Honeywell

Excel 500/600
CONTROL SYSTEM

HONEYWELL EXCEL 5000 OPEN SYSTEM

INSTALLATION INSTRUCTIONS

CONTENTS

CE

EN1R-1047GE51 R0308

REVISION OVERVIEW

On the following pages, changes have been made compared to the previous release of this document:

Page:	**Change:**
throughout	All references to TCP/IP and GSM communication have been eliminated.

SAFETY INSTRUCTIONS

— When performing any work (installation, mounting, start-up), all instructions given by the manufacturer and in particular the safety instructions provided in the Installation Instructions are to be observed.

— The Excel 500/600 controller may be installed and mounted only by authorized and trained personnel.

— If the unit is modified in any way, except by the manufacturer, all warranties concerning operation and safety are invalidated.

— Make sure that certain local standards and regulations are observed at all times. Examples of such regulations are VDE 0800 and VDE 0100.

— Use only accessory equipment which comes from or has been approved by Honeywell.

⚠ CAUTION

Risk of electric shock! Disconnect the power supply before you start to install the Excel 500/600 Controller and do not reconnect the power supply until you have completed installation. NOTE: More than one disconnect switch may be required to de-energize the device.

⚠ ATTENTION

Risque de choc électrique. Il peut être nécessaire de couper l'alimentation à plus d'un interrupteur pour effectuer le désamorçage de ce dispositif.

⚠ CAUTION

Disconnect the power supply before plugging in or removing the XDL505 Application Module.

MOUNTING

Control Unit Installation

The Excel 500 and 600 controllers have the same housing and can be installed two different ways:

— Installation inside a control panel (see page 7).

— Installation through a control panel door (see page 9).

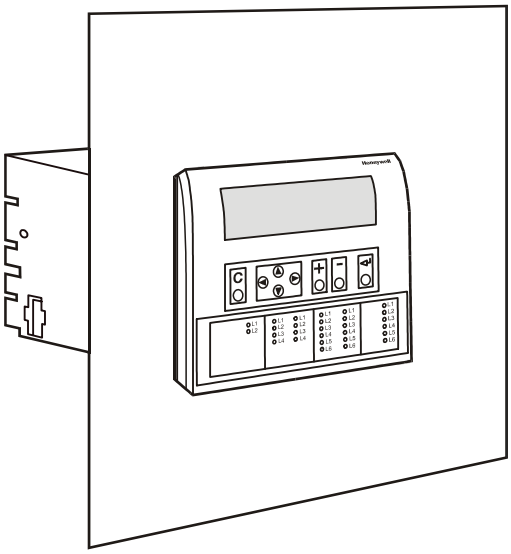

Fig. 1. Excel 500/600 panel door mounting

The XCL5010 can be mounted only on a DIN rail; control panel door installation is not possible.

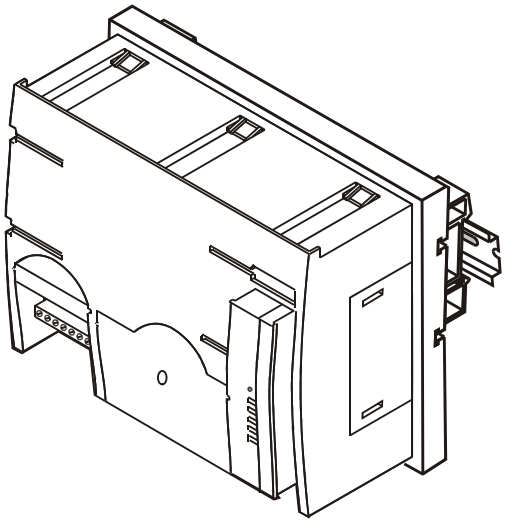

Fig. 2. XCL5010 DIN rail mounting

Excel 500/600 Housing Layout (not XCL5010)

A controller comprises from one to a max. of five housings. The housings may be fitted alongside one another or, one above the other. Any combination is possible.

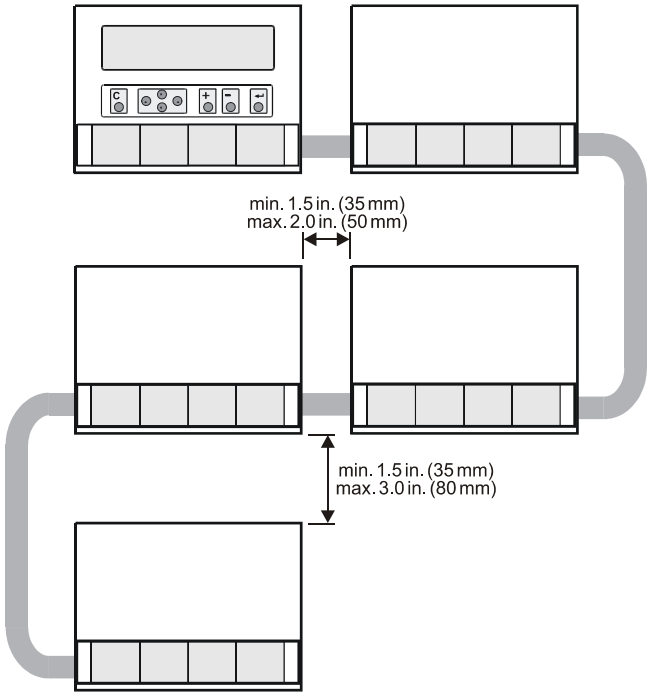

Fig. 3. Up to five housings can be connected together

When housings are alongside one another, provide for a min. spacing of 1.5 in. (35 mm) to enable the hinged cover to be opened. The max. spacing between housings is limited by tailor-made internal bus cables (see Fig. 3.

Excel 500/600 Internal Bus Wiring (not XCL5010)

Each housing has four plug-in module locations. The individual modules are connected by an internal bus in the housing.

Configurations comprising more than one housing must have the individual busses in the housings connected to one another.

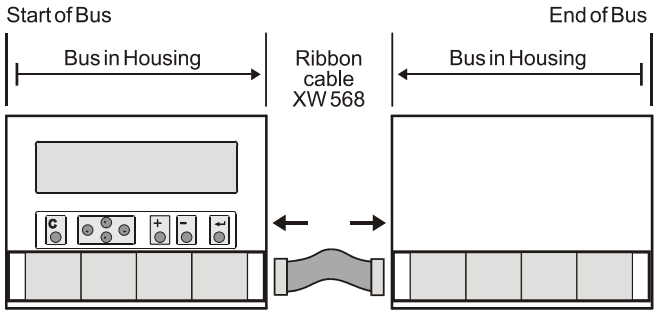

Fig. 4. Excel 500/600 bus wiring

The connection is made via tailor-made ribbon cables. Two different types are available:

— Type XW568 3 in. (80 mm) long (for housings alongside one another)

— Type XW569 13 in. (330 mm) long (for housings one above the other)

⚠ CAUTION

Incorrectly inserted bus cables can destroy the modules installed.

The internal bus begins at the first housing, containing the power supply and CPU modules, and ends at the last housing.

The protective bus connection covers must be removed.

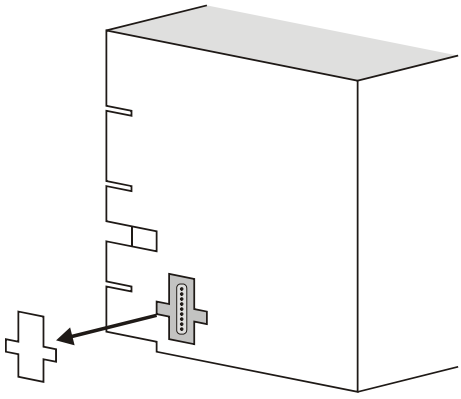

Fig. 5. Removal of bus connection cover

The overall internal bus length (bus cable and bus in the housings) must not exceed 6 ft (2 m).

Bus cables must be routed at least 2 in. (50 mm) away from power cables to prevent possible inductive and capacitive interference.

Module Locations (not XCL5010)

Each housing has four plug-in module locations.

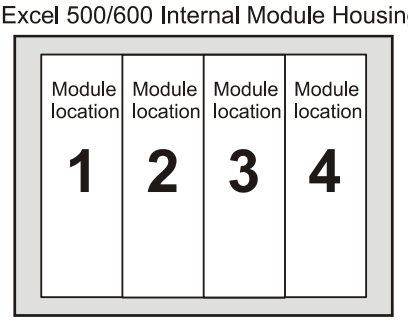

Fig. 6. Internal module numbering

Table 1 shows the plug-in location to which each module may be assigned:

Table 1. Internal module locations

module	type	module location
CPU	XC5010C / XC6010	1st housing, location 4
power supply	XP502	1st housing, location 1
AI	XF521A / XF526	any
AO	XF522A / XF527	any
DI	XF523A	any
DO	XF524A / XF529	not in 1st housing
3-position output	XF525A	not in 1st module housing

Coding the Terminal Block (not XCL5010)

The terminal block is coded with pins to prevent mixing the module types during commissioning or servicing. Mixing the modules can damage them.

You can code the terminal block by inserting pins into designated location holes on the terminal block in the base.

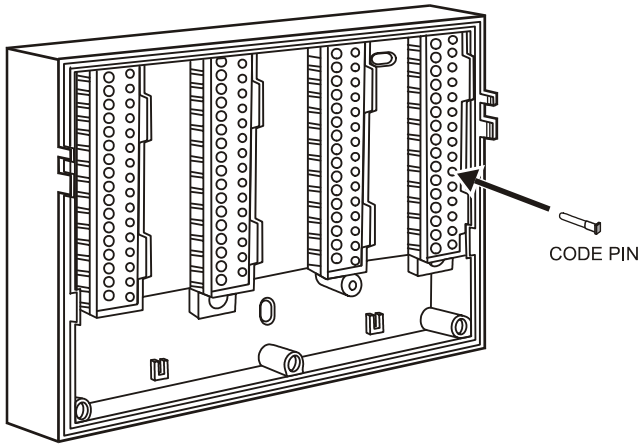

Fig. 7. Inserting the code pin in the terminal block

Table 2 shows the coding pin positions for the individual module types:

Table 2. Code pin position by module type

module	type	pin position
CPU	XC5010C, XC6010	08
power supply	XP502	06
AI	XF521A, XF526	07
AO	XF522A, XF527	11
DI	XF523A	09
DO	XF524A, XF529	10
3-position output	XF525A	12

NOTE: Distributed I/O modules are coded differently. See Distributed I/O Product Data (EN0B-0090GE51).

Setting the Module Address (not XCL5010)

In the case of an application prior to CARE 4.0, you can set the module address using the rotary HEX switches located on the upper surface of the respective input and output modules. The rotary HEX switch of Distributed I/O modules is situated within the housing. The XP502 power supply module and the XC5010C/XC6010 CPU modules do not need a hardware address.

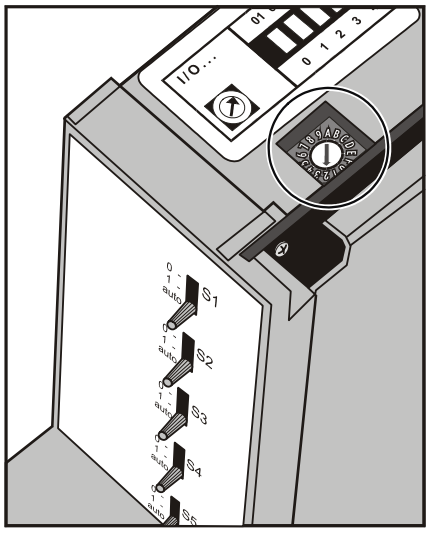

Fig. 8. Internal module HEX switch location

The 16 I/O modules (max. including Distributed I/O) are addressed by means of the rotary HEX switch settings 0 to F.

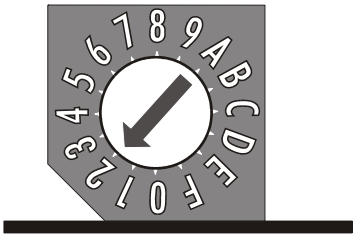

Fig. 9. Close-up of HEX addressing switch

The relationship between the rotary HEX switch and the module address can be seen on the label located next to the rotary HEX switch.

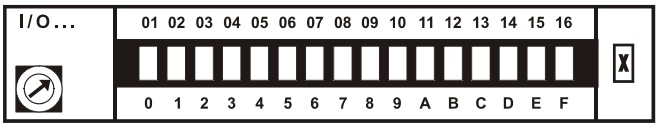

Fig. 10. HEX switch label

Care should be taken to ensure that each module gets its own module address. Addressing the modules in ascending order 0 through F is recommended for the sake of clarity for maintenance personnel.

⚠ CAUTION

Unplugging a module before switching OFF the power supply could destroy the module. Do not unplug modules with the power still connected. First switch S1 on the power supply module to the 0 position.

Installation Inside a Control Panel

Excel 500/600

IMPORTANT

When installing more than one housing, observe the min. spacing of 1.5 in. (35 mm). Do not exceed the max. spacing; otherwise, the tailor-made internal bus cables will be too short.

1. Break off cable entry strip segments.

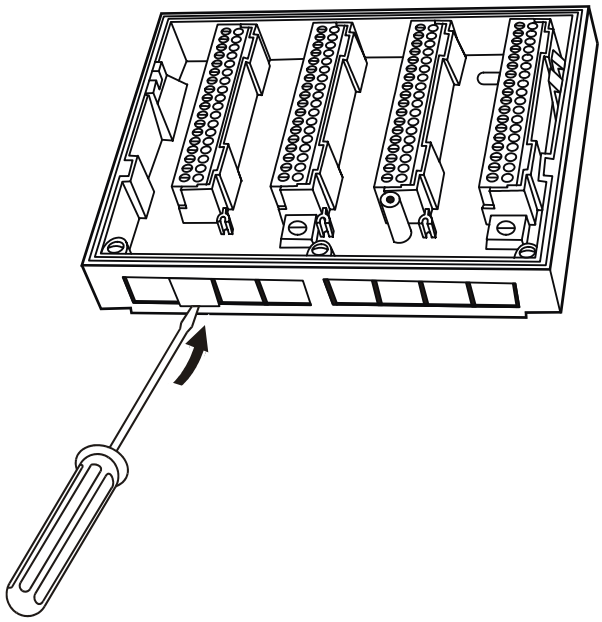

Fig. 11. Cable entry strip segments

2. Install the base.

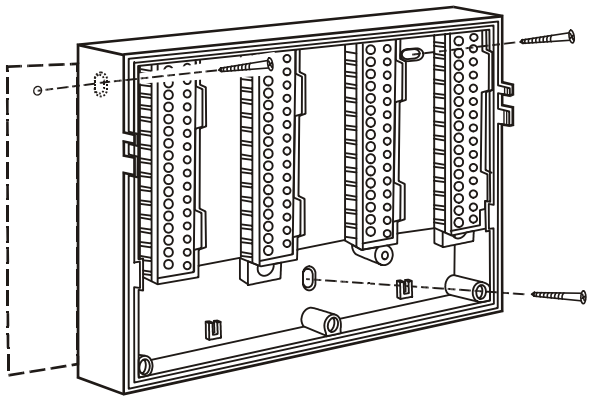

Fig. 12. Installing the base in the panel

3. Code the terminal block (see section "Coding the Terminal Block (not XCL5010)" on page 6).
4. Make sure that the locking screws are positioned as shown in Fig. 13.
5. Plug in the enclosure.

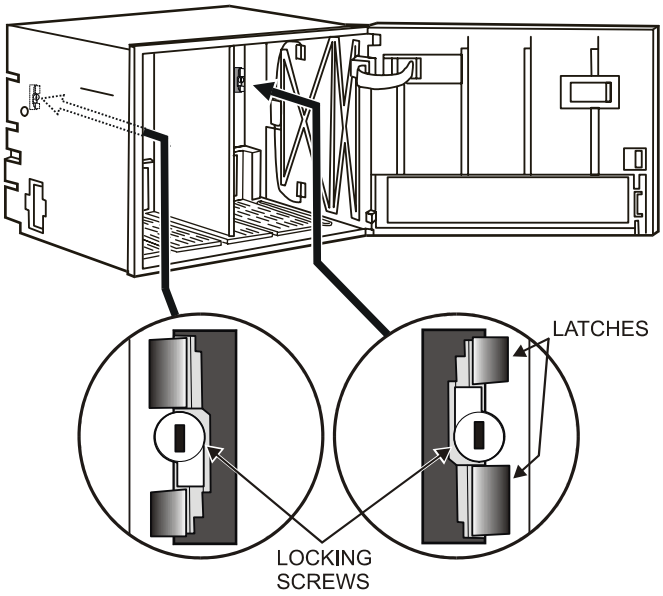

Fig. 13. Housing locking screws and latches

6. Shift latches inwards until the housing is released.
7. Set the module addresses (see section "Setting the Module Address (not XCL5010)" on page 7).
8. Insert the modules.

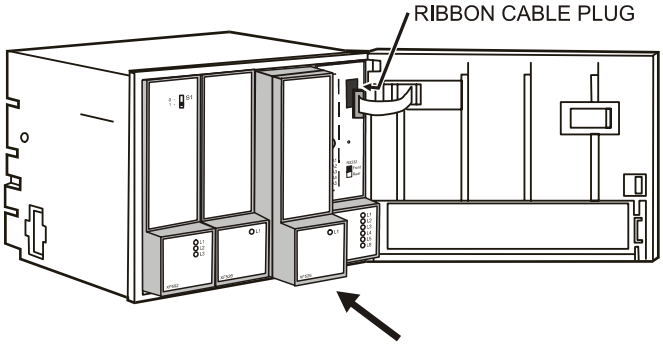

Fig. 14. Modules and ribbon cable

9. Plug the ribbon cable onto the CPU module.
10. Close the cover.

Extended wiring base (wall-mounting, only; US, only):
As an alternative to the base plate, an extended wiring base may be used. This is available for the U.S. market, only, and can be ordered without cover plate (OS No. 14507274-001) or with cover plate (OS No. 14507274-002).

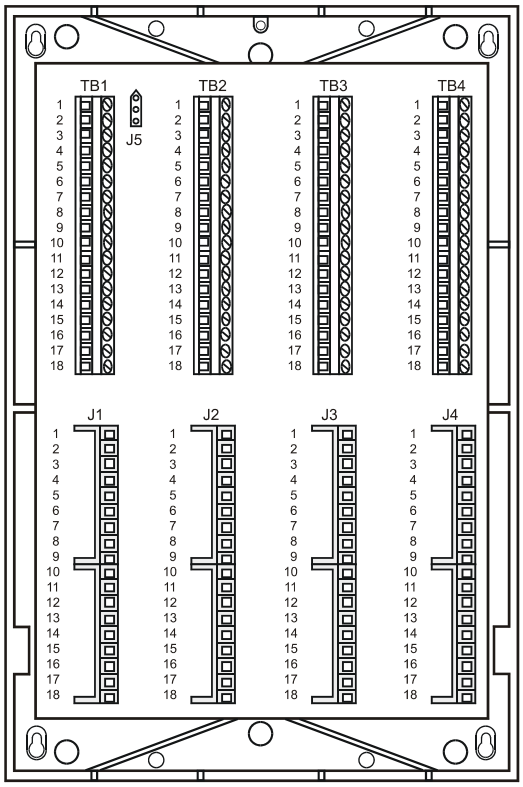

Fig. 15. Excel 500/600 extended wiring base

Using the extended wiring base the I/O terminals are accessible at run-time.

XCL5010

1. Attach the DIN rail mounting clips to the housing.
2. Mount the controller on the DIN rail.

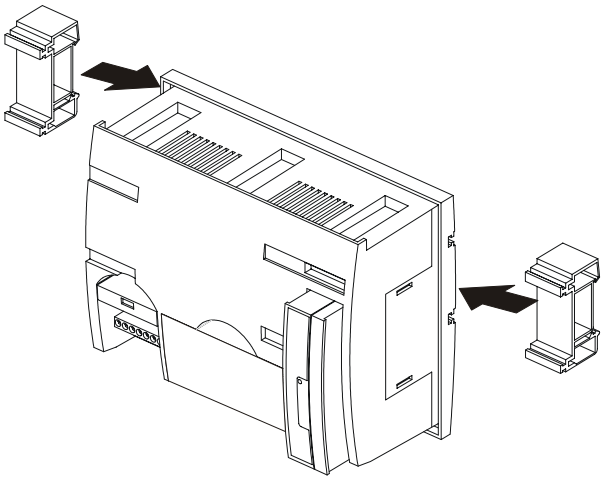

Fig. 16. Mounting XCL5010 on DIN rail (a)

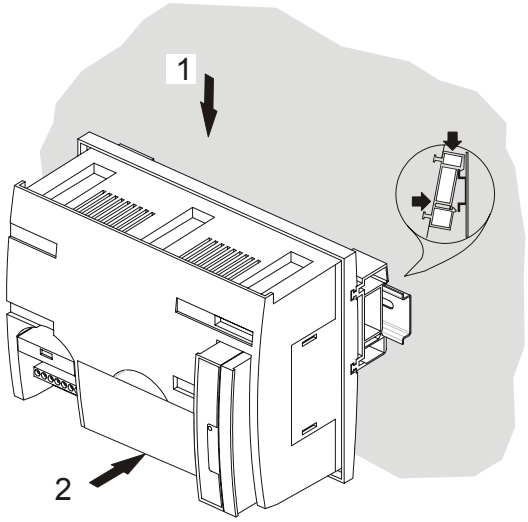

Fig. 17. Mounting XCL5010 on DIN rail (b)

XDL505 Application Module

⚠ CAUTION

Always plug in the application module *before* connecting the power supply.

Always disconnect the power supply *before* unplugging the application module.

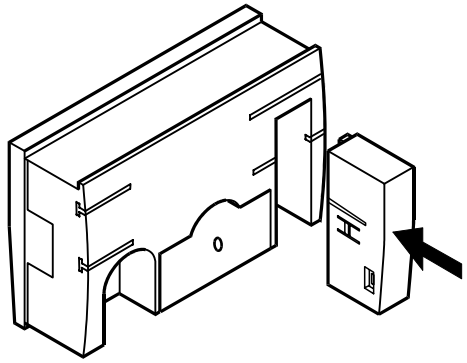

Fig. 18. Inserting the application module

Plug in the application module until it snaps into the controller housing

NOTE: If the application module has been replaced or pulled out and plugged in again, push the reset button after power on.

Installation through a Control Panel Door (not XCL5010)

IMPORTANT

When installing more than one housing, observe the min. spacing of 1.5 in. (35 mm). Do not exceed the max. spacing; otherwise, the tailor-made internal bus cables will be too short.

1, Prepare the door in accordance with the following. dimensions.

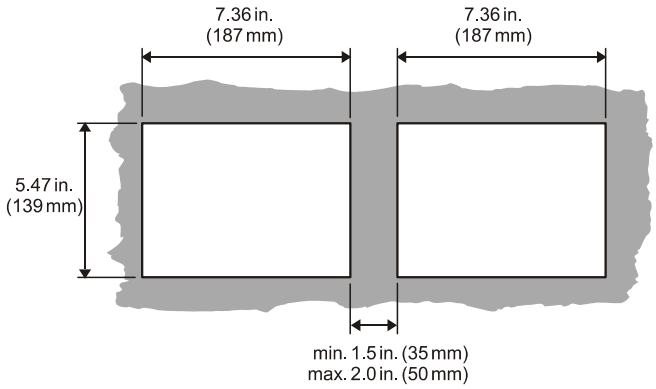

Fig. 19. Panel door mounting dimensions

2. Insert the housing.

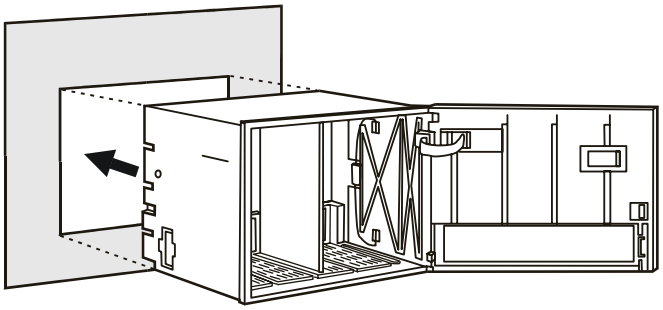

Fig. 20. Inserting the housing in the panel door

3. Insert the retaining clamp.

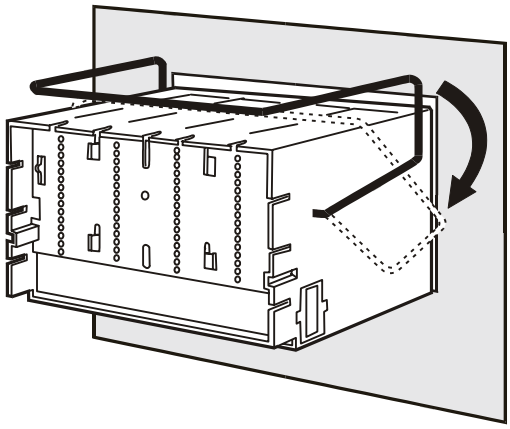

Fig. 21. Housing retaining clamp

4. Turn retaining clamp to fix housing.
5. Code the terminal block (see page 6).
6. Install the base.

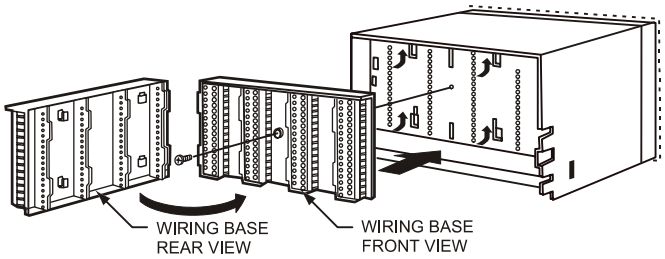

Fig. 22. Installing the wiring base

7. Complete electrical wiring.
8. Lock the cover.

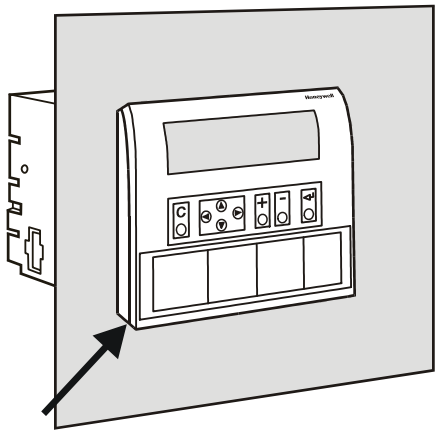

Fig. 23. Locking the MMI cover

External Installation of XI582

1. Remove the front cover from the XI582 by inserting tip of an awl (or a similar narrow, pointed object) into the small hole on one side of the operator terminal. When the latch releases, insert the awl into the small hole on the other side of operator terminal and pry off the cover.

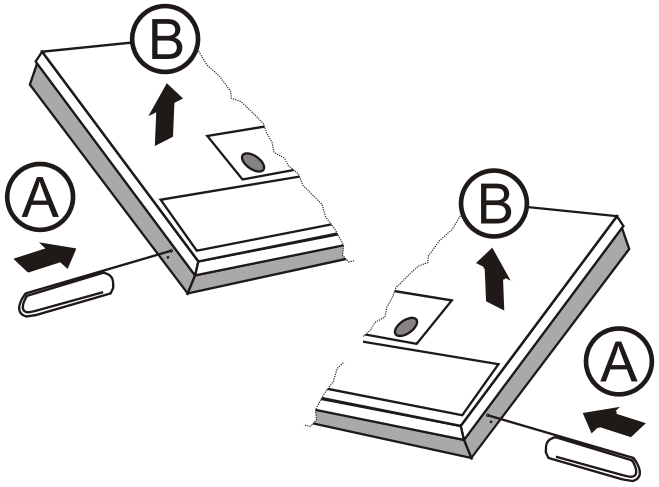

Fig. 24. Removing the cover

2. Route cable from the CPU module (XC6010, XC5010C, XCL5010).

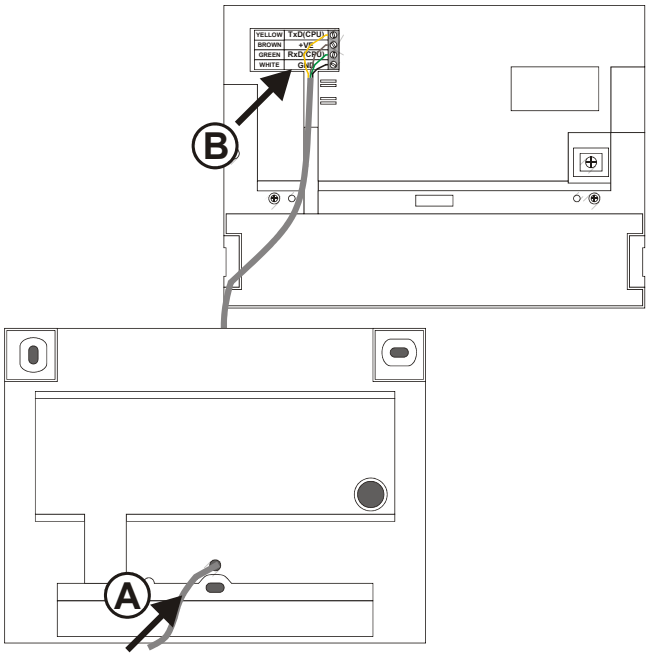

Fig. 25. Routing the cable

3. If mounting on a wall, remove feet.

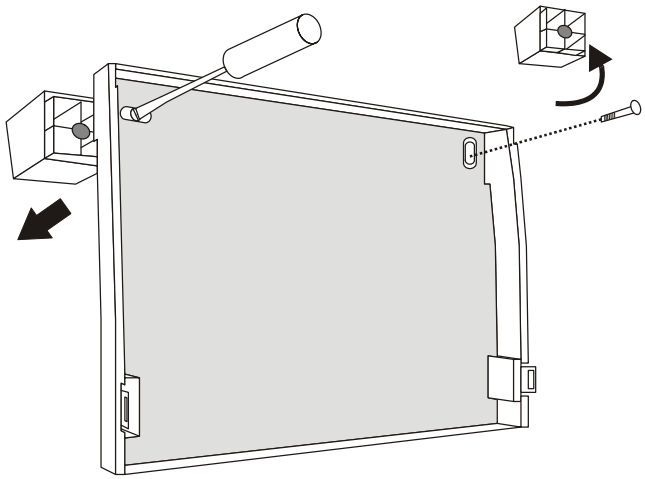

Fig. 26. Removing feet

4. Attach the housing to the wall.

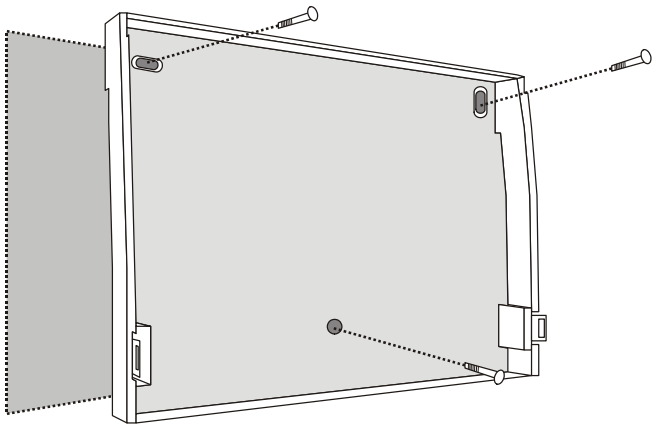

Fig. 27. Attaching to wall

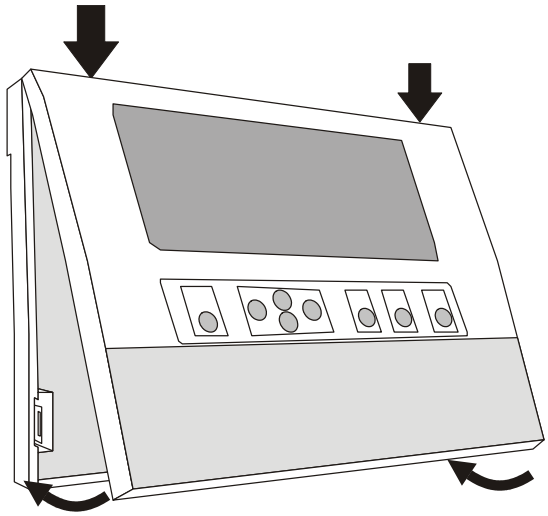

Fig. 29. Reattaching cover

5. Make electrical connections (black/gray wire not used).

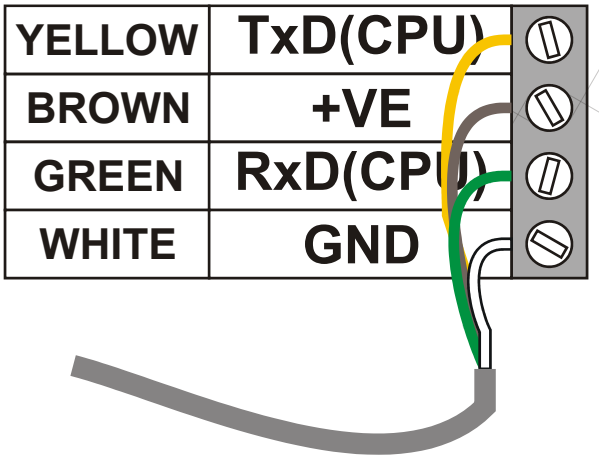

Fig. 28. Making electrical connections

6. Reattach the cover.

Backlight

The contrast of the display can be adjusted by rotating the corresponding knob accessible through a hole at the rear of the device (see Fig. 30). Pressing any of the eight operating keys activates the backlight. If no entries are made for approx. ten minutes, the backlight turns itself off automatically until a key is pressed again.

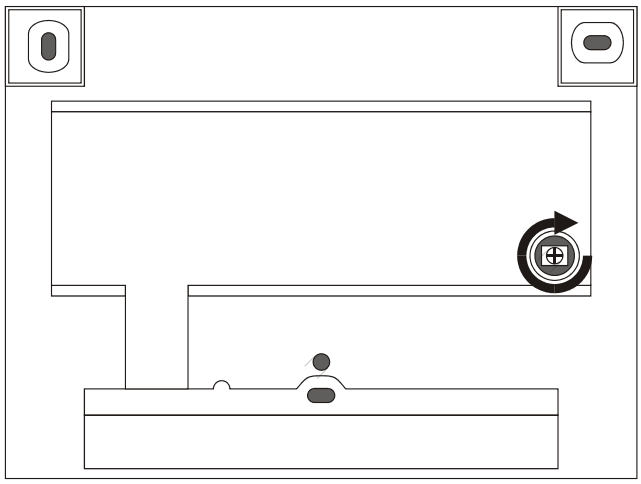

Fig. 30. Contrast potentiometer

Distributed I/O Installation

Please refer to Distributed I/O Product Data sheet (EN0B-0090GE51) for more information.

Dimensions

Excel 500/600

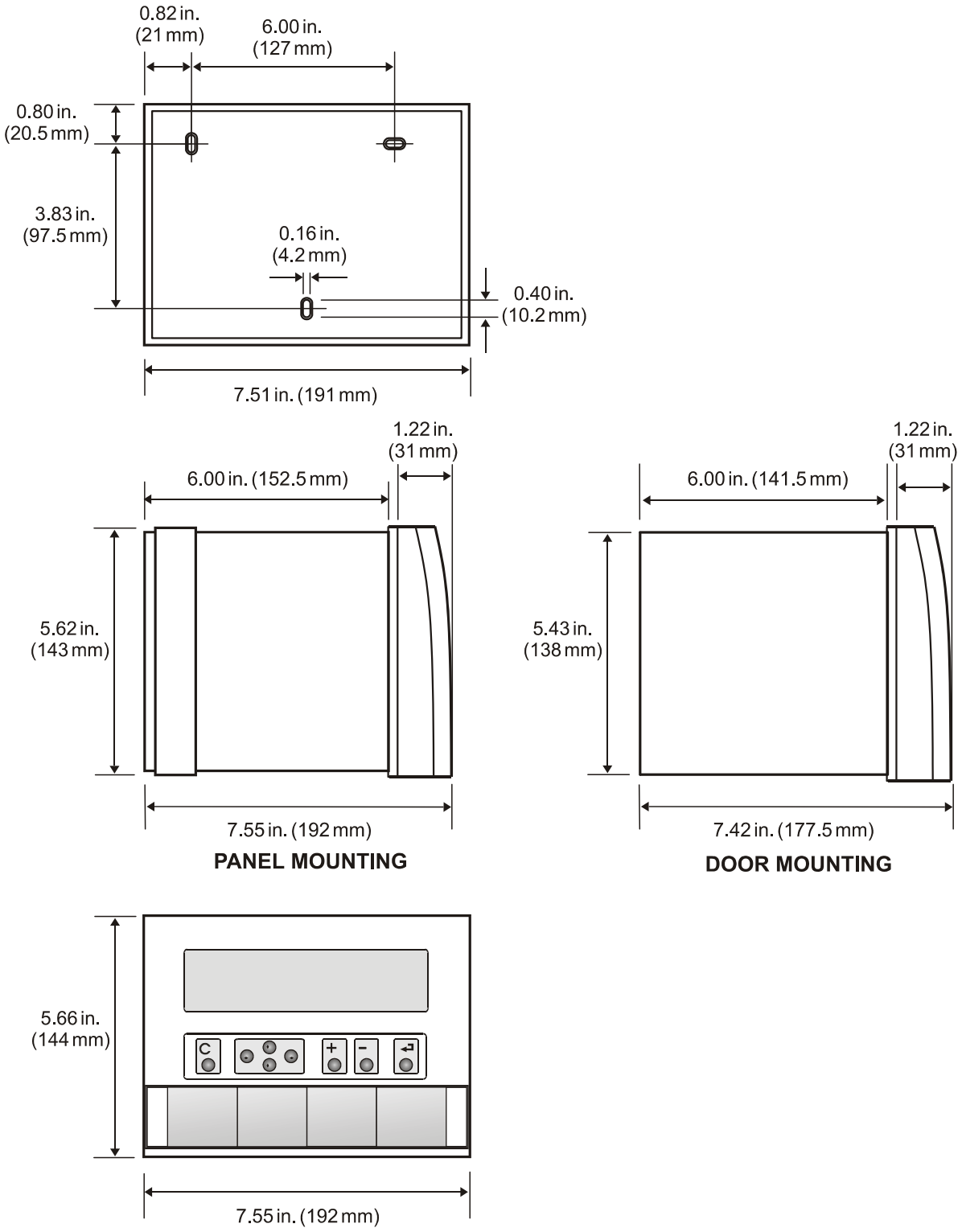

Fig. 31. Excel 500/600 outside dimensions

XCL5010

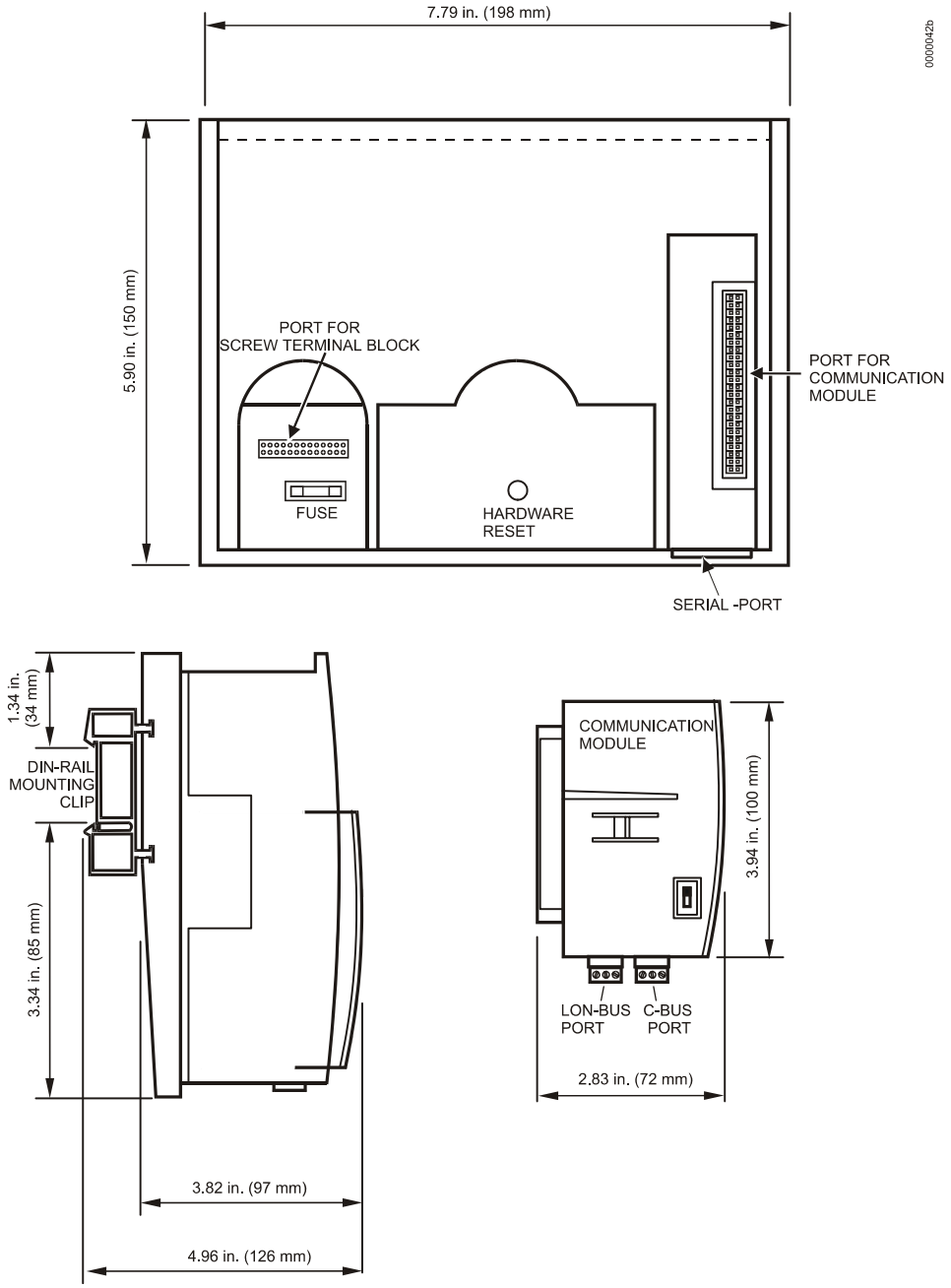

Fig. 32. XCL5010 dimensions

XI582

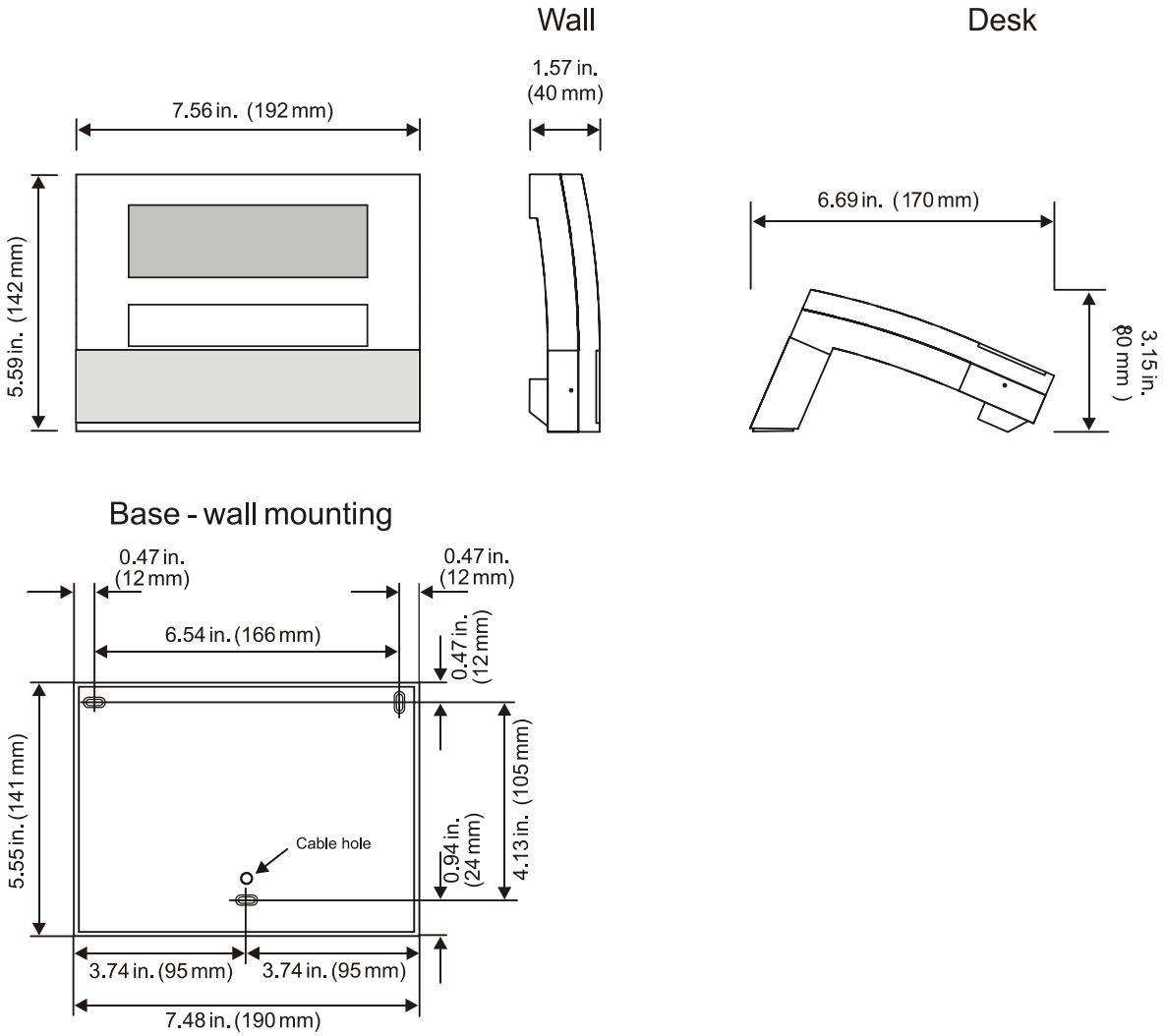

Fig. 33. XI582 dimensions

Battery Activation during Commissioning (XC6010, only)

The controller is delivered from the factory with the battery in the CPU module electrically isolated from the internal circuitry by a safety tag to prevent the battery from discharging in transit.

1. Unscrew the CPU module cover with a screwdriver.

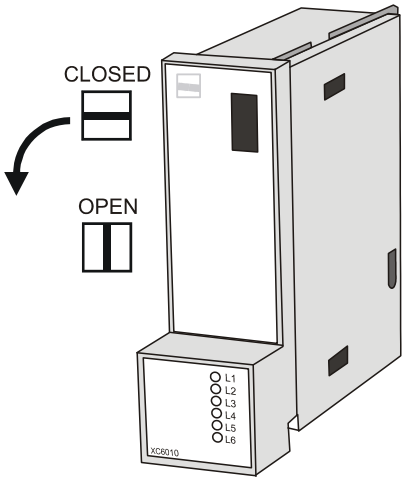

Fig. 34. Accessing the battery compartment

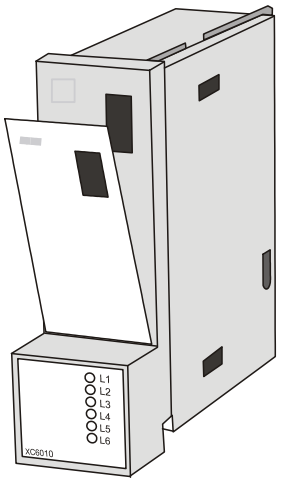

Fig. 35. Removing the faceplate

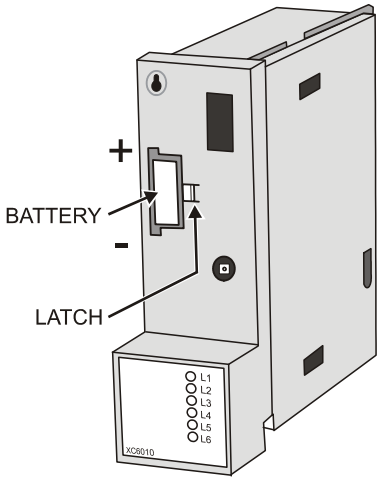

Fig. 36. Battery compartment

2. Remove the safety tag.
3. Install the cover.

Replacing the Battery

IMPORTANT

Batteries must not be disposed of as household waste. The law requires that you as the consumer return the waste batteries. Dispose of the battery according to legal regulations

During normal operation, the battery is periodically tested under load. If the battery voltage falls below a threshold of 2.45 V during operation or under load, the CPU module generates an error message which is displayed on the MMI as a system alarm. The battery must be replaced as soon as possible after the system alarm.

IMPORTANT

The line power supply must not be interrupted while replacing the battery; otherwise, all data held in RAM is lost.

NOTE: In the event that your fingers touch the battery contacts, please clean the contacts with cleaning agent.

1. Unscrew the CPU module cover with a screwdriver as shown in the previous section.
2. Release the latch holding the battery in its compartment (See Fig. 36).
3. Remove the old battery.
4. Insert the new battery with the positive contact pointing upwards.

Battery type:

Lithium battery 3 V, 1000 mAh, e.g. VARTA lithium battery CR1/2 AA – 3 V, 1000 mAh

NOTE: The XC5010C and XCL5010 CPU modules do not contain a battery. RAM is buffered for 3 days by a capacitor.

Dismantling the Control Panel Unit

Before dismantling the controller, the low voltage switch S1 of the power supply module must be switched OFF (position 0).

To dismantle the control panel unit, reverse the steps of the installation procedure (see page 7). To release the locking screws in order to remove the wiring base, turn them clock-wise as shown in Fig. 37.

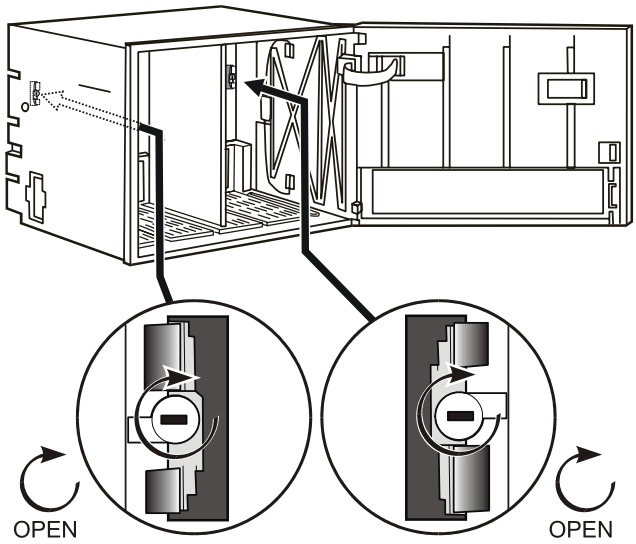

Fig. 37. Releasing housing locking screws

Dismantling the Control Panel Door Unit

Before dismantling the system, disconnect the power supply.

To dismantle the control panel unit, reverse the steps of the installation procedure (see page 9).

Dismantling the Housing Cover

1. Release the metal retaining clamp.

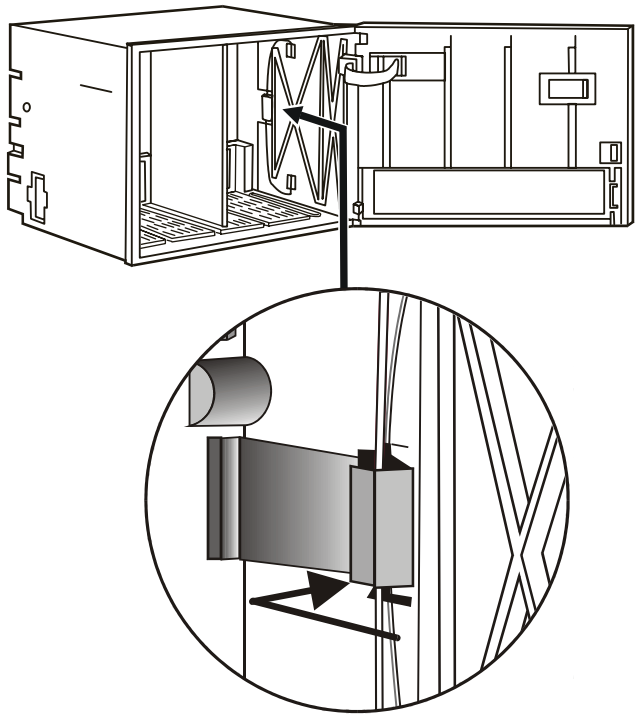

Fig. 38. Housing cover retaining clamp

2. Pull off the cover.

Dismantling the XCL5010 CPU

Before dismantling the system, disconnect the power supply (e.g. by removing the terminal block or by an additional 3rd-party switch which should be installed onto the DIN rail close to the controller; see also warnings and notes in section "Electrical Connections" on page 16).

⚠ CAUTION

Always plug in the application module *before* connecting the power supply.

Always disconnect the power supply *before* unplugging the application module.

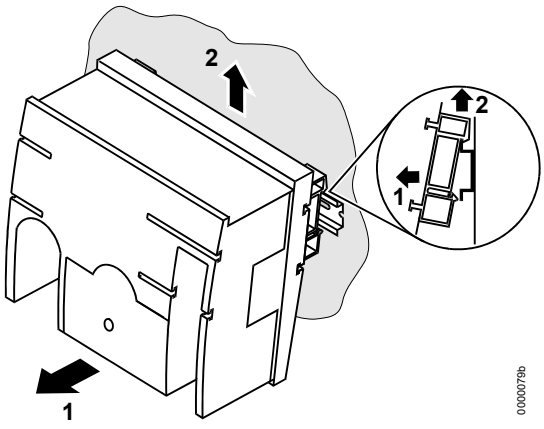

Fig. 39. Removing XCL5010 from DIN rail

1. Dismantle the controller housing as depicted.
2. Pull the lower part of the housing off the control panel.
3. Lift the housing from DIN rail.

Dismantling the XI582 Operator Interface

Remove the front cover from the XI582 by inserting tip of an awl (or a similar narrow, pointed object) into the small hole on one side of the operator terminal. When the latch releases, insert the awl into the small hole on the other side of operator terminal and pry off the cover.

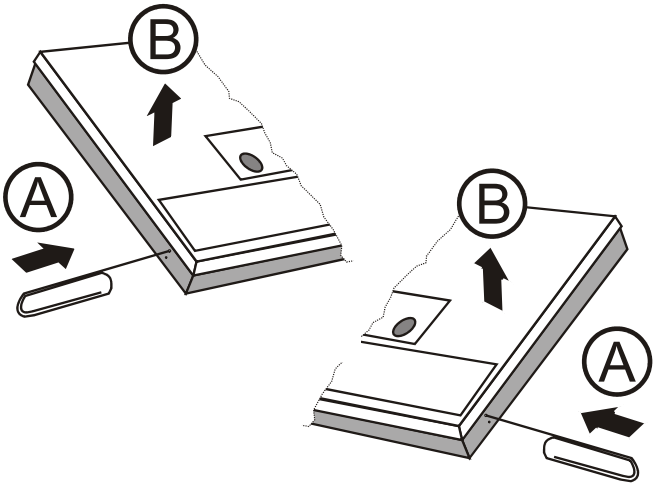

Fig. 40. Opening the XI582 Operator Interface unit

ELECTRICAL CONNECTIONS

When connecting the controller, both VDE, National Electric Code NEC (or equivalent) and any local regulations concerning grounding and zero voltage must be observed.

Electrical work should be carried out by a qualified electrician.

Under no circumstances should spare controller terminals be used as wiring support points. Doing so could damage the modules.

The electrical connections must be made at the terminal blocks. Maximum torque for fastening the wiring terminal screws is 0.5 Nm (4.5 lb-in). The corresponding connection diagrams are on the individual modules.

⚠ WARNING

Switch power OFF before making connections to or removing connections from terminals to avoid electrical shock or equipment damage.

IMPORTANT (FOR EUROPE, ONLY)

To comply with CE requirements, devices with a voltage in the range of 50...1000 Vac or 75...1500 Vdc which are not provided with a supply cord and a plug or with other means for disconnection from the supply having a contact separation of at least 3 mm in all poles, must have the means for disconnection incorporated in the fixed wiring.

Cable Routing

The min. distance to power mains cables is 0.4 in. (10 mm) for shielded cable and 4 in. (10 cm) for unshielded cable.

All low-voltage signal and output cables should be regarded as communication circuits in accordance with VDE 0100 and VDE 0800 (or NEC or other equivalent), and should therefore be routed separately from mains cables.

Joining sensor cables should be avoided.

Shielding I/O Module, Power Supply Cables

Shielding input and output module and power supply cables is not necessary if the general guidelines for cable routing are observed. If, in certain cases, the routing guidelines cannot be observed, then shielded cable must be used.

The shield must not be terminated at a controller; instead, to avoid ground loops, the shield must be grounded (at only one end) at the control panel.

To prevent ground loops, shielding of input/output cables leading to peripheral devices must be grounded only at the control panel end.

Shielding of Data-Transmitting Cables

Connect the shield of the system bus (C-Bus) to system ground on both ends. Each end of the shield on the system bus should be connected to the system ground terminal of the respective CPU module. Do not connect it to the control panel earth or any other earth ground points.

NOTE: The LONWORKS bus must not be grounded on the CPU side.

To connect remote operator interface units, ready-made cables are available (XW565; XW582, XW583, etc.) with the shield already connected to the CPU module plug end.

Grounding (XC5010C / XC6010, only)

The controller should be grounded using as short a cable as possible (min. 16 AWG [1.5 mm²]) between the control panel and terminal 3 of the power supply module.

System Ground

⚠ WARNING

High voltage

Risk of electrical shock or equipment damage.

The controller's system ground must have no connection with the control cabinet ground!

NOTE: A document providing additional information on system grounding (if required) is available via the Honeywell Technical Assistance Center (TAC) or, for Honeywell employees, on the Docu Server under: *http://web.ge51.honeywell.de/dep/mc/TAC_Tips*.

RFI Suppression

Honeywell actuators are RFI (Radio Frequency Interference) suppressed as standard in accordance with VDE 0871/B and VDE 0875/N.

XC5010C/XC6010 Cable Lengths and Sizes

Table 3. Cable sizing (use only copper cables)

type of signal	cross-sectional area		
	≤ 300 ft (100 m)	**≤ 550 ft (170 m)**	**≤ 1300 ft (400 m)**
24 Vac power supply	16 AWG (1.5 mm^2)	14 AWG (2.5 mm^2)	-
low voltage signals*	14 – 18 AWG (2.5 – 0.75 mm^2)		
*0…10 V sensors, totalizers, digital inputs, 0 to 10 V signals for actuators, etc.			

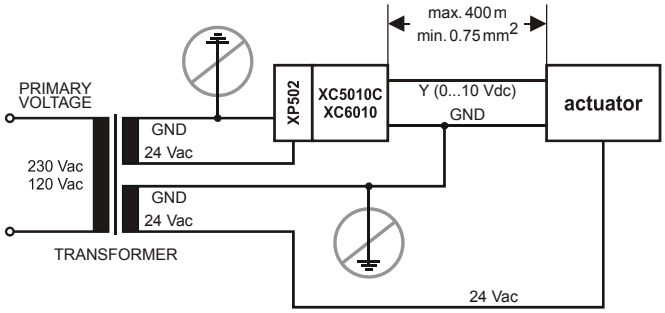

Fig. 41. Power for XC5010C/XC6010 (XP502 power supply module) with 24 V actuator

A cable length of 1300 ft (400 m) with a cross sectional area of 0.75 mm^2 (18 AWG) is permissible for a two-core, 0…10 Vdc signal cable.

For cable lengths exceeding 1300 ft (400 m) between the transformer and the field device, see NOTE in section "System Ground".

Lightning Protection

Please contact your local Honeywell representative for information on lightning protection.

Summary of Internal Modules

Table 4. Summary of Excel 500/600 internal modules

module	name	inputs	outputs	manual override switches	LED display
CPU module	XC5010C			Reset button LONWORKS service button RS232 front-rear switch	LONWORKS Service LED C-Bus transmit C-Bus receive normal system error RS232 transmit RS232 receive ground loop error
CPU module	XC6010			Reset button	normal system error RS232 transmit RS232 receive C-Bus transmit C-Bus receive
power supply module	XP502		1	0 (1 x)	power supply watchdog ext. battery operation
analog input module	XF521A	8			
analog input module	XF526	8			CPU active
analog output module	XF522A		8	0 (5 x) 1 Auto	8 x output intensity
analog output module	XF527		8		8 x output intensity
digital input module	XF523A	12			12 x status, invertible
digital output module	XF524A		5 changeover 1 NO contact	0 (5 x) 1 Auto	6 x status
digital output module	XF529		5 changeover 1 NO contact		6 x status
three-position output module	XF525A		3 three-position	+ (3 x) 0 - Auto	3 x open close

NOTE: With XC6010 CPU only, there are submodules for system bus combination, XD505A (10 KBit) / XD508 (1 MBit).

Line Power Supply

⚠ WARNING

A separate CRT 6 or 1450 series (U.S.) transformer must be used for each of the EXCEL 500/600 controller's 24 V supplies.

No additional loads may be connected!

Each additional XL500/600 controller requires its own transformer.

An additional transformer, appropriate to the power requirements, should be used to power input/output peripherals (e.g. actuators). See also Fig. 41.

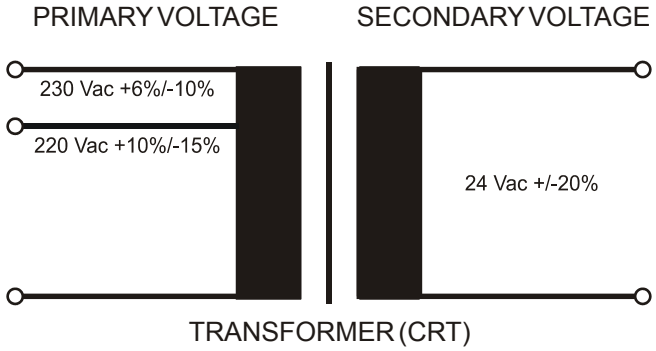

Fig. 42. Excel 500/600 power supply (CRT)

To avoid interference, the cable between the transformer and the power supply module should be kept as short as possible (max. 6 ft [2 m]). The transformer should therefore be positioned close to the power supply module.

Fuse the transformer primary with its own fast-acting 10 A back-up fuse (or H 16 or L 16 miniature circuit breaker).

The primary coil of the CRT 6 contains a 0.8 A / 250 V quick-blow fuse.

Table 5 gives an overview of the transformers of the 1450 series (U.S.):

Table 5. 1450 series transformers data

part # 1450 7287	primary side	secondary side
-001	120 Vac	24 Vac, 50 VA
-002	120 Vac	2 x 24 Vac, 40 VA, and 100 VA from separate transformer
-003	120 Vac	24 Vac, 100 VA, and 24 Vdc; 600 mA
-004	240/220 Vac	24 Vac, 50 VA
-005	240/220 Vac	2 x 24 Vac, 40 VA, and 100 VA from separate transformer
-006	240/220 Vac	24 Vac, 100 VA, and 24 Vdc; 600 mA

The 1450 series includes built-in fuses, line transient /surge protection and AC convenience outlet, it meets NEC class 2 requirements.

XC6010 Computer Module

⚠ CAUTION

Do not unplug the CPU module with the power still connected, since this could destroy the module. First, switch S1 on the power supply module to the 0 position.

If one of the C-bus submodules XD505A or XD508 is installed on the XC6010, follow Fig. 43.

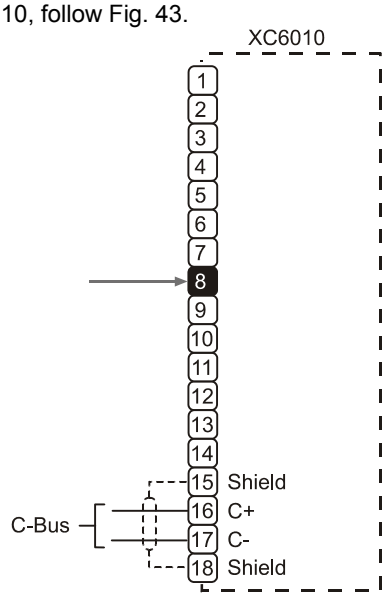

Fig. 43. Excel 600 CPU module C-Bus connections

The system bus is connected to terminal 16 (C+) and terminal 17 (C-). See also section "C-Bus Termination (XC6010)" on page 33.

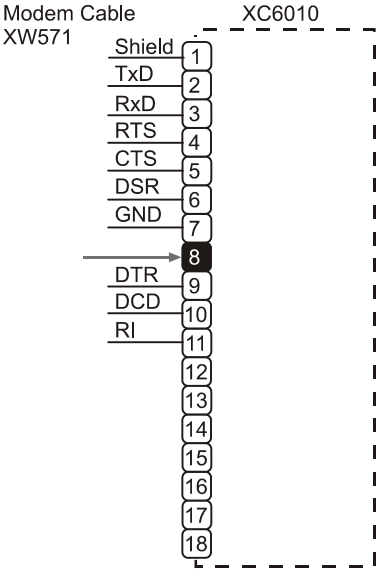

Fig. 44. Excel 600 CPU modem connection

The XC6010 has two EPROMs for the operating system and one flash EPROM for the application software. Their locations are shown in Fig. 45.

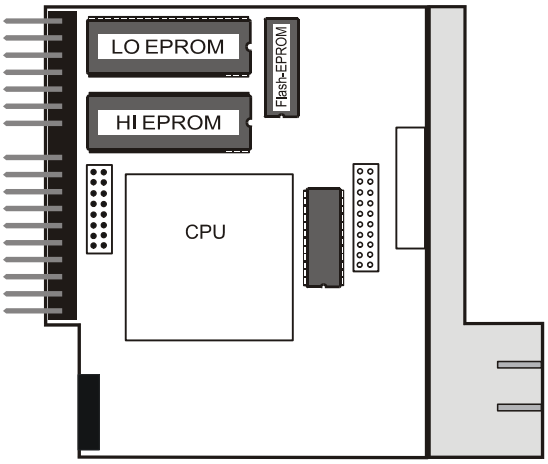

Fig. 45. Excel 600 EPROM locations

Communication between several Excel 600 controllers is possible only if the system bus submodule is plugged into every CPU module printed circuit board. This submodule must be installed when joining several controllers or when monitoring via a central. XD505A or XD508 can be used for local bus communication. A stand-alone controller can be operated without a submodule.

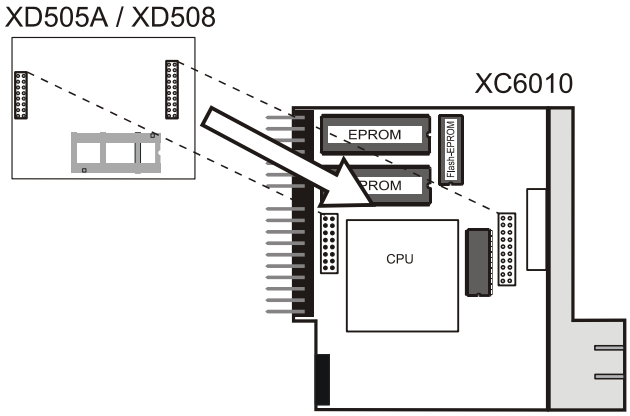

Fig. 46. Excel 600 submodule mounting location

For information pertaining to system bus baud rates and termination switch settings, see section "C-Bus Termination (XC6010)" on page 33.

XC5010C CPU Module

⚠ CAUTION

Do not unplug the CPU module with the power still connected, since this could destroy the module. First, switch S1 on the power supply module to the 0 position.

The XC5010C CPU module contains both the system bus and the field bus. Fig. 47 shows the pin-out of the module.

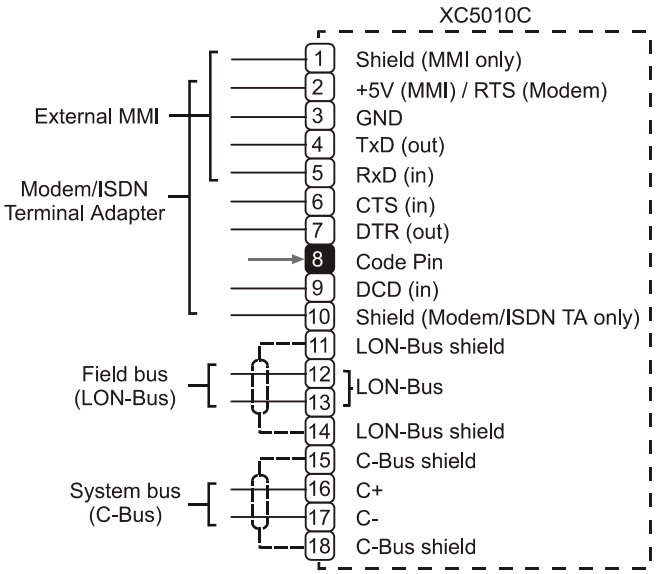

Fig. 47. Excel 500 CPU module pin-out

The system bus is connected to terminal 16 (C+) and terminal 17 (C-). The field bus (LONWORKS bus) is connected to terminals 12 and 13. The LONWORKS bus is non-polarized, i.e. there is no + or – pin. See section "COMMUNICATIONS LonWorks Bus Wiring" (page 31) and "System Bus (C-Bus)" (page 32) for more information.

NOTE: The cable for the LONWORKS bus does not require shielding.

The serial port connections at the back of the module can be used to connect an XI582 MMI or, for CPUs with firmware version V2.1.0 or newer, a modem or ISDN terminal adapter. See section "Remote Communications" on page 37 for more information.

Each XC5010C contains an application submodule that is different from the XD505A/XD508 submodule. The submodule for the XC5010C contains the C-Bus, LONWORKS bus, as well as part of the RAM and flash EPROMs. For information on C-Bus baud rates and the bus termination switch, see section "C-Bus Termination (XC5010C)" on page 33.

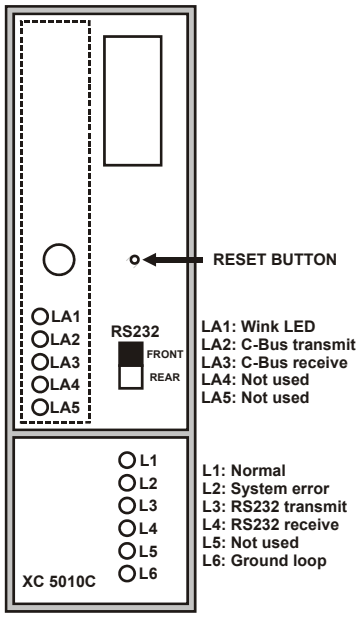

Fig. 48. Excel 500 CPU module front panel

The operator interface on the front of the CPU modules allows connection of the XI581/XI582 Operator Interface or the XL-Online PC MMI. As an option, the XI582 can be connected at the rear of the XC5010C. When connecting at the rear, the switch on the front panel of the XC5010C must be set to "Rear".

XP502 Power Supply Module

Fig. 49 shows the pin-out of the XP502 Power Supply module.

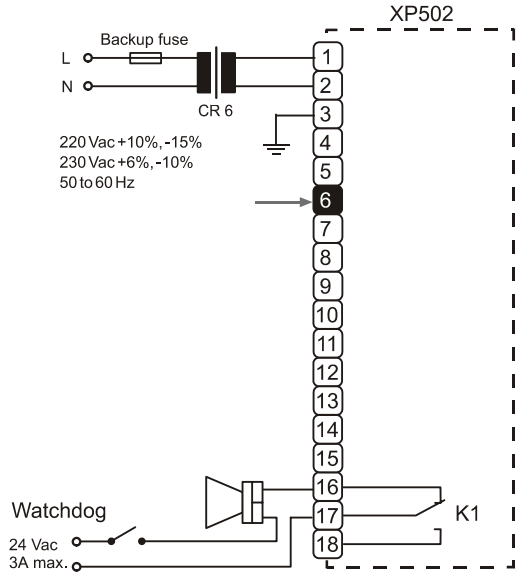

Fig. 49. XP502 Power supply module and watchdog circuit

To monitor the line power supply, the watchdog alarm must be provided with its own power or battery supply.

Controller in operation: Watchdog relay terminals 17 and 18 connected.

Controller non-operational: Watchdog relay terminals 16 and 17 connected.

RIN-APU24 Uninterruptable Power Supply

The RIN-APU24 Uninterruptable Power Supply can be wired to an XP502 in order to power XC5010C/XC6010 controllers. In this context, a distinction must be made between the following three different possible cases:

- wiring of the RIN-APU24 to an XP502 powering XC5010C/XC6010 controllers equipped with internal modules, but not connected to Distributed I/O's;
- wiring of the RIN-APU24 to an XP502 powering XC5010C controllers connected to Distributed I/O's, but not equipped with internal modules; and
- wiring of the RIN-APU24 to an XP502 powering XC5010C controllers equipped with internal modules and connected with Distributed I/O's.

Further, in the case of the XCL5010, the RIN-APU24 can provide power directly (i.e. without recourse to an XP502). In this case, no distinction need be made between controllers with (or without) internal modules and/or connected (or not connected) to Distributed I/O's.

Table 6. Power consumption of Excel 500 controllers

devices powered	supply voltage	
	24 Vdc	28.8 Vdc
XP502, XC5010C, XI581 (backlight ON)	170 mA	155 mA
XP502, XC5010C	140 mA	130 mA

See also RIN-APU24 Uninterruptable Power Supply – Mounting Instructions (MU1B-0258GE51) for detailed wiring diagrams covering all of the aforementioned cases.

XF521A Analog Input Module

Technical Specifications

Number:

eight inputs (AI1 – AI8)

Input:

0...10 Vdc (low-input impedance, 25 kΩ to 10 V / 200 kΩ to GND);
0...20 mA (via external 500-Ω resistor);
4...20 mA (via external 500-Ω resistor);
NTC 20 kΩ(-50...+150 °C);
PT1000 (-50...+150 °C)

Protection:

up to 40 Vdc / 24 Vac

Resolution:

12-bit resolution

Accuracy:

±75 mV or 0.75% (0...10 V)

Table 7. Accuracy of analog input sensors

range	measurement error (without sensor tolerance)	
	PT1000	NTC 20K
-58...-4 °F (-50...-20 °C)	≤ 1.2 K	≤ 5.0 K
-4...+32 °F (-20...0 °C)	≤ 0.7 K	≤ 1.0 K
+32...86 °F (0...30 °C)	≤ 0.5 K	≤ 0.3 K
86...158 °F (30...70 °C)	≤ 0.7 K	≤ 0.5 K
158...212 °F (70...100 °C)	≤ 1.2 K	≤ 1.0 K
212...266 °F (100...130 °C)	≤ 1.2 K	≤ 3.0 K
266...302 °F (130...150 °C)	≤ 1.2 K	≤ 5.5 K

With current sensors, a terminating resistor of R1 = 499 Ω ± 0.25% must be connected.

Terminal 18 is an auxiliary output voltage (+10 Vdc, I_{max} = 5 mA) available for various sensor circuits.

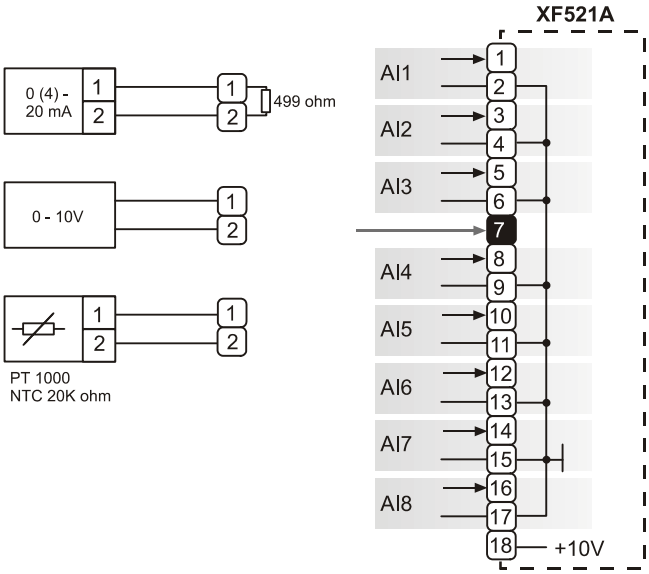

Fig. 50. XF521A Analog Input module connections

Fig. 51 shows several connection examples for various sensors: WS21 Wind Sensor; SAF 25 Solar Sensor; and VMP Feedback Potentiometer.

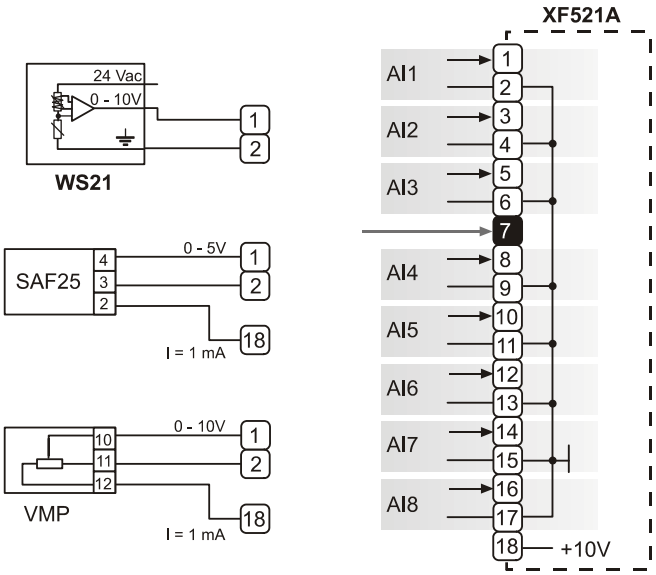

Fig. 51. XF521A connection examples

Fig. 52 shows connections to a TF26.

Terminals 1, 3: temperature adjustment
Terminals 5, 3: room sensor
Terminals 6, 3: LED

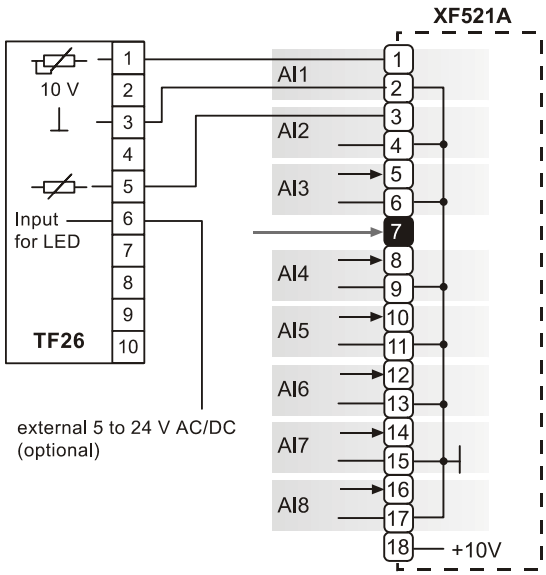

Fig. 52. XF521A and TF26 example

XF526 Analog Input Module

Technical Specifications

Number:

eight inputs (AI1 – AI8)

Input:

0...10 Vdc (low-input impedance, 25 kΩ to 10 V / 200 kΩ to GND);
0...20 mA (via external 500-Ω resistor);
4...20 mA (via external 500-Ω resistor);
NTC 20 kΩ (-50...+150 °C);

PT1000 (-50...+150 °C)
PT1000 (0...+400 °C)
PT100 (-50...+150 °C)
PT3000 (-50...+150 °C)
Balco 500 (-50...+150 °C)

Protection:

up to 40 Vdc / 24 Vac

Resolution:

12-bit resolution

Accuracy:

±75 mV or 0.75% (0...10 V)

See also Table 7.

With current sensors, a terminating resistor of R1 = 499 Ω ±0.25% must be connected.

Terminal 18 is an auxiliary output voltage (+10 Vdc, I_{max} = 5 mA) available for various sensor circuits.

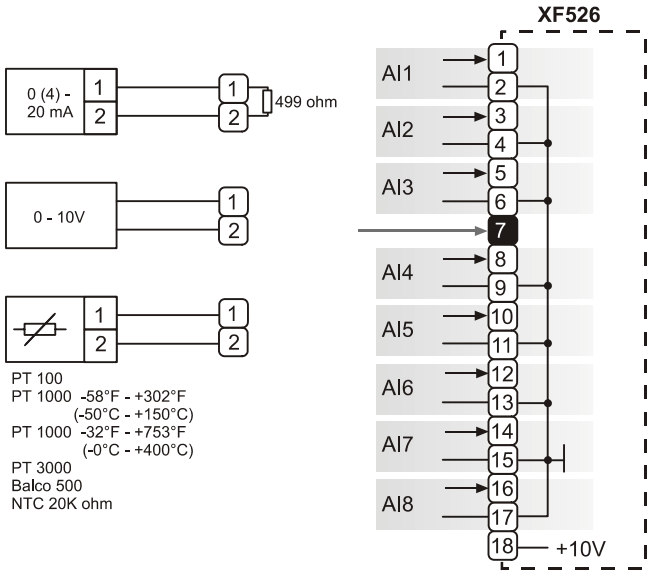

Fig. 53. XF526 Analog Input module connections

XF523A Digital Input Module

The digital input module can process DC or AC voltage signals. The module has 12 digital inputs. When the input voltage reaches 5 V, the digital signal is set to a status of "1". With a hysteresis of 2.5 V, the digital input signal must fall below 2.5 V before a digital status of "0" is reported.

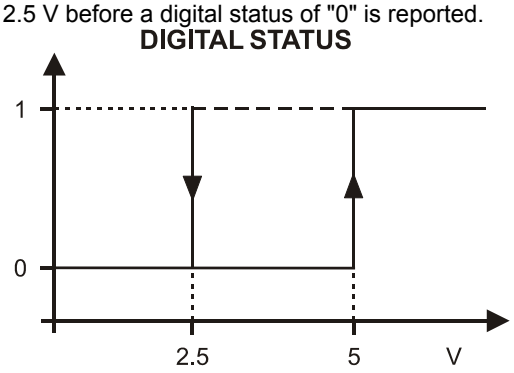

Fig. 54. Digital input hysteresis

The LED functionality of each digital input channel can be altered via 12 internal DIP switches. In the ON position (default), the LED will illuminate when energized (normally-open contacts). In the OFF position, the LED will illuminate when de-energized (normally-closed contacts).

Max. signal voltage from non-Honeywell voltage sources:

DC Voltage: V_{max} = 40 V

AC Voltage: V_{max} = 28 V / ≥ 50 Hz

Input resistance:

R_i = 15 kΩ

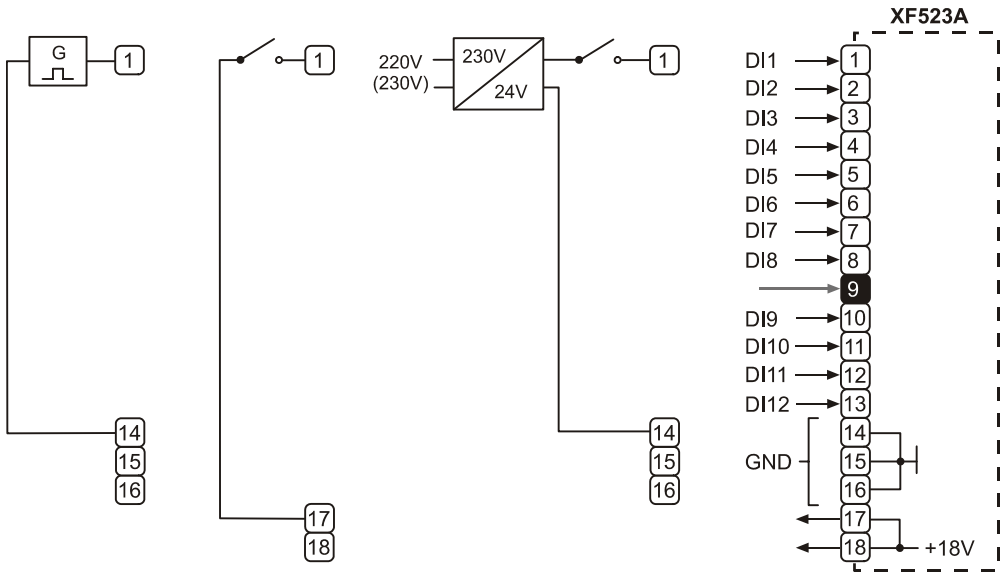

Fig. 55. XF523A connection examples

If the inputs are used as totalizers, Table 8 applies.

Table 8. Totalizer inputs specifications

input	frequency	pulse duration	pulse internal	chatter time
1, 2	max. 15 Hz	min. 20 ms	min. 33 ms	max. 5 ms
3 to 12	max. 0.4 Hz	min. 1.25 s	min. 1.25 s	max. 50 ms

The inputs shown in row one (Input 1 to 2) may be used as fast totalizers. In this case, the input signal characteristics of row one are valid. If they are not used as fast totalizers, the values of row two (Inputs 3 to 12) apply to them as well.

XF522A and XF527 Analog Output Modules

Technical Specifications

Number:
eight analog outputs

Voltage rating:
0…10 V, max. 11 V

Current rating:
max. 1 mA

Resolution:
8 bit

Accuracy:
±150 mV or 1.5% deviation from output voltage

Manual override switches:

XF522A	5 manual override switches (AO1 to AO5)
XF527	No manual override switches

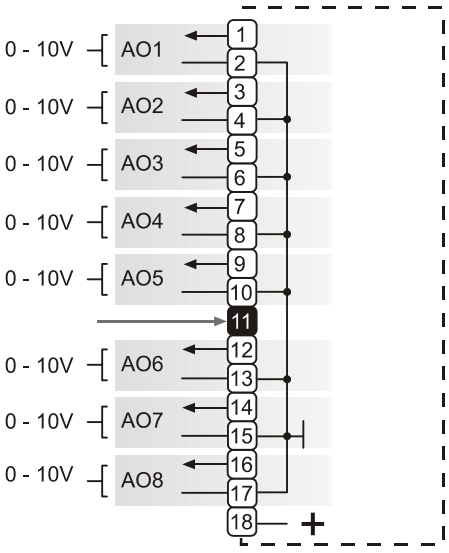

Fig. 56. XF522A and XF527 Analog Output modules

NOTE: The max. output current of 1 mA must not be exceeded.

NOTE: Both modules are fully pin-compatible.

XF524A and XF529 Digital Output Modules

Technical Specifications

Number:
six digital outputs

Voltage rating:
max. 240 Vac per contact and per module

Current rating:
max. 4 A at 240 Vac; max. 12 A per module
max. 4 A at up to 35 Vdc
max. 3 A at up to 40 Vdc
max. 2 A at up to 50 Vdc
max. 1 A at up to 70 Vdc
max. 0.6 A at up to 100 Vdc
max. 12 A per module

Relay contacts:
K1 to K5: changeover contact (voltage-free)
K6: Normally-open contact (voltage-free)

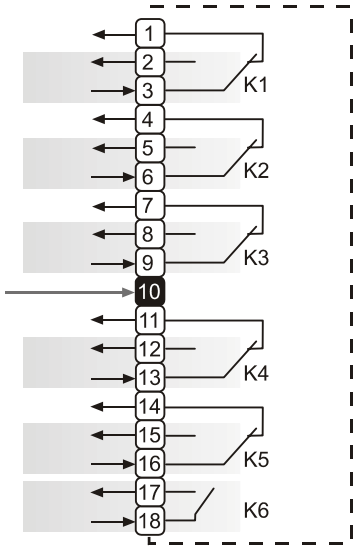

Fig. 57. XF524A and XF529 Digital Output module

NOTE: The max. voltage for U.S. is 24 V.

NOTE: Both modules are fully pin-compatible.

Beginning with V3.04.00 firmware, the online point attribute normally-open/normally-closed (NO/NC) defines the relation

between the physical input signal and its logical status. See Table 9.

Table 9. NO/NC attribute and output characteristic

relay ON/OFF	NO/NC attribute	logical status
ON	NO	1
OFF	NO	0
ON	NC	0
OFF	NC	1

XF525A Three-Position Output Module

Technical Specifications

Voltage rating:

max.240 Vac or 28 Vdc

Current rating:

max. 4 A at 240 Vac; max. 12 A per module
max. 4 A at up to 35 Vdc
max. 3 A at up to 40 Vdc
max. 2 A at up to 50 Vdc
max. 1 A at up to 70 Vdc
max. 0.6 A at up to 100 Vdc
max. 12 A per module

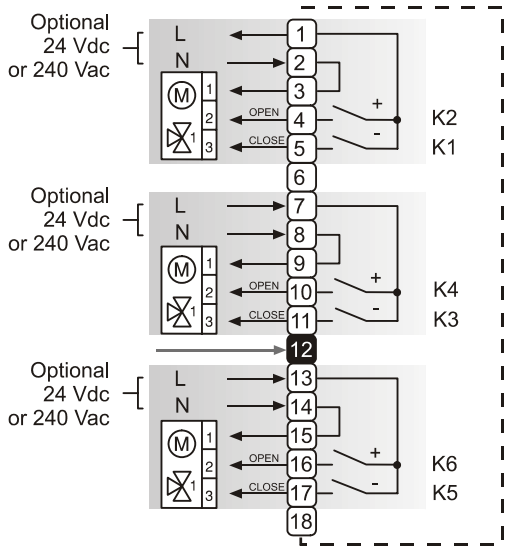

Fig. 58. XF525A Three-position output module

An L 16 miniature circuit breaker or G 10 A quick blow fuse should be used to protect the 240 Vac mains supply.

NOTE: The max. voltage for the U.S. is 24 V.

XCL5010

NOTE: The XCL5010 has Pollution Degree 2, making it suitable for use in residential controls, commercial controls, in a clean environment, or non-safety controls for installation on or in appliances.

The XCL5010 housing comprises a removable screw terminal block for direct power supply wiring. For proper installation of the terminal block, follow these instructions:

1. Read the complete chapter "Installation" carefully.
2. Follow the instructions from the chapter Screw Terminal Block Installation Procedure on page 27.

The screw terminal block is attached directly to the controller housing.

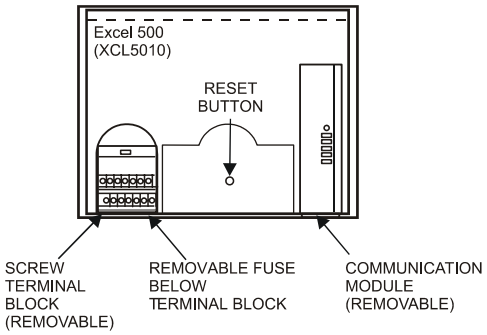

Fig. 59. XCL5010 terminal block location

Serial Port

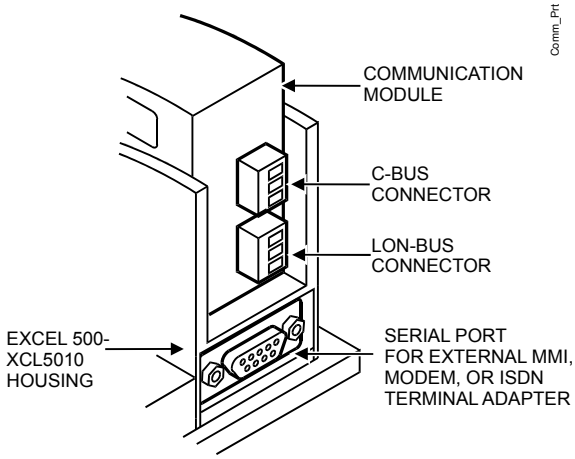

Fig. 60. Serial port

The serial port has a 9-pin sub-D connector and has a default communication speed of 9.6 Kbaud.

Table 10. Signals of serial port

signal type	controller output	controller input
signal ground		
transmit	x	
receive		x
carrier detect		x
clear to send		x
data terminal ready	x	
5 V	x	

MMI Connection

For direct communication the external operator interface XI582 and the XL-Online PC MMI can be connected to the serial port.

Power Supply

The XCL5010 is powered by an external transformer.

IMPORTANT

Only the terminals 1 and 2 of the terminal block may be used for power supply. Do not wire any of the terminals 3 to 14.

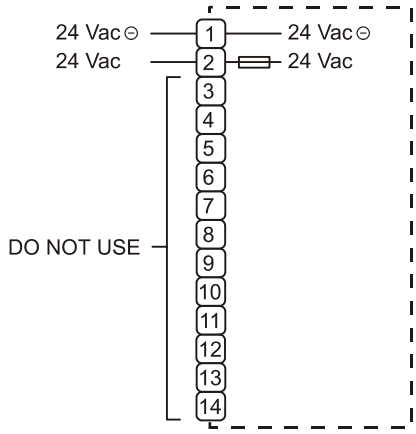

Fig. 61. XCL5010 power terminals location

Terminal 2 is protected by a 4 A quick-acting fuse.

Transformer requirements for one XCL5010:

Voltage: 21…30 Vdc or 24 Vac ± 20%

Current: 5 VA

The transformer, already installed in the cabinet, can be used to supply several controllers, communication devices, or peripherals like actuators, etc. if the transformer provides sufficient power.

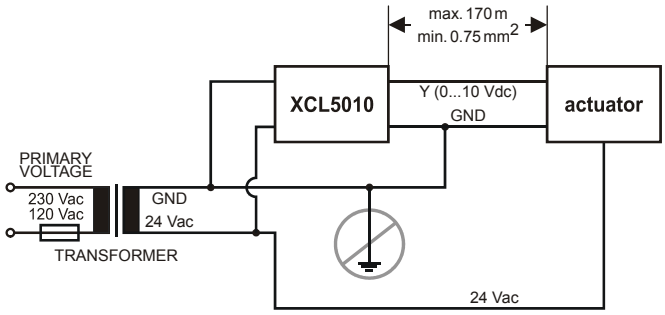

Fig. 62. Power for XCL5010 with 24 V actuator (single transformer)

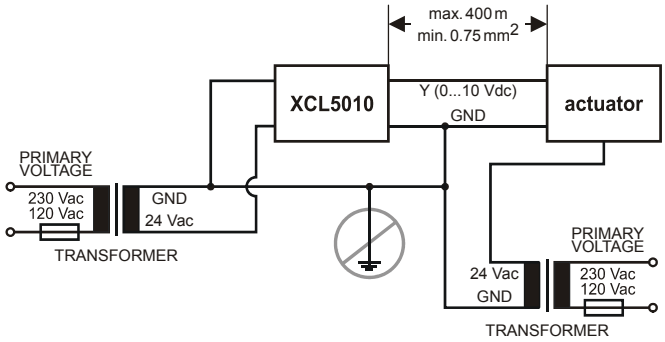

Fig. 63. Power for XCL5010 with 24 V actuator (separate transformer)

Use quick-acting backup fuse 10 A (or automatic H16 or L16) to protect transformer primary side. On the primary side of the CRT 2, there is a fusible output of type M 0.315 A (T) 250 V for the purpose of fine fusing.

NOTE: When selecting the appropriate transformer, consider the number of Distributed I/O modules (see worst-case power consumption information below) to be used as well as the power requirements of all active sensors and actuators connected to the transformer.

CRT-Series

Table 11. Overview of CRT Series AC/DC current

transformer	max. AC current	max. DC current
CRT 2	2 A	0.5 A = 500 mA
CRT 6	6 A	1.3 A = 1300 mA
CRT 12	12 A	2.5 A = 2500 mA

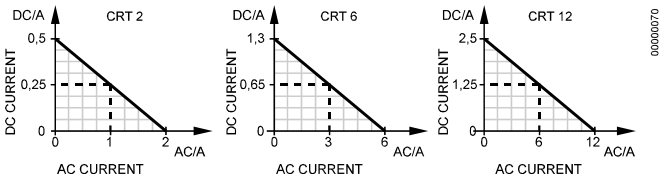

Fig. 64. AC/DC current graphs

1450 Series

All transformers of the 1450 series are designed for 50/60 Hz AC and have insulated accessory outputs. The transformers include built-in fuses, line transient/surge protection and AC convenience outlets and meet NEC class 2 requirements.

Table 12. 1450 Series transformers

part # 1450 7287	primary side	secondary side
-001	120 Vac	24 Vac, 50 VA
-002	120 Vac	2 x 24 Vac, 40 VA and 100 VA from separate transformer
-003	120 Vac	24 Vac, 100 VA and 24 Vdc 600 mA
-004	240/220 Vac	24 Vac, 50 VA
-005	240/220 Vac	2 x 24 Vac, 40 VA and 100 VA from separate transformer
-006	240/220 Vac	24 Vac, 100 VA and 24 Vdc 600 mA

Standard Transformers

Standard commercially available transformers must fulfill the specifications stated in Table 13.

Table 13. Requirements for standard transformers

output voltage	impedance	AC current
24.5 Vac to 25.5 Vac	≤ 1.15 Ω	max. 2 A
24.5 Vac to 25.5 Vac	≤ 0.40 Ω	max. 6 A
24.5 Vac to 25.5 Vac	≤ 0.17 Ω	max. 12 A

Screw Terminal Block Installation Procedure

⚠ WARNING

High Voltage

Risk of death or electrical shock.

— Do not connect line power supply directly to the terminals.

— Insulate devices with 120 Vac / 230 Vac by a transformer.

1. Make sure that the power supply of the cabinet is disconnected.
2. Make sure that the power supply of the cabinet is disconnected and the application module is plugged in the housing.

IMPORTANT

When installing a separate external transformer, do not connect the cabinet ground to the controller system ground.

3. If the distance between the controller and an actuator or sensor with 24 Vac supply is greater than 550 ft (170 m):
   a) Choose a transformer from the transformers listed in section "Power Supply" on page 26.
   b) Connect the chosen transformer directly to the actuator or sensor.
4. Select one of the transformers of the CRT-series or 1450 series from the tables on the previous page or take a commercially available standard transformer fulfilling the requirements listed in Table 13.
5. Make sure that the application module is attached to the controller housing.

IMPORTANT

The transformer feeding the Excel 500 Controller must be in the same cabinet. For the selection of the transformer, the max. DC current must be considered if field devices with DC load are used.

The secondary side of the transformer must not be connected to earth ground.

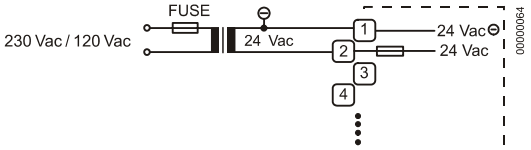

Fig. 65. Connecting the power supply

6. Connect the 24 Vac (-) on the secondary side of the transformer to terminal 1 on the Screw Terminal Block.
7. Connect the 24 Vac on the secondary side of the transformer to terminal 2 on Screw Terminal Block.

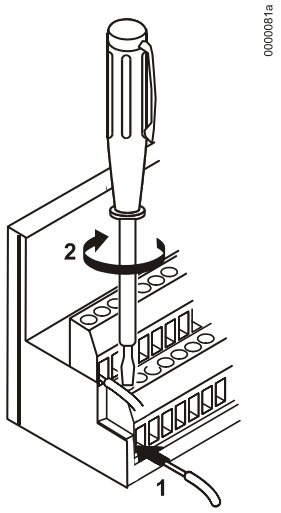

Fig. 66. Connecting to a screw terminal

IMPORTANT

If there already are additional transformers, for example supplying actuators or active sensors, connect the 24 Vac (-) (secondary side) of the transformers together.

8. Attach the terminal blocks to the housing as shown in Fig. 67.

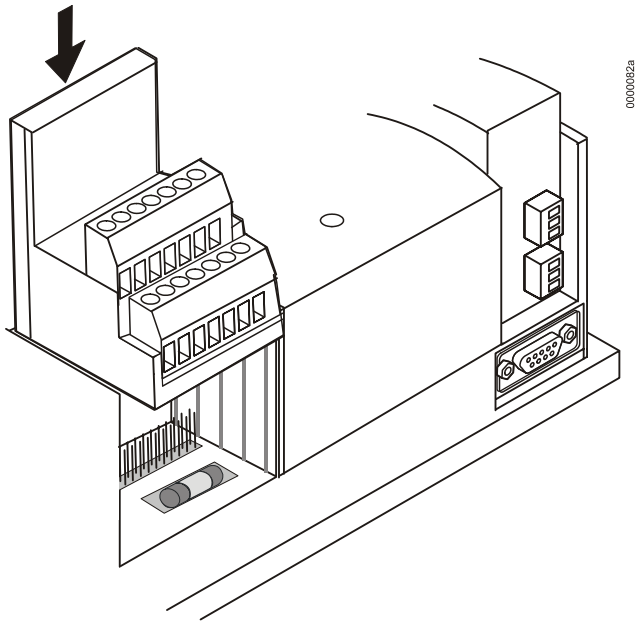

Fig. 67. Attaching screw terminal block

Table 14. Accuracy of analog input sensors

range	measurement error (without sensor tolerance)	
	Pt1000	**NTC (20k ohms)**
-58 to –4 °F (-50 to –20 °C)	≤ 1.2 K	≤ 5.0 K
-4 to 32 °F (-20 to 0 °C)	≤ 0.7 K	≤ 1.0 K
32 to 86 °F (0 to 30 °C)	≤ 0.5 K	≤ 0.3 K
86 to 158 °F (30 to 70 °C)	≤ 0.7 K	≤ 0.5 K
158 to 212 °F (70 to 100 °C)	≤ 1.2 K	≤ 1.0 K
212 to 266 °F (100 to 130 °C)	≤ 1.2 K	≤ 3.0 K
266 to 302 °F (130 to 150 °C)	≤ 1.2 K	≤ 5.5 K

Pull-Up Resistor Handling

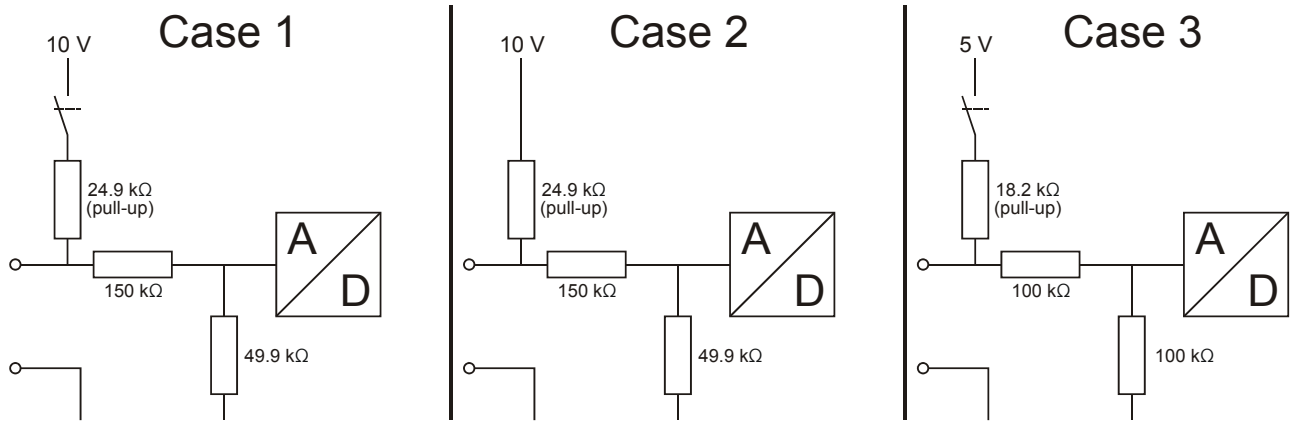

Fig. 68. Input circuit diagram

Table 15. Pull-up resistor handling

device	pull-up						input circuit diagram (Fig. 68)	load-free voltage	
	voltage	hardware	de-activated by @[8]	configured by DIP switch	configured by plug-in	activated for DI on AI		with NTC or low-impedance input	for voltage input or high-impedance input
XF521, XF521A	10 V	fixed	NO	NO	NO	YES	case 2	8.89 V	8.89 V
XF526		fixed	NO			YES	case 2		8.89 V
XFL521, XFL521A/B		optional switch-off	YES[3]		YES	config.[6]	case 1		0 V
Smart I/O XFC	5 V		YES[4]			YES[7]	case 3	5 V	
XL20	10 V	fixed	NO	NO	NO	YES	case 2	8.89 V	8.89 V
XL50		optional switch-off	YES[2]			YES[5]	case 1		0 V
XL100, XL100A		fixed	NO			YES	case 2		8.89 V
XL100B		optional switch-off		YES		configurable	case 1		0 V
XL100C			YES[1]	NO		YES[5]			

[1] controller firmware ≥ 2.03;
[2] controller firmware ≥ 2.02;
[3] controller firmware ≥ 2.03 (local/shared mode), CARE ≥ 5.00.01 (open mode);
[4] CARE ≥ 5.00.01;
[5] controller firmware < 2.04;
[6] controller firmware < 2.04 (local/shared mode), CARE ≥ 5.01.xx (open mode);
[7] CARE ≥ 5.01.xx;
[8] Assigning "@" as first digit of input characteristic name (e.g.: "@0-10V") in CARE text editor disables the pull-up resistor.

Sensors and Transducers

Table 16. Sensors suitable for use with Excel 500/600 (external transducer not required)

sensor type	range	characteristic in controller (set using CARE)
AF20 Outside Air Temperature Sensor	-20…+30° C	NTC
VF20A Strap-On Temperature Sensor	0…+110° C	
KTF20 Boiler Temperature Sensor	0…+100° C	
LF20 Duct Temperature Sensor	-30…+100° C	
AQS51 or C7110C1001 CO_2 Sensor	0...2000 ppm CO_2	0…10 V = 0..2000 ppm
C7110A1005 Air Quality (Mixed Gas) Sensor	0…100%	0…10 V = 0…100%
T7560C1006 Combined Room Temp. / Humidity Sensor or H7012B1023 Room Humidity Sensor	6…40°C	NTC
	20...95% relative humidity	0..10 V = 0...100%

Table 17. Room Temperature Sensors suitable for use with Excel 500/600 (external transducer not required)

sensor type	range	characteristic in controller (set using CARE)
T7460A1001 Room Temperature Sensor	6...40°C	NTC
T7460B1009 Room Temperature Sensor		
	setpoint wheel	linear input
TF22 Room Temperature Sensor	6…40°C	NTC
	setpoint wheel	linear input
	operating knob	-
T7460C1007 Room Temperature Sensor	6...40°C	NTC
	setpoint wheel	linear input
	occupancy button*	-
T7460E1002 Room Temperature Sensor	6...40°C	NTC
	setpoint wheel	linear input
	occupancy button*	-
	fan speed, 3 stages	
T7460F1000 Room Temperature Sensor	6...40°C	NTC
	setpoint wheel	linear input
	occupancy button*	-
	fan speed, 5 stages	
T7460A1000 Room Temperature Sensor	6...40°C	NTC
	setpoint wheel	linear input
	occupancy button*	-
	fan speed, 5 stages	
T7460C1006 Combined Room Temperature / Humidity Sensor	6…40°C	NTC
	20...95% r.h.	0..10 V = 0…100%
C7110D1009 Combined Room Temperature / Humidity Sensor	6..40°C	NTC
	0...2000 ppm CO_2	0..10 V = 0…2000 ppm
	setpoint wheel	linear input
	occupancy button*	-
T7560B1008 Combined Room Temperature / Humidity Sensor	6...40°C	NTC
	20...95% r.h.	0...10 V = 0...100%
	setpoint wheel	linear input
	occupancy button*	-
	fan speed, 5 stages	
*supported in AH03		

Table 18. Humidity Sensor suitable for use with Excel 500/600 (external transducer not required)

sensor type	characteristic in controller (set using CARE)	additional remarks
H7015B1020 Duct Humidity Sensor	0..10 V = 0...100%	set jumper to 0...10 V
H7508A1042 Outside Humidity Sensor		

Table 19. Flue Gas Sensors suitable for use with Excel 500/600 (external transducer required)

sensor type	characteristic in controller (set using CARE)	additional remarks
AGF1	0...10 V = 0…400 °C	requires LC-MV-1xPT1000.0-400°C: converts PT1000 to 0…10 V: order from: www.rinck-electronic.de

Table 20. Differential (+ Static Duct) Pressure Sensor suitable for use with Excel 500/600 (no external transducer required)

sensor type	range	characteristic in controller (set using CARE)	additional remarks
DPT500 Differential (+ Static Duct) Pressure Sensor	0...500 Pa	0..10 V = 0...500 Pa	set jumper to 0...500 Pa
	0... 1000 Pa	0..10 V = 0...1000 Pa	set jumper to 0...1000 Pa

Table 21. Differential Pipe Pressure Sensors suitable for use with Excel 500/600 (external transducer not required)

sensor type	range	characteristic in controller (set using CARE)	additional remarks
FHBN 3+ED1	0 – 2.5 bar	0...10 V = 0...250 kPa	ED1 is an integrated transducer with 0…10 V output
FHBN 5 +ED1	0 – 5 bar	0...10 V = 0...500 kPa	
FHBN 10 +ED1	0 – 10 bar	0...10 V = 0...1000 kPa	

COMMUNICATIONS

LONWORKS Bus Wiring

Connection between the Distributed I/O modules and the CPU are made from the LONWORKS connector module XSL511. The LONWORKS bus is a 78-kilobit serial link that uses transformer isolation so that the bus wiring does not have a polarity; that is, it is not important which of the two LONWORKS bus terminals are connected to each wire of the twisted pair.

The LONWORKS bus can be wired in daisy chain, star, loop or any combination thereof as long as the max. wire length requirements given below are met. The recommended configuration is a daisy chain with two bus terminations. This layout allows for max. LONWORKS bus length, and its simple structure presents the least number of possible problems, particularly when adding on to an existing bus.

Table 22. Doubly-terminated bus specifications

cable type	max. bus length
Belden 85102	2700 m (8900 ft)
Belden 8471	2700 m (8900 ft)
Level IV, 22 AWG	1400 m (4600 ft)
JY (St) Y 2x2x0.8	900 m (3000 ft)
TIA568A Cat. 5 24AWG, twisted pair	900 m (3000 ft)

NOTES: The cable types listed above are as recommended by Echelon in their FTT-10A User Guide. The cable recommended by Honeywell is the level IV, 22 AWG, solid core, nonshielded cable. Belden part numbers are 9H2201504 (plenum) and 9D220150 (non-plenum).

IMPORTANT

It is recommended that ferrules not be used to terminate stranded wires inserted in the Distributed I/O Terminal blocks spring-clamp terminals.

The FTT specification includes two components that must be met for proper system operation. The distance from each transceiver to all other transceivers and to the termination must not exceed the *max. node-to-node distance*. If multiple paths exists, the *max. total wire length* is the total amount of wire used.

Table 23. Free topology (singly-terminated) specifications

cable type	max. node-to-node distance	max. total wire length
Belden 85102	1650 ft (500 m)	1650 ft (500 m)
Belden 8471	1300 ft (400 m)	1650 ft (500 m)
Level IV, 22AWG	1300 ft (400 m)	1650 ft (500 m)
JY (St) Y 2x2x0.8	1050 ft (320 m)	1650 ft (500 m)
TIA568A Cat. 5 24AWG, twisted pair	825 ft (250 m)	1500 ft (450 m)

IMPORTANT

Do not use different wire types or gauges on the same LONWORKS network segment. The step change in line impedance characteristics would cause unpredictable reflections on the bus.

NOTE: In the event that the limit on the total wire length is exceeded, then FTT physical layer repeaters (FTT 10A) can be added to interconnect segments and increase the overall length by an amount equal to the original specification for that cable type and bus type for each repeater used. For example, adding repeaters for a doubly-terminated bus using JY (St) Y 2x2x0.8 cable increases the max. length 3000 ft (900 m) for each repeater.

In the case of the XCL5010, the LONWORKS bus connections are located on the application module as shown in Fig. 69:

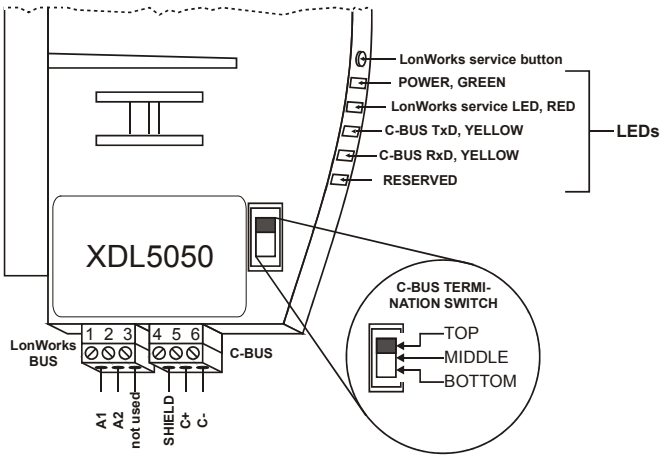

Fig. 69. XDL5050 application module LEDs and ports

LONWORKS Bus Termination

Depending upon the configuration, either one or two termination modules are required for terminating a LONWORKS bus with FTT devices on it. The following two different LONWORKS termination units are available for this purpose:

- 209541B LONWORKS Bus Termination Module (see Fig. 70 and Fig. 71) and
- XAL-Term LONWORKS connection and termination module (see Fig. 72), which can be mounted on DIN rails and in fuse boxes.

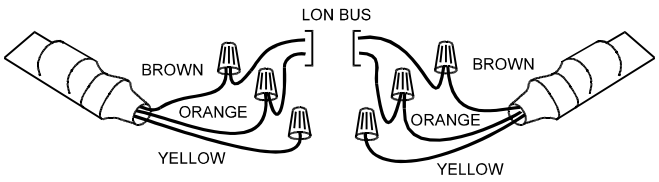

Fig. 70. Termination Module 209541B connections for doubly-terminated FTT network

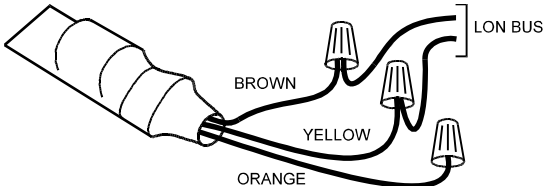

Fig. 71. Termination Module 209541B connections for a singly-terminated FTT network

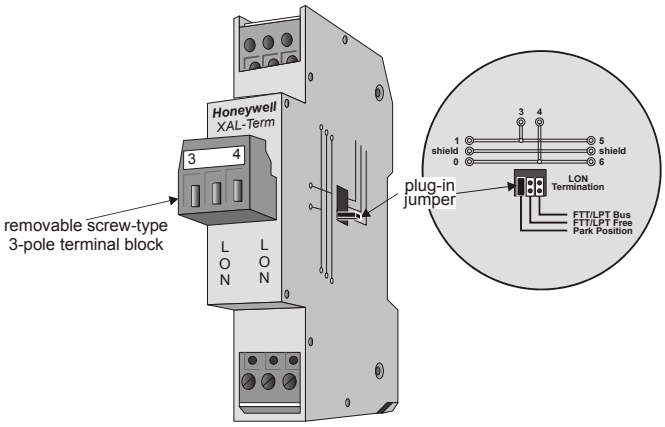

Fig. 72. XAL-Term

In the case of either a daisy chain or free-topology LONWORKS bus layout, the max. lengths described above must be adhered to.

System Bus (C-Bus)

Up to 30 controllers can communicate with one another and a PC central via the system bus. Instead of an Excel 500 / 600 / 800 controller, other system bus compatible components can also be connected. (Excel IRC Multicontroller; Excel EMC).

The system bus must be connected through the individual controllers (open ring).

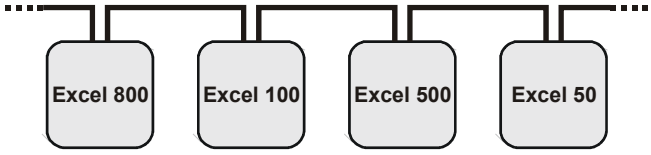

Fig. 73. C-bus topology

IMPORTANT

Star connection is not permissible because uncontrollable line reflections may occur.

For setting up the system bus in the right way, three steps have to be followed:

1. Select submodule for system bus communication (XC6010, only)
2. Specify cable for system bus.
3. Set up submodule (XC6010), CPU module (XC5010C), or application submodule (XCL5010).

Submodule Selection (XC6010)

Two submodules for system bus communication are available. The selection depends on the communication speed.

Table 24. C-Bus submodule baud rates

submodule	possible baud rates
XD505A	9600 baud
XD508	9600 baud
	19200 baud
	76800 baud

If the system bus speed throughout the system life-time is restricted to 9600 baud, then a submodule XD505A should be chosen. Otherwise, the XD508 must be used.

NOTE: All communication submodules on one bus must be of the same type, i.e. either uniquely XD505A or uniquely XD508. Do not use a mix between submodules XD505A and XD508 on the same bus.

IMPORTANT

For communication with more than 9600 baud it is required to enable the termination of the first and the last device on the C-bus (see the following sections). The controllers with termination must be switched ON prior to the controllers in the middle of the C-bus. The C-bus might not work if the controllers with termination are switched OFF.

The max. communication speed of the XC5010C/XCL5010 is 76800 baud. The XC5010C/XCL5010 can be mounted together with the XC6010 (with XD505A or XD508 submodule) since the XC5010C/XCL5010 communication speed can be changed to match either submodule.

NOTE: When changing the baud rate of bus devices, proper communication cannot be ensured until all bus devices are set to the same baud rate again.

NOTE: When adding or removing a controller to/from the C-Bus, it may take up to two minutes to re-initialize the bus. During this time, communication on the C-bus is lost.

System Bus Cable Specification

The max. cable length is 4000 ft (1200 m). There are regional differences as to whether shielded or unshielded cable must/can be used.

IMPORTANT

In Europe, only shielded cable is permitted, while in the US, shielded or unshielded cable can be used.

Inside the cabinet:

J-Y-(ST)Y 2 x 2 x 0.8

Outside the cabinet:

A-Y-(ST) 2 x 2 x 0.8

In principle, data transmitting cables should be shielded in case of RFI.

The following summarizes cable types and gives selection guidance. Note that baud rate and max. bus length are related to each other.

Table 25. C-Bus cable types

cable type	description	recommended for
J-Y-(ST)Y 2 x 2 x 0.8	shielded, twisted pair	Europe Inside cabinet
A-Y-(ST)Y 2 x 2 x 0.8	shielded, twisted pair	Europe Outside cabinet
AK 3702	unshielded, twisted pair	US not approved for Europe
AK 3740A	shielded	US (low-cost) not approved for Europe
Belden 9842	twisted pair	Europe US also possible
Belden 9841	shielded	US
AK 3702	unshielded, twisted pair	US not approved for Europe
AK 3740A	shielded	US (low-cost) not approved for Europe

Each end of the shield on the C-Bus should be connected to the shield terminal of the respective device. Do not connect it to the cabinet ground or any other ground points.

C-Bus Termination (XC6010)

The XC6010 CPU module may have either the XD505A or the XD508 submodules mounted on them for C-Bus communication. Table 24 provides baud rate information for selecting the module.

The XD508 submodule is equipped with a DIP switch which activates (ON position) deactivates (OFF position) a terminating resistor. Depending on where the controller is located on the bus the DIP switch settings must be as follows:

Table 26. XD508 DIP switch settings for C-Bus termination

controller location	DIP switch setting
beginning or end of bus	ON
middle of bus	OFF

C-Bus Termination (XC5010C)

The XC5010C CPU module contains a switch for setting different C-Bus baud rates.

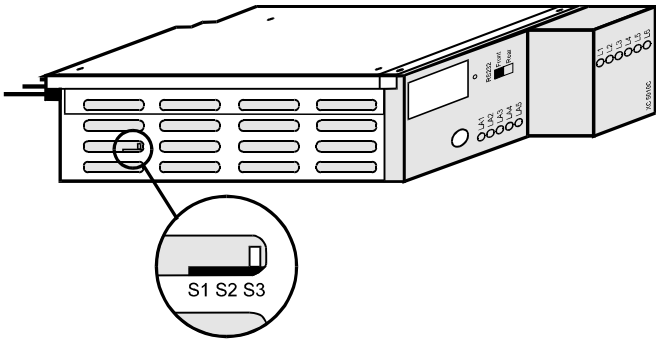

Fig. 74. XC5010C C-Bus termination switch location

The bus termination switch for setting the baud rate has three settings:

Table 27. XC5010C C-Bus termination switch settings

switch setting	baud rate	notes
S1	up to 76800 baud with bus termination	same functionality as XD508A, up to 76800 baud
S2	up to 76800 baud without bus termination	same functionality as XD508A, up to 76800 baud
S3	up to 9600 baud	same functionality as XD505A - **Default setting**

C-Bus Termination (XCL5010)

The XDL505 application module features a DIP switch for the C-Bus to set the bus termination appropriate for the communication speed (see Fig. 69).

Table 28. DIP switch settings for C-Bus termination (XCL5010)

DIP switch setting	communication speed	controller location	com-patibility
up	max. 9.6 Kbaud	-	XD505A, XL20XD
middle	max. 76.8 Kbaud	middle of bus	XD508, XL20XD508
down	max. 76.8 Kbaud	beginning or end of bus	XD508, XL20XD508

NOTE: Modules listed in Compatibility column are used in Excel 20/100B/500/600 Controllers.

XC6010 Cable Specifications

For connection of the XC6010 to the XI582 Operator Interface, two tailor-made cables are available.

— **XW564** cable, length 7 ft (2.5 m)

— **XW565** cable, length 15 ft (5 m)

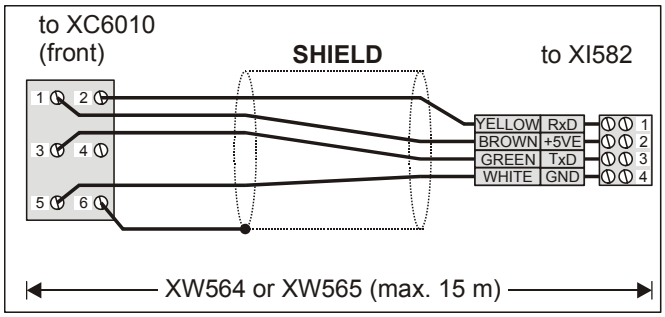

Fig. 75. Connecting front of XC6010 via XW564 or XW565 to XI582

For connection to the XL-Online PC MMI, a tailor-made cable is available with plugs on both ends.

— **XW567** cable, length 7 ft (2.5 m)

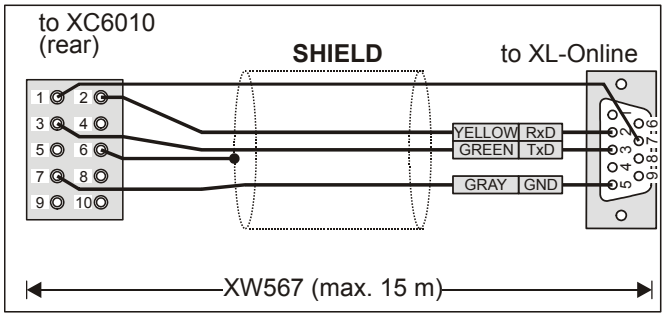

Fig. 76. Connecting rear of XC6010 via XW567 to the XL-Online PC MMI

XC5010C Cable Specifications

The XI582 Operator Interface can be connected to either the front or the back of the XC5010C.

— **XW582** cable, front connection, length 15 ft (5 m)

— **XW583** cable, back connection, length 15 ft (5 m)

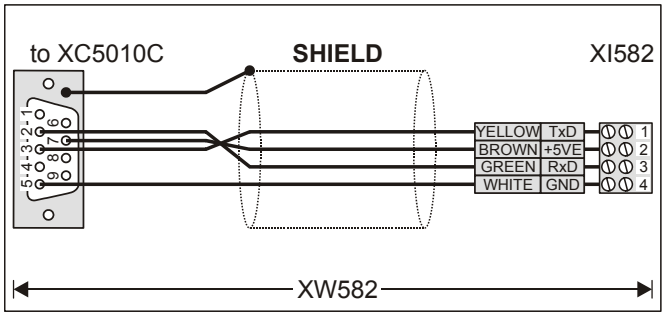

Fig. 77. Connecting front of XC5010C via XW582 to XI582

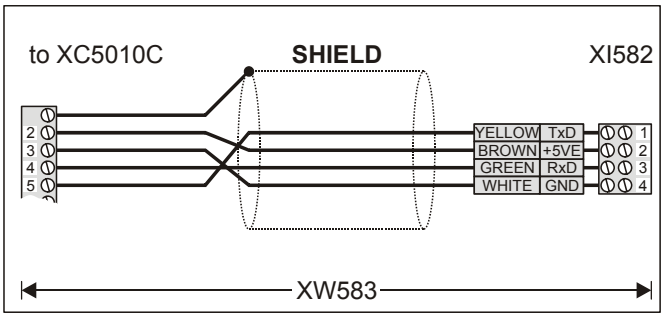

Fig. 78. Connecting back of XC5010C via XW583 to XI582

The XL-Online PC MMI can be connected to the front of the XC5010C CPU module with the following cable:

— **XW585** cable, length 15 ft (5 m)

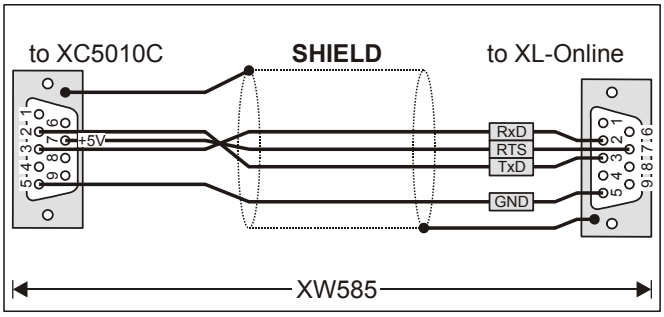

Fig. 79. Connecting front of XC5010C via XW585 to the XL-Online PC MMI

NOTE: You can also use a standard null modem cable.

An adapter cable XW584 is needed when the same MMI unit XI582 or XL-Online PC MMI is used on a site where there is a mix of XC5010C and XC6010 CPU modules. Always use the new cables XW582 and XW585 with the XC5010C CPU module and the additional adapter cable XW584 for connecting to the XC6010 CPU module.

XCL5010 Cable Specifications

MMI Cables

Ready-made cables with the shield already connected to the CPU module plug end are available for the connection of external MMIs.

Table 29. Cable specifications

MMI type	cable	length
XI582 (remote MMI)	XW582	17 ft (5 m)
XL-Online PC MMI	XW585	17ft (5 m)

For connection to the XL-Online PC MMI, a standard null modem cable may be used.

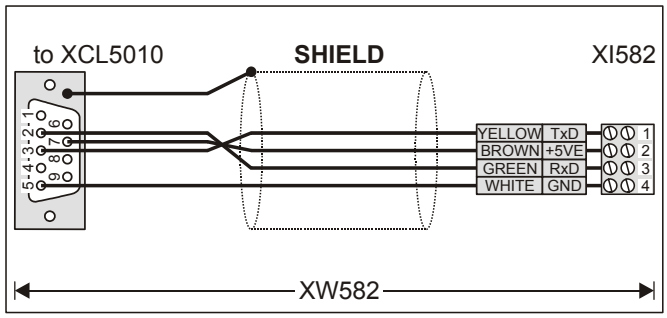

Fig. 80. Connecting XCL5010 via XW582 to XI582

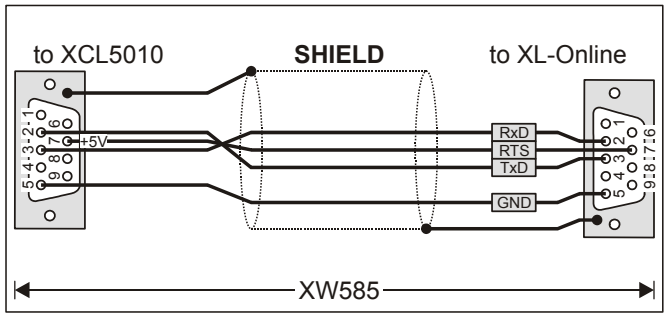

Fig. 81. Connecting XCL5010 via XW585 to the XL-Online PC MMI

Modem or ISDN Terminal Adapter Connections

For remote communications, a modem or ISDN terminal adapter can be connected directly to the serial port of the XCL5010.

The serial port of the XCL5010 accepts a standard modem cable with a female 9-pin connector. Use the cable that is supplied with the modem/ISDN terminal adapter.

The communication speed is 9600 baud by default but can be set to as high as 38.4 Kbaud.

For more details, see section "Remote Communications" on page 37.

Changing Between MMI and Modem Connection

The XCL5010 will detect when an MMI or modem/ISDN terminal adapter is connected and will adjust the communication speed automatically according to the preset values. This automatic detection can take up to 5 seconds.

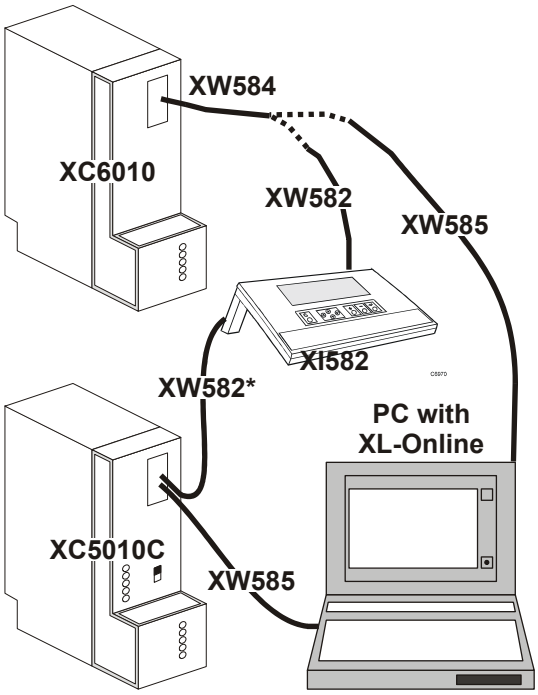

Fig. 82. Excel 500 and Excel 600 used together with XL-Online PC MMI and XI582 Operator Interfaces

NOTE: XI582 units supplied with XW882 cable (for Excel 800 controllers) need an XW884 adapter in order to be connected with the XC5010 and XCL5010 CPU.

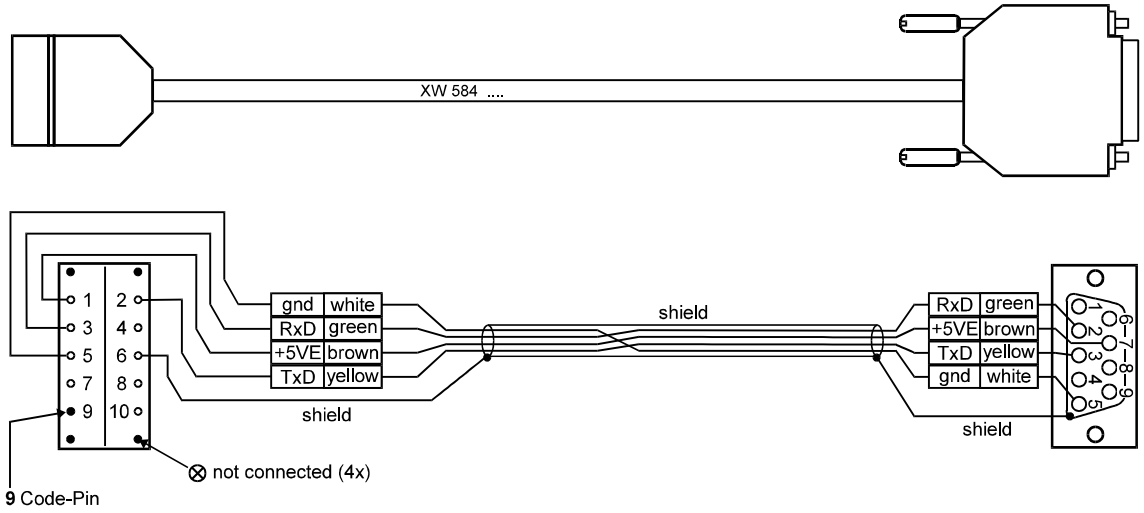

Fig. 83. XW584 cable details

REMOTE COMMUNICATIONS

The following applies to the XC5010C and XCL5010, only.

For remote communications with up to three XBS Building Centrals, a modem or ISDN terminal adapter can be connected directly to the serial port of the XC5010C CPU module (either front or rear connection) or the serial port of the XCL5010.

NOTE: Remote communication via modem or ISDN terminal adapter requires firmware version V2.1.0 or higher.

NOTE: XBSi building supervisors are not supported for remote communication.

Modem or ISDN Terminal Adapter Connections

The front serial port of the XC5010C CPU module accepts a standard modem cable with a female 9-pin connector.

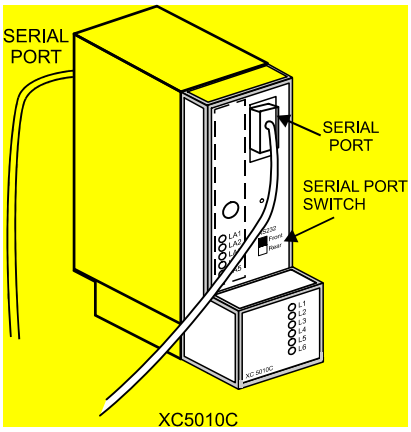

Fig. 84. Serial port locations on Excel 500

Use the cable that is supplied with the modem/ISDN terminal adapter. To connect to the terminals of the rear serial port of the XC5010C, use cable XW571 (length: 6 ft (1.9m)).

Table 30. XW571 Connection

pin XC5010C	RS232 signal	wire color
2	RTS	blue
3	GND	white
4	TxD	yellow
5	RxD	green
6	CTS	violet
7	DTR	black
8 (not used)	SG	white
9	DCD	brown
10	Shield	clear
11 (not used)	RI	red

NOTE: Pin numbers shown are for the rear connector of the XC5010C CPU module.

The serial port of the XCL5010 accepts a standard modem cable with a female 9-pin connector.

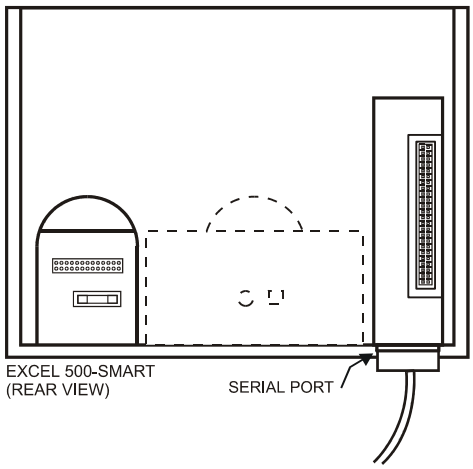

Fig. 85. Serial port location on XCL5010

Use the cable that is supplied with the modem/ISDN terminal adapter. The communication speed is 9600 baud by default but can be set as high as 38.4 Kbaud.

NOTE: See section "Serial Port" on page 25, for signals of serial port.

Modem Requirements

- Modem must support Hayes compatible command set (not V150 or V151 = Microsoft command set)
- Modem must support alpha-numeric return codes
- Modem must follow serial baud rate of the CPU
- Modem must support auto-bauding (baud rate fall-back)
- When carrier detect (connect) is reported, the carrier must be on simultaneously at both modems (on CPU side and on XBS side) ⇒ use same modem
- After a switch-ON of the DTR line by the CPU or XBS, the modem must accept a dial command after 3 seconds
- Modem must answer AT commands in less than 3 seconds

No Set-Up for Standard Modem Behavior

If no special modem behavior is required, there is no need to set up or initialize the modem/ISDN terminal adapter. The XC5010C/XCL5010 will automatically detect the device (MMI or modem) attached to the serial port and set the appropriate communication speed. The controller will also automatically adapt to alphanumeric return codes used by the modem. This automatic detection and adjustment can take up to 5 seconds.

NOTE: It is highly recommended to use a state-of-the-art modem and leave it in its factory setting.

Automatic Baudrate Synchronization

The default communication speed between the XC5010C/XCL5010 and the local modem/ISDN terminal adapter is 9600 baud.

The communication speed between the XC5010C/XCL5010 and XBS modems/ISDN terminal adapters is automatically synchronized by the two devices to the highest speed that both of the devices are capable of. This feature is called autobauding and is a feature that all state-of-the-art modems/ISDN terminal adapters provide when left in their factory default settings.

The communication speed between the XBS and its modem/ISDN terminal adapter is part of the modem set-up at the XBS.

Auto / Manual Answer Detection

The XC5010C/XCL5010 will automatically detect whether the modem/ISDN terminal adapter is initialized in auto-answer or manu-answer mode, and it will set the modem to manual answer mode (S0 = 0).

Resetting the Modem

For those cases where it is not clear if the modem to be used is in its factory setting, the modem can be reset to its factory setting by using the RESET MODEM command in the Start-up sequence or through the HW Config. part of the System Info. sequence on the MMI. This will allow a quick and easy modem reset without the need to run the modem set-up software or the Windows™ terminal program.

The RESET MODEM command causes the following commands to be sent to the modem:

1. ATZ
   executes hardware reset on modem
2. AT&FX3&W
   resets modem to factory configuration settings, configures the modem not to wait for the public phone system dial tone, and writes this to nonvolatile memory.

Set-Up for Special Modem Behavior

If special modem/ISDN terminal adapter behavior is required, the communication device should be set up according to the instructions provided with it. This typically involves running a setup program on a computer with the device connected to the computer serial port or using the Windows™ terminal program.

Set-Up for In-House Telephone Systems

A common case of special modem behavior is when the modem is connected to an in-house telephone network requiring a prefix to be dialed before the destination number to provide access to the public telephone network. There are two important aspects of the special initialization of the modem to consider:

1. Do not wait for the public network dial tone. Typically the init command ATX3 will trigger the modem to dial without waiting for a public network dial tone. Save this modem set-up in the modem EEPROM with the command AT&W. Check the modem handbook to verify the correct commands. Note that these commands are executed automatically with the RESET MODEM command.

2. Add the prefix required for access to the public telephone network to the destination telephone number. Depending on the in-house telephone system, a certain prefix may have to be added to the destination number in the XBS system configuration/site definition screen prior to sending the set-up to the remote Excel 500 controller.

Set-Up for Limited Communication Speed

The communication speed of the modem can be fixed to a lower rate in case of data transmission errors due to telephone line limitations. See the XI581/582 Buswide Operator Interface User Guide (EN2B-126GE51) for the procedure for fixing the baud rate.

Troubleshooting

In case of any problems the handbook of the modem or ISDN terminal adapter must be consulted.

A “Frequently Asked Questions and Troubleshooting” document is available via the Honeywell Technical Assistance Center (TAC) or, for Honeywell employees, on the HIVE under:
Technical Assistance Center/Controllers/Excel 80 and 100 and 500 and 600/ technical literature/modemfaq.doc
or on the Docu Server under:
http://web.ge51.honeywell.de/dep/mc/TAC_Tips/Modem FAQ.doc

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