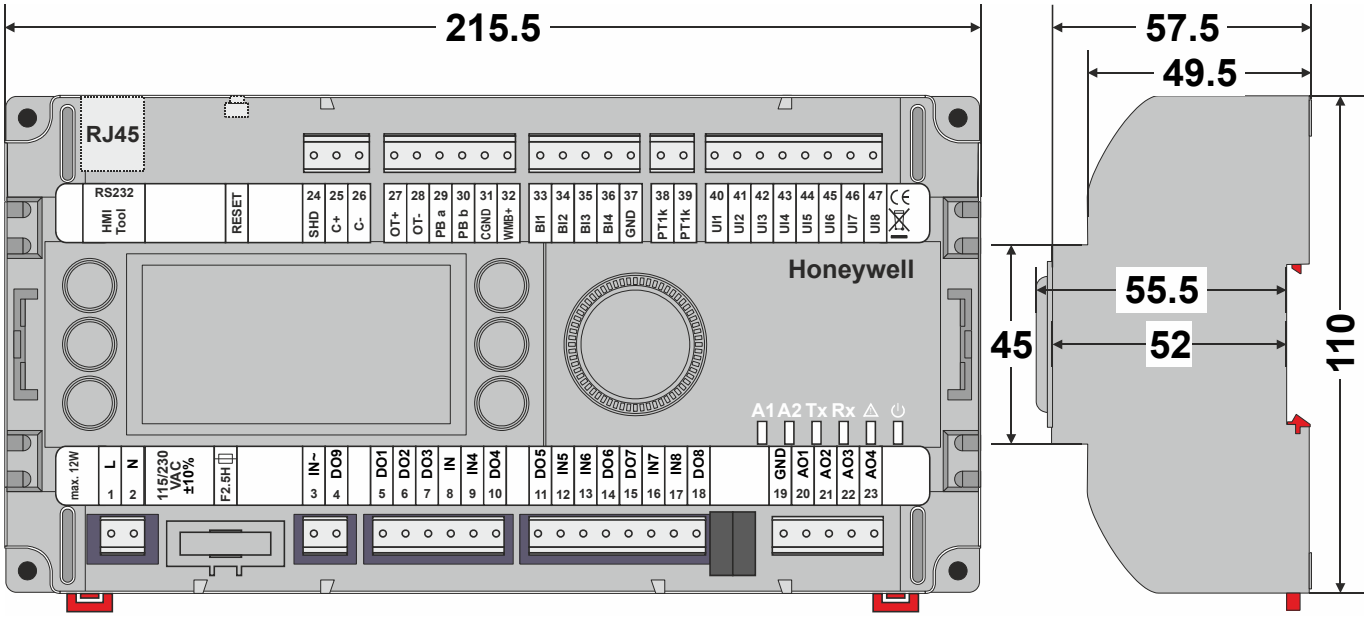


Fig. 17. MVC Controller (MVC-80M-CPSW1A, shown without terminal covers, removable terminals), dimensions (in mm)

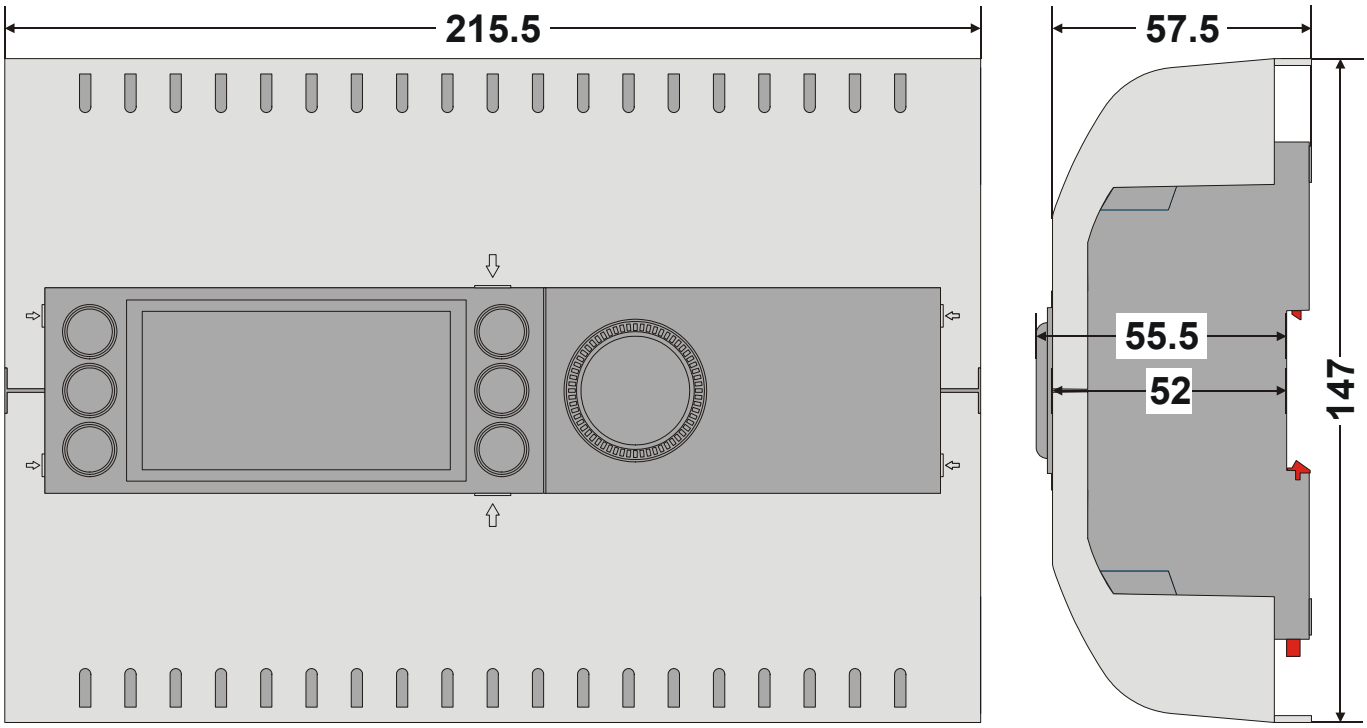


Fig. 18. MVC Controller (MVC-80M-CPSW1A, shown with terminal covers), dimensions (in mm)

Pluggable Panel Bus I/O Modules

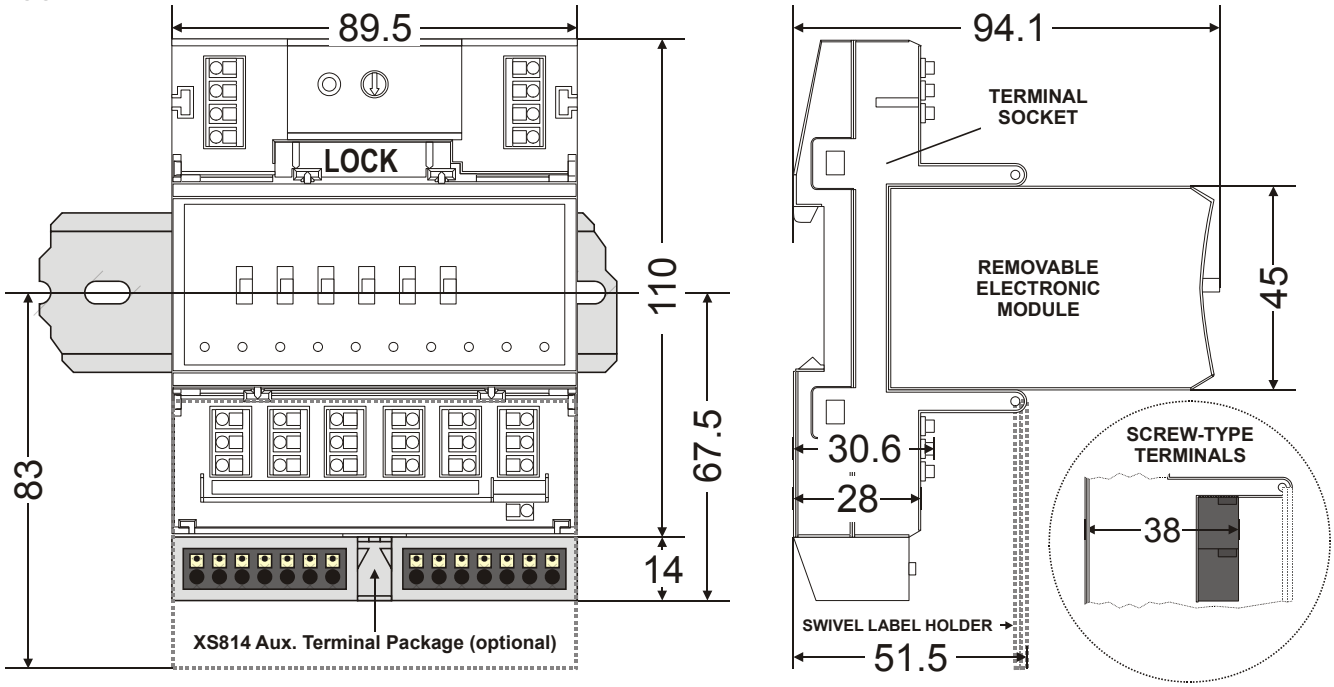


Fig. 19. Pluggable Panel Bus I/O Modules (with Manual Overrides), incl. Terminal Socket, dimensions (in mm)

Mixed Panel Bus I/O Modules

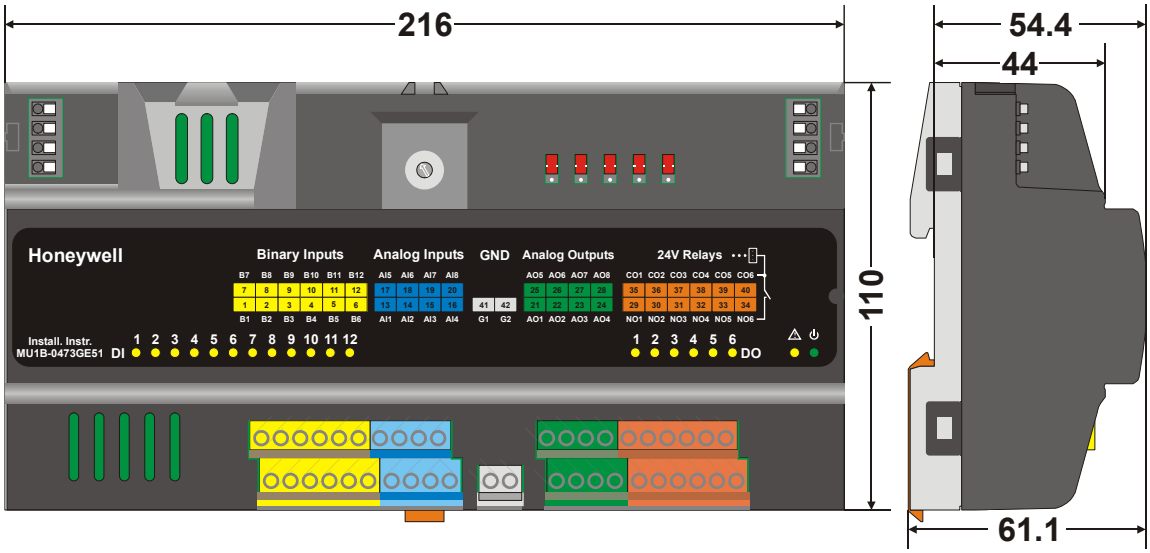


Fig. 20. Mixed Panel Bus I/O Module MVC-IO830A, dimensions (in mm)

Honeywell

Manufactured for and on behalf of the Environmental and Combustion Controls Division of Honeywell Technologies Sàrl, Rolle, Z.A. La Pièce 16, Switzerland by its Authorized Representative:

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