Honeywell

Excel 12

W7704

HONEYWELL EXCEL 5000 OPEN SYSTEM

INSTALLATION INSTRUCTIONS

GENERAL INFORMATION

Depending on your application's hardware requirements, you can choose between the following different Excel 12 models:

Table 1. Overview of Excel 12 models

	short housing	long housing	24 Vac	230 Vac	binary input 1	binary input 2	binary input 3	binary input 4	relay 1 (N-O)	relay 2 (N-O)	relay 3 (N-O)	relay 4 (C-O)	relay 5 (C-O)	triac 1	triac 2	triac 3	traic 4	triac 5	triac 6	wall module LED output	AI1 (NTC20k + V)	AI2 (NTC20k)	AI3 (fan speed / bypass)	AI4 (setpoint)	AI5 (NTC20k + V)	AI6 (NTC20k)	AI7 (NTC20k + V)	AO1 (0…10 Vdc)	AO2 (0…10 Vdc)
W7704A1004*[1]		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X
W7704B1002*[1]		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W7704C1000*[1]	X		X		X	X	X	X						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W7704D1008	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W7704D1016		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W7704F1003*[1]*[2]		X		X	X	X	X	X	X	X	X	X													X	X	X	X	X

*[1] These hardware versions have been discontinued.
*[2] The hardware variant W7704F1003 is cost-optimized for light control and does not support hardwired wall modules.

NOTE: The support of the functionalities listed above and the availability, via LONWORKS, of information pertaining to a given Excel 12 module depend upon the application and configuration of that module.

BEFORE INSTALLATION

IMPORTANT

It is recommended that the Excel 12 be kept at room temp. for at least 24 hours before applying power; this is to allow the evaporation of any condensation resulting from low shipping / storage temperatures.

⚠ CAUTION

To avoid electrical shock or equipment damage, you must turn off the power supply before attaching / removing connections to/from any terminals.

Approvals, Certifications, and Standards

Approvals and Certifications

- CE-approved
- EUBAC-certified as follows:

W7704D1008: eu.bac Cert 020896

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

Without terminal covers:	IP20
With terminal covers:	IP30

Ambient Environmental Limits

Operating temperature:	0 … +50 °C at 5…90% r.H.
Storage temperature:	-30 … +70 °C at 5…90% r.H.

W7704D1008 Temperature CA

Chilled ceiling:	0.5 K
Electric convector:	0.3 K
Electric floor heating:	1.2 K
Radiator heating:	0.5 K
FCU heating mode:	0.4 K
FCU cooling mode:	0.2 K

(min. Temperature Control Accuracy values requested by EUBAC: ≤ 1.4 K for hot water radiator heating, fan coil unit, VAV, and chilled ceiling applications; ≤ 1.8 K for water floor heating, electric convector, electric floor heating, and electric ceiling heating applications)

Weight

Short housing:	400 g
Long housing:	860 g

MOUNTING

The unit is available with either short (W x L x H = 126 x 76 x 110 mm) or long (W x L x H = 180 x 76 x 110 mm) housings (see Fig. 1). The mounting procedures are similar for both sizes.

The unit is suitable for mounting on a standard rail (DIN EN 50022-35 x 7,5) and for installation in wiring cabinets, in fuse boxes, and on walls/ceilings.

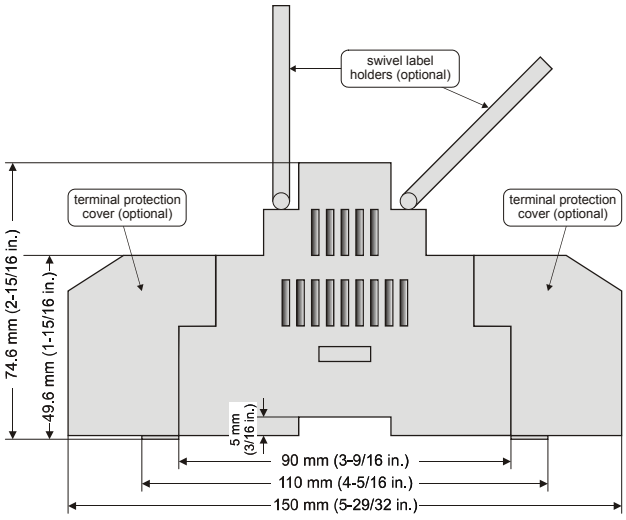

Fig. 1. Excel 12 housing (side view)

DIN Rail Mounting/Dismounting

The unit can be mounted onto a DIN rail simply by snapping it into place and securing it with a stopper to prevent sliding. It is dismounted by gently pulling the stirrup located in the base of the housing (see Fig. 2).

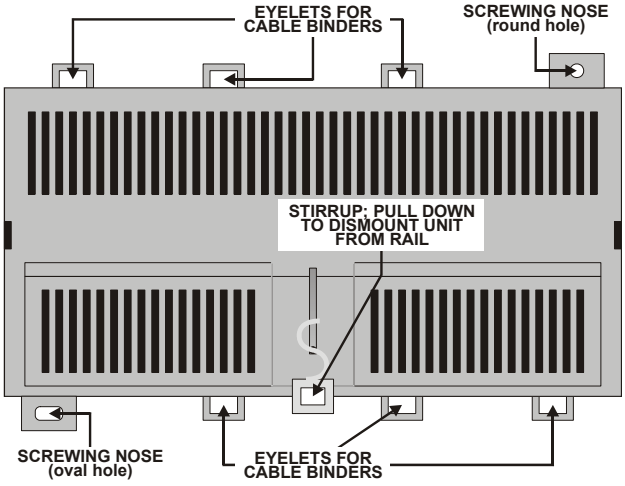

Fig. 2. Housing base (view from below)

Wall/Ceiling Mounting/Dismounting

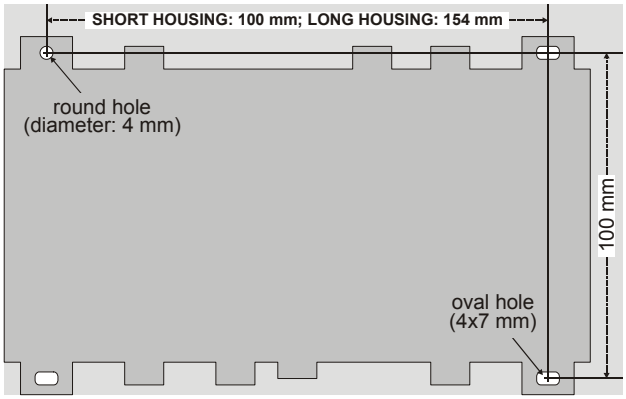

Fig. 3. Drilling template (view from above)

The unit can be mounted on walls or ceilings in any orientation desired. In the case of ceiling mounting, however, it should not be operated at ambient temperatures exceeding 45 °C. The unit is mounted by inserting 3.5-mm dowel screws through the corresponding screwing noses.

Optional Use of Terminal Covers

After mounting the unit onto the wall or ceiling, provide for cable access by snipping out the terminal protection covers' cut-out tabs and snap (by hand) the covers (available in packs of 8) into place onto the housing. To remove a cover, place a screwdriver in the leverage slot (see Fig. 10 on page 7) and pry it loose.

Terminal Assignment

The terminal blocks are arranged on two sides of the controller: the relay side and the low-voltage side.

- The relay side consists of a single row of terminal blocks for the connection of cables to the relays. In the case of models with 230 Vac power supply, the 230 Vac power is also connected on this side.
- The low-voltage side consists of two rows of terminal blocks for the connection of cables to all other input / outputs. In the case of models with 24 Vac power supply, the 24 Vac power supply is also connected on this side.

NOTE: According to VDE guidelines, it is not allowed to mix low-voltage and high-voltage signals on the relays.

NOTE: For controlling thermal actuators, we recommend using the 24 Vac models, which provide more current.

Each unit is equipped with a terminal assignment label on the top of the housing (see Fig. 4). The terminal assignment label is a plastic part displaying the max. complement of I/O's.

The small sticker in the upper left corner provides model-specific information, e.g., the date code, the type of power supply, that terminals 36-38 (triac outputs 5 and 6) are not connected, and that terminals 1, 2, 22, and 23 may be used as 24 Vac output terminals, only (secondary side of the built-in transformer).

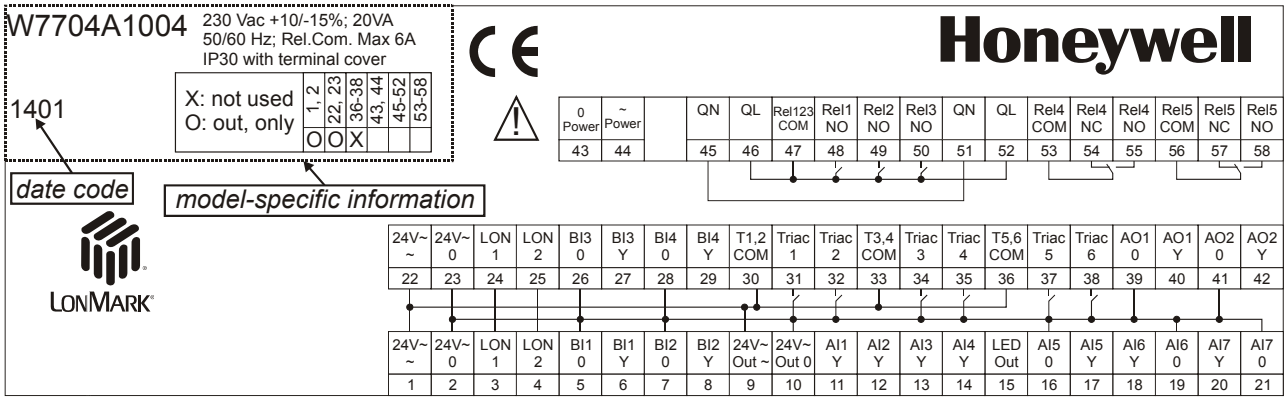

Fig. 4. Example terminal assignment label for W7704A1004

Power Supply

General Information

NOTE: Local wiring guidelines (e.g., VDE 0100) may take precedence over recommendations provided in these installation instructions.

NOTE: To comply with CE requirements, devices having a voltage of 50...1000 Vac or 75...1500 Vdc but lacking a supply cord, plug, or other means for disconnecting from the power supply must have the means of disconnection incorporated in the fixed wiring. This means of disconnection must have a contact separation of at least 3 mm at all poles.

All wiring must comply with applicable electrical codes and ordinances. Refer to job or manufacturers' drawings for details. Use a min. of 18 AWG (1.0 mm^2) and a max. of 14 AWG (2.5 mm^2) for all power wiring.

If power is supplied via a T terminal plug, individual Excel 12 modules can be disconnected from the power supply without disturbing the operation of other devices powered by the same source.

Models with 230 Vac Power Supply

Models with 230 Vac power supply are equipped with a built-in 24 Vac transformer, the secondary side of which can be used to power external devices. The max. current at the field device supply terminals and all triac outputs together must not exceed 300 mA continuous.

NOTE: Do not connect external 24 Vac on models with 230 V power supply!!

These models have a long housing (180 mm). The power supply (230 Vac [-15% / +10%], 50/60 Hz) is connected to terminals 43 and 44. Terminals 1, 2, 22, and 23 are connected to the secondary side of the built-in 24 Vac transformer; these terminals must **not** be used for connecting an external transformer. The terminals can be used to power, e.g., an active sensor.

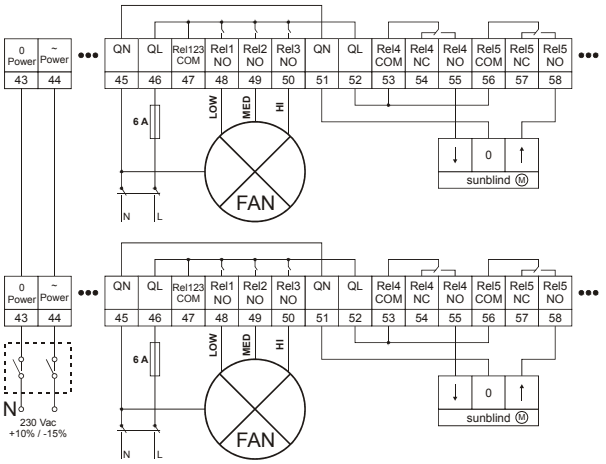

Fig. 5. Connection to 230 Vac power supply

NOTE: The max. current at the field device supply terminals and all triac outputs together must not exceed 300 mA continuous. Disregarding these limits can result in the destruction of the built-in transformer.

When not supplying external devices with 24 Vac, these models have a power consumption of < 17.5 VA.

Models with 24 Vac Power Supply

These models have a short housing (126 mm). The power supply (24 Vac [±20%], 50 or 60 Hz) is connected to terminals 1 and 2. Terminals 22 and 23 may be used to connect further devices to the same 24 Vac power supply.

NOTE: Do not reverse the polarity of the power connection cables and avoid ground loops (i.e., avoid connecting one field device to several XL12's) as this may result in short circuits damaging your device.

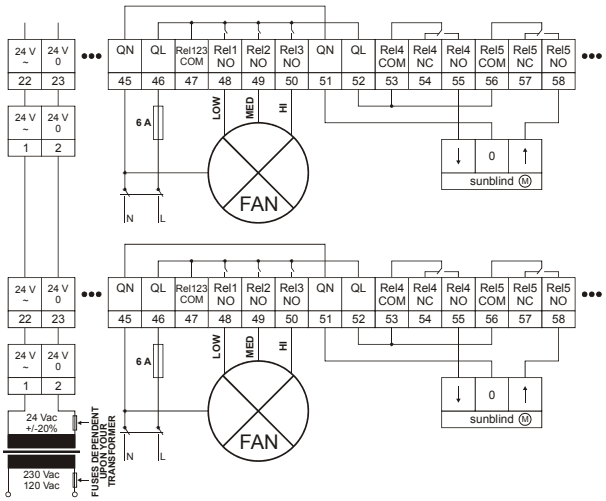

Fig. 6. Connection to 24 Vac power supply

NOTE: The max. current at the field device supply terminals and all triac outputs together must not exceed 500 mA continuous.

The 24 V models have a power consumption of < 6.5 VA.

Wall Modules

The T7460 and T7560 Wall Modules can be used in conjunction with the Excel 12 to perform room temperature sensing, set-point adjustment, fan speed manual override, and occupancy bypass. When hardwired to the Excel 12, the wall module's LED/LCD can be configured to provide information about the effective occupancy mode, etc. (see section "Configuration of the Wall Module's LED / LCD").

Table 2. Supported wall module functions

	T7560 button	bypass	unit ON/OFF	fan speed
T7460C		•		
T7460D				•
T7460E		•	•	
T7460F		•		
T7560A	left			•
	middle		•	
	right	•		
T7560B	left			•
	middle		•	
	right	•		

NOTE: The intended use of the wall module's buttons must be configured using Honeywell's LNS plug-in.

Example:
The T7560A has a left button which can be configured to act as a “fan speed” button, a middle button which can be configured to act as a “unit ON/OFF” button, and a right button for “bypass.”

Wall Module Connection

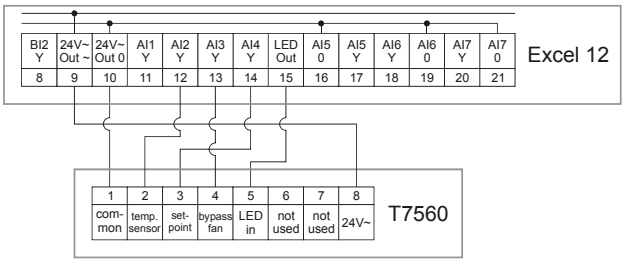

Fig. 7. Wall module connection

Configuration of the Wall Module's LED / LCD

When either a T7460 and T7560 Wall Module has been hardwired to the Excel 12, its LED can be configured (using Honeywell's LNS plug-in) to provide information about, e.g., overrides or effective occupancy modes. Further, in the case of a T7560 Wall Module, its LCD can likewise be configured to display such information.

Configuration of the LED to Display Info on Overrides

The wall module's LED can indicate if an override has been activated by either the wall module's bypass button being pushed or because the Excel 12 has received a network command. Specifically:

- If the wall module's LED is OFF, then no override (from the wall module or the LONWORKS network) is currently in effect.
- If the wall module's LED is ON continuously, the bypass button or a network command has placed the Excel 12 into the "occupied" or "bypass" mode (however, if the bypass button is again pushed or if a cancellation network command is received or if the bypass time expires, the Excel 12 will return to its scheduled occupancy mode).
- If the wall module's LED flashes once per second, the bypass button or a network command has placed the Excel 12 into the "unoccupied" mode (however, if the bypass button is again pushed or if a cancellation network command is received, the Excel 12 will return to its scheduled occupancy mode).
- If the wall module's LED flashes twice per second, a network command has placed the Excel 12 into either the "standby" or the "occupied" mode.
- If the wall module's LED flashes four times per second, the Excel 12 is responding to a network management "wink" command.

Configuration of the LED to Display Info on Occupancy Mode

The wall module's LED can also indicate the Excel 12's effective occupancy mode. Specifically:

- If the wall module's LED is OFF, the Excel 12 is in the "unoccupied" mode.
- If the wall module's LED is ON, the Excel 12 is in the "occupied" mode.
- If the wall module's LED flashes once per second, the Excel 12 is in the "standby" mode.
- If the wall module's LED flashes four times per second, the Excel 12 is responding to a network management "wink" command.

Configuration of the T7560 Wall Module's LCD
The T7560 Wall Module's LCD can be configured to display various symbols providing the following information:

- If ☀ is displayed continuously, the Excel 12 is in the "occupied" or "bypass" mode; if it flashes, the given mode has been overridden.
- If ☀ is displayed continuously, the Excel 12 is in the "standby" mode; if it flashes, the "standby" mode has been overridden.
- If ☾ is displayed continuously, the Excel 12 is in the "unoccupied" mode; if it flashes, the "unoccupied" mode has been overridden.

NOTE: If all three of these symbols are flashing simultaneously, the Excel 12 is responding to a network management "wink" command.

- OFF means that the Excel 12 is OFF.
- OFF and ☀ mean that the Excel 12 is OFF, but that "frost protection" has been enabled.

Connection of CO2-Sensor

A CO2-sensor (e.g., C7110D1009) may be connected to analog inputs 1, 5, or 7 for air-quality control.

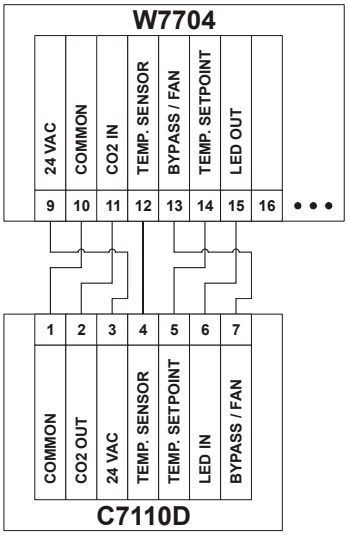

Fig. 8. Connection of C7110D1009

LonWorks Communications

General Information

The Excel 12 is equipped with a free-topology transceiver (FTT10A) for communicating on LONWORKS® networks. The LONWORKS network is insensitive to polarity, eliminating the possibility of installation errors due to miswiring.

Different network configurations (daisy-chain, loop, and star configurations, or any combination thereof) are possible (see also Excel 50/500 LONWORKS Mechanisms Interface Description, EN0B-0270GE51).

All Excel 12 controllers feature a LONWORKS service LED and service button (see section "Troubleshooting" on page 7).

Connecting to the LONWORKS Network

IMPORTANT

Do not bundle wires carrying field device signals or LONWORKS communications together with high-voltage power supply or relay cables. Specifically, maintain a min. separation of 3 inches (76 mm) between such cables. Local wiring codes may take precedence over this recommendation.

IMPORTANT

Try to avoid installing in areas of high electromagnetic noise (EMI).

The unit must be wired to the LONWORKS network using level IV 22 AWG (Belden part number 9D220150) or plenum-rated level IV 22 AWG (Belden part number 9H2201504) non-shielded, twisted-pair, solid-conductor wire. When possible, use Honeywell AK3781, AK3782, AK3791, or AK3792 cable (US part nos.). See Excel 50/5000 LonWorks Mechanisms, EN0B-0270GE51, for details, including max. lengths.

Use wire with a min. size of 20 AWG (0.5 mm^2) and a max. size of 14 AWG (2.5 mm^2).

The unit is connected to the LONWORKS network as shown in Fig. 9 via terminal pins 3 and 4 (black screw-type T terminal plug) underneath the terminal protection cover (if present) located on the low-voltage side. Terminal 24 and 25 are used to connect further devices to the LONWORKS network.

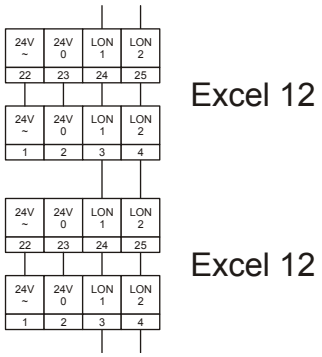

Fig. 9. Connection to LonWorks (fixed terminals)

Depending upon the chosen network configuration, one or two terminations (see section "LONWORKS Termination" on page 7) may be required.

Inputs/Outputs

Wiring the Inputs/Outputs

Use a min. size of 20 AWG (0.5 mm^2) and a max. of 14 AWG (2.5 mm^2) for all input/output connections. The max. length of all input/output cables is 1300 ft (400 m).Two wires with a total thickness of 14 AWG can be twisted together and connected using a wire nut (include a pigtail with this wire group and attach the pigtail to the individual terminal block). Deviations from this rule can result in improper electrical contact. Local wiring codes may take precedence over this recommendation. Wire to the terminal blocks as follows:

1. Strip 5/16 in. (8 mm) insulation from the conductor.
2. Insert it at the required terminal location, and tighten the screw to complete the termination. Fix the cable using cable binders if required.

Binary Inputs

The Excel 12 is equipped with dry-contact binary inputs. The binary inputs are fast (i.e., the signal must be stable for 25 ms). The binary inputs are therefore suitable for processing signals which need to be handled quickly, e.g., light switch input or sunblind UP/DOWN button. In the case of slow signals, it is sufficient to use analog inputs, all of which can be configured as slow binary inputs using Honeywell's LNS plug-in.

Hardware Limits

- In order for the software to detect that a fast binary input is closed, the resistance of the dry contact must be less than 200 Ω.
- In order for the software to detect that a fast binary input is open, the resistance of the dry contact must exceed 50 kΩ.
- Signal must be stable for a min. of 25 ms.

NOTE: Push buttons connected to the Excel 12 must be new. Specifically, it is not allowed to use push buttons which have already been used for 230 Vac.

Binary Outputs

The triac outputs or relay outputs can be configured for different functions.

Example: Floating Drives

You can choose to use two triac outputs or two relays to connect a floating drive (no mixing of triac outputs and relays allowed). Once the outputs have been configured using Honeywell's LNS plug-in, floating actuators can be directly connected to them.

Relay Outputs

The Excel 12 is equipped with up to two change-over relays and up to three normally-open relays.

Hardware Limits

- A min. current of 50 mA is required to ensure a reliable contact.
- The normally-open contacts are designed for a max. continuous current of 6 A. The normally-closed contacts are designed for a max. continuous current of 1 A.
- The max. combined allowable current flowing through all relays simultaneously is 24 A (continuous).
- The max. peak in-rush current (20 ms) at the normally-open contact is 80 A.
- Number of switching operations at
  - Resistive charge: 200,000 (6 A)
  - Inductive charge: 170,000 (6 A, cos φ > 0.6)

NOTE: If inductive components are to be connected to the relays and if these relays switch more often than once every two minutes, they must be prevented from causing harmful interference to radio or television reception (conformance with EN 45014).

In-Rush Currents:

Fluorescent lamps equipped with electronic control gear often produce high in-rush currents when switched ON. This max. in-rush current value is stated by the vendor of the fluorescent lamps (to be summed up if more than one is to be installed) and should be lower than the allowed limit of the relay output. If this value is higher than the allowed limit, then external techniques for current limiting may be used: One common method is to install several meters of cable between the relay output terminal and the lamps. The additional cable resistance can limit current. Due to the wide range of fluorescent lamps on the market and the stability of line voltage, the needed cable length has to be chosen for each individual situation. A rule of thumb for estimation is: A cable resistance of 0.5 Ω reduces the current by about 10 A.

IMPORTANT

Local wiring standards must be fulfilled. If the analog input of a dimmable electronic load is not a protective low voltage signal or if the analog signal is wired in the same cable as the dimmable electronic ballast's power supply, the Excel 12 system ground must be earthed.

Triac Outputs

The Excel 12 is equipped with up to six triac outputs.

Hardware Limits for Excel 12 with 230 Vac Power Supply

- Low signal: 0 V; high signal: 24 Vac
- **Maximum 250 mA** continuous current in sum for all triac outputs together
- 550 mA for max. 10 sec.
- cos φ > 0.5

Hardware Limits for Excel 12 with 24 Vac Power Supply

- Low signal: 0 V; high signal: 24 Vac
- **Maximum 500 mA** continuous current in sum for all triac outputs together
- 800 mA for max. 10 sec.
- cos φ > 0.5

Analog Inputs

The Excel 12 is equipped with up to seven analog inputs, all of which can be configured as slow binary inputs (in which case the signal must be stable for at least 1.25 seconds) for the detection of slow signals (e.g., from a window contact). The analog inputs are configured using Honeywell's LNS plug-in.

Table 3. Analog input usage

analog input	voltage	NTC	wall module
AI1	X	X	e.g., CO_2 or humidity
AI2		X	room temperature[1]
AI3			fan speed or bypass[2]
AI4			set-point[3]
AI5	X	X	e.g., CO_2 or humidity
AI6		X	
AI7	X	X	e.g., CO_2 or humidity

[1] For all NTC inputs, temperatures of ≤ -50...-45 °C are interpreted as being due to a sensor break, and temperatures of ≥ +145...+155 °C are interpreted as being due to a sensor short-circuit.

[2] A contact open for ≥ 10 seconds is interpreted as a sensor failure.

[3] A resistance of > 15 kΩ is interpreted as being due to a sensor break, a resistance of < 100 Ω is interpreted as being due to a sensor short-circuit.

Analog Outputs

The Excel 12 is equipped with two 0...11 Vdc analog outputs, each of which can drive a max. of 1.1 mA.

Troubleshooting

All models feature a LONWORKS service LED and corresponding LONWORKS service button (accessible from the outside on top of the module) for commissioning and troubleshooting. When the service button is pressed, the service pin message is broadcasted.

See Table 4 on page 8 for a description of the meaning of the various different possible behaviors of the LONWORKS service LED. For more information on standard service LED behavior, refer to Motorola LONWORKS Technology Device Data Manual, page AL-190.

Possible Problems and Recommended Actions

Check if switching the power OFF/ON changes the LONWORKS service LED's behavior. Please contact Honeywell if this does not solve the problem.

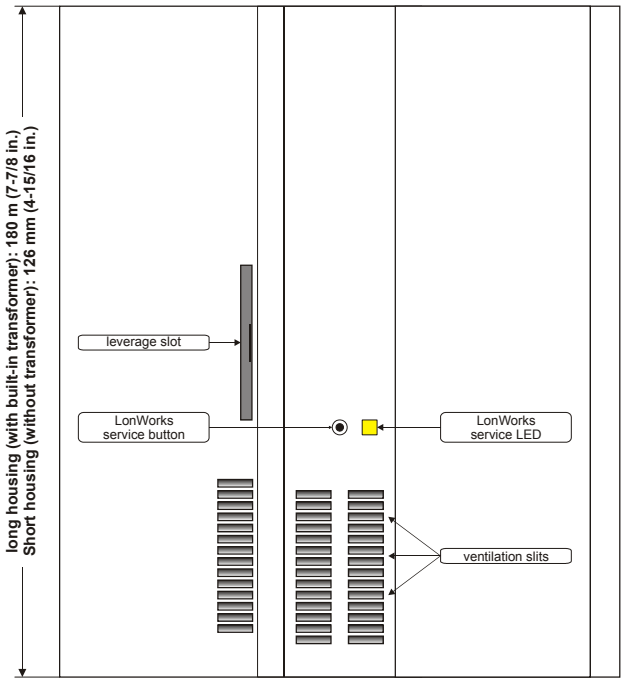

Fig. 10. Housing (top view)

Accessories

Swivel Label Holders

For short or long housings (required for modules equipped with manual override switches). Packs of eight.

- 24 Vac models (short), order no.: **XAL_LAB_S**
- 230 Vac models (long), order no.: **XAL_LAB_L**

Terminal Protection Covers

For short or long housings (required for wall/ceiling mounting). Packs of eight.

- 24 Vac models (short), order no.: **XAL_COV_S**
- 230 Vac models (long), order no.: **XAL_COV_L**

LONWORKS Termination

One or two LONWORKS terminations are required, depending on the given LONWORKS bus layout.
The following LONWORKS termination module is available:

- LONWORKS connection / termination module (mountable on DIN rails and in fuse boxes), order no.: **XAL-Term2**

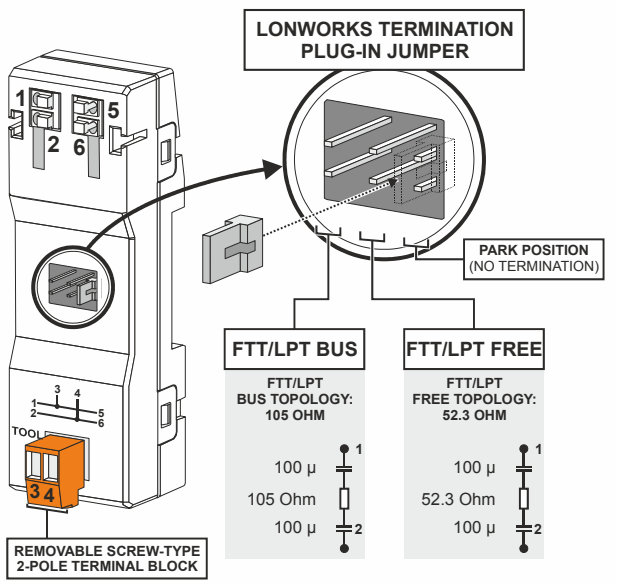

Fig. 11. LONWORKS connection and termination module

Table 4. LONWORKS Service LED Behaviors and Meanings

	LED Flashing Pattern	Meaning
1	LED remains OFF after power-up.	Defective device hardware. Suspect power supply problems, clock problems, or a defective Neuron Chip.
2	LED is ON continuously after first power-up.	Defective hardware.
3	LED flashes at power-up, goes OFF, then comes ON solid.	Node is applicationless.
4	LED flashes briefly once every second.	This device is probably experiencing continuous watchdog resets, or the external memory or EEPROM is corrupt.
5	LED flashes ON and OFF at 0.5 Hz.	Node is unconfigured but has an application.
6a	OFF duration ≈ 10 sec. Afterwards, the service LED turns ON and remains ON, indicating completion of the blanking process.	Using EEBLANK on a Neuron 3150 Chip-based custom node.
6b	OFF duration ≈ 1 sec. Afterwards, the service LED turns ON and remains ON.	First power-up with a new PROM on a Neuron 3150 Chip-based custom node. Application less firmware state exported.
6c	OFF duration is 1...15 sec, depending on the application size and the system clock. Afterwards, the service LED begins flashing ON and OFF at 0.5 Hz.	First power-up with a new PROM on a Neuron 3150 Chip-based custom node. Unconfigured firmware state exported.
6d	OFF duration is indefinite (1...15 sec to load internal EEPROM; remains OFF).	First power-up with a new PROM on a Neuron 3150 Chip-based custom node. Configured firmware state exported.
7	LED remains OFF after a short ON duration.	Node is configured and running normally.
8	LED flashes ON for one second and OFF for one second five times in succession and then remains OFF for five seconds, after which the pattern is repeated.	Module has received a WINK command from the network. Other physical outputs are unaffected.
9	LED flashes ON for one second and OFF for one second four times in succession and then remains OFF for five seconds, after which the pattern is repeated.	There are two possible causes: 1. Coprocessor identification. After reset (power-up), the Neuron Chip waits for the coprocessor's ID message (sent periodically until acknowledged). While waiting, the application remains OFF. This wait status will remain if the hardware ID fails, e.g., because the Neuron application does not match the hardware. 2. NEC/Neuron communication failure. If a NEC failure (e.g., NEC application too big, sensor break, etc.) is detected, the service LED flashes as described at left, and continues doing so as long as the NEC failure is recognized.

Honeywell

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