

По вопросам продаж и поддержки обращайтесь:

Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48

Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курган (3522)50-90-47
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Ноябрьск(3496)41-32-12

Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Пермь (342)205-81-47
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саранск (8342)22-96-24
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35

Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Улан-Удэ (3012)59-97-51
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70

Казахстан +7(7172)727-132

Киргизия +996(312)96-26-47

сайт: www.honeywell.nt-rt.ru || эл. почта: hwn@nt-rt.ru

МОДУЛИ ДЛЯ ПЕРЕДАЧИ ДАННЫХ

Технические характеристики

IO-R-16



Remote IO-R-16 Module

14006

Mounting and Wiring Guide

This document covers the mounting and wiring of a Remote I/O Module (IO-R-16), for expanding a JACE-8000® controller. It assumes that you are an engineer, technician, or service person who is performing control system design or installation. Please read through this entire document before beginning the installation procedures.

Product Description

The IO-R-16 expands a JACE-8000 controller¹ with 16 I/O points that can be remotely located, including:

- 8 Universal inputs (UIs), compatible with 0–10Vdc, 0–20mA, dry contact pulsing dry contacts, 0–100K ohm resistive, or Type 3 thermistor temperature sensors.
- 4 Digital outputs with Form-A relay contacts, for on/off control of loads to 24Vac/dc, at 0.5A max.
- 4 Analog outputs (AOs) for 0–10Vdc analog control of loads at 2.5K ohm minimum, or 4mA drain maximum.

The IO module uses DIN rail mounting and has two end-mounted 5-pin connectors that support direct-chaining (in-line attachment) to other IO-R-16 modules or IO-R-34 modules.

Communications to a JACE-8000 use RS-485 multidrop on 3 wires of an end-mounted 5-pin connector. The other 2 wires on that connector are for INPUT power (15Vdc) which can be supplied from a DIN-mountable option

(IO-R-34) or a third party 13.5-15.75 Vdc power supply. The RS-485 bus is wired back to Com 1 or Com 2 of the JACE-8000 controller.

Related Documentation

For more information on mounting, wiring and configuring a system, refer to the *JACE-8000 Mounting & Wiring Guide*, *Remote IO-R-34 Mounting and Wiring Guide*, and the *NRIO Guide*.

System Planning

System planning requires consideration of options regarding power, RS-485 communications, mounting and wiring. The following sections describe communications and power variables to consider before mounting and wiring your hardware.

Number of Supported Expansion Modules

A JACE-8000 controller can support up to a maximum of 16 IO-R-16 modules via a single RS-485 bus. If an IO-R-34 is included, the IO-R-34 counts as two modules. So, for example, the JACE-8000 could support 2 IO-R-34 modules and 12 IO-R-16 modules. [Table 1](#) shows possible options for combinations of IO-R-16 and IO-R-34 modules. If you are using T-IO-16-485 modules, they count the same as an IO-R-16.



Power Supply Options and Considerations

You can provide power to the IO-R-16 from the 5-pin connector of an IO-R-34. Each IO-R-34 module can power up to 4 IO-R-16 modules. You can also use a third-party 13.5-15.75 Vdc power supply (output regulated to within $\pm 4\%$) wired to the P+ and P- terminals of an IO-R-16 module's 5-position end connector.

Table 1 shows possible combinations. For example, Option 2 includes a total of 14, IO-R-16s and 1, IO-R-34. Four of the IO-R-16s are powered by the IO-R-34. The remaining 10 IO-R-16s must be powered by an external power supply.

| Combinations | Module | Number of Devices | Powered by IO-R-34(s) | Powered by External Supply |
|--------------|---------|-------------------|-----------------------|----------------------------|
| Option 1 | IO-R-16 | 16 | 0 | 16 |
| | IO-R-34 | 0 | | |
| Option 2 | IO-R-16 | 14 | 4 | 10 |
| | IO-R-34 | 1 | | |
| Option 3 | IO-R-16 | 12 | 8 | 4 |
| | IO-R-34 | 2 | | |
| Option 4 | IO-R-16 | 10 | 10 | 0 |
| | IO-R-34 | 3 | | |
| Option 5 | IO-R-16 | 8 | 8 | 0 |
| | IO-R-34 | 4 | | |
| Option 6 | IO-R-16 | 6 | 6 | 0 |
| | IO-R-34 | 5 | | |
| Option 7 | IO-R-16 | 4 | 4 | 0 |
| | IO-R-34 | 6 | | |
| Option 8 | IO-R-16 | 2 | 2 | 0 |
| | IO-R-34 | 7 | | |
| Option 9 | IO-R-16 | 0 | 0 | 0 |
| | IO-R-34 | 8 | | |

Both IO-R-16 and IO-R-34 should have a UPS power backup if continuous operation during power failures is a requirement. These modules do not support the battery powered configurations provided on some legacy hardware. The 5 pin power/comm connectors do not include a battery pin, preventing connection to (and possible damage from) legacy controllers.



Note When cabling power to modules located some distance from the controller, you should allow for voltage drops introduced by cabling distances. See “[Voltage drop considerations](#)” on page 3.

Operation without power backup

If an IO-R-16 module is powered locally, with an IO-R-34, for example, and a momentary AC power loss occurs, note that a number of *undesirable things can result*, including:

- Load cycling from IO-R-16 relays dropping out, including several seconds lag to first re-establish communications with the JACE (Nrio driver) before relays can pull in again, as needed.
- Totalized “counts” zeroed out.
- History (logging) entries for associated IO points as “down,” as well as Nrio “device down”

Further loss of power without backup makes an IO firmware upgrade a risky operation. Such an upgrade is initiated from the “Nrio Device Manager” view (in a station connection to the JACE). If this upgrade process is interrupted by a IO-R-16 power cycle, the module may be rendered inoperable—and will likely need to be replaced. Therefore, consider providing UPS backup power.

Configure default settings for comm loss scenarios—You can use Niagara Workbench to configure default AO and DO values to be set in case of a power outage or other communications-loss situations. The feature is configurable for timing and function. You can choose to use it on Powerup, CommLoss, both or neither. See the *Niagara Nrio Driver Guide* for details.

Voltage drop considerations

You should be aware of potential voltage drops in the connecting “trunk power” cabling. Typically, this applies only if modules are located in different locations—that is, not near the power supply.

Note that each IO-R-16 draws (at most, when all four relays are pulled in) 0.133A, and thus can introduce voltage drop when long cabling distances are used for power/backup. [Table 2](#) provides a summary of IO-R-16 power consumption for these purposes.

Table 2 IO-R-16 Power Consumption.

| Device | Max per System | Amps / W used @ 15Vdc (each) | Notes |
|---------|-----------------------------|------------------------------|------------------------|
| IO-R-16 | see Table 1 | 0.133 A / 2.00 W | Has 4 on-board relays. |

Undersized selection of power cabling can result in unacceptably high voltage drops, and remotely located IO-R-16 modules may not operate correctly—especially during emergency (battery backup) operation.

The maximum allowable voltage drop due to wiring is 1.5V. This equates to the difference in voltage measured across the P+ and P- at the source power supply, and the P+ and P- at the furthest expansion module (IO-R-16).

[Table 3](#) provides a voltage drop chart, showing voltage drops per 100 feet of paired wire of different gauges (AWG), at different load amps.

Table 3 Voltage Drop Per 100 Feet Run (30m) of Paired Wire.

| Gauge (AWG) | Load Current | | | | | | |
|-------------|--------------|-------|------|------|------|------|-------|
| | 0.10A | 0.25A | 0.5A | 1.0A | 1.5A | 2.0A | 4.0A |
| 10 | 0.020 | 0.05 | 0.10 | 0.20 | 0.30 | 0.40 | 0.80 |
| 12 | 0.032 | 0.08 | 0.16 | 0.32 | 0.48 | 0.64 | 1.27 |
| 14 | 0.050 | 0.13 | 0.25 | 0.50 | 0.75 | 1.01 | 2.02 |
| 16 | 0.080 | 0.20 | 0.40 | 0.80 | 1.20 | 1.60 | 3.20 |
| 18 | 0.127 | 0.32 | 0.64 | 1.27 | 1.91 | 2.54 | 5.08 |
| 20 | 0.202 | 0.50 | 1.01 | 2.02 | 3.03 | 4.03 | 8.07 |
| 22 | 0.320 | 0.80 | 1.60 | 3.20 | 4.80 | 6.40 | 12.81 |

For an example, consider a system where two IO-R-16 modules are mounted remotely in a location 500 feet (152m) away. In this example, worst-case amps used by each remote IO-R-16 is 0.133A. Looking at [Table 3](#) at the 0.25A column, a #16 AWG cable pair drops 0.20V per 100 feet, meaning a 500 foot run would drop 1V. This would be a good choice over an #18 AWG cable, which would drop 1.6V (above the 1.5V maximum allowable drop).

Preparation

Unpack the IO-R-16 module and inspect the contents of the package for damaged or missing components. If damaged, notify the appropriate carrier at once, and return for immediate replacement (see “[Returning a Defective Unit,](#)” page 19). See the next sections “[Included in this Package](#)” and “[Material and Tools Required](#)”.

Included in this Package

Included in this package you should find the following items:

- IO-R-16 module with quick disconnect female connectors.
- *Remote I/O Module (IO-R-16) Mounting and Wiring Guide*, Part Number 32327275-001.
- Hardware bag containing the following items:
 - One (1) grounding wire, with quick-disconnect 0.187" female connector.
 - Eight (8) 499-ohm resistors, used for 4–20mA inputs.

Material and Tools Required

The following supplies and tools are required for installation:

- IO-R-34 or other 13.5 -15.75 Vdc power supply source (see “Power Supply Options and Considerations” on page 2).
- If DIN mounting, a DIN rail, type NS35/7.5 (35mm x 7.5mm) and DIN rail end-clips (stop clips), and screws for mounting. Low- profile end clips are preferred to avoid contacting module connectors. See [Figure 1](#) on page 7. If DIN rail is not used, suitable screws for mounting base of Remote I/O Module module.
- Suitable tools and supplies for making all wiring terminations.

Precautions

This document uses the following warning and caution conventions:



Caution

Cautions remind the reader to be careful. They alert readers to situations where there is a chance that the reader might perform an action that cannot be undone, might receive unexpected results, or might lose data. Cautions contain an explanation of why the action is potentially problematic.



Warning

Warnings alert the reader to proceed with extreme care. They alert readers to situations where there is a chance that the reader might do something that can result in personal injury or equipment damage. Warnings contain an explanation of why the action is potentially dangerous.

Safety Precautions

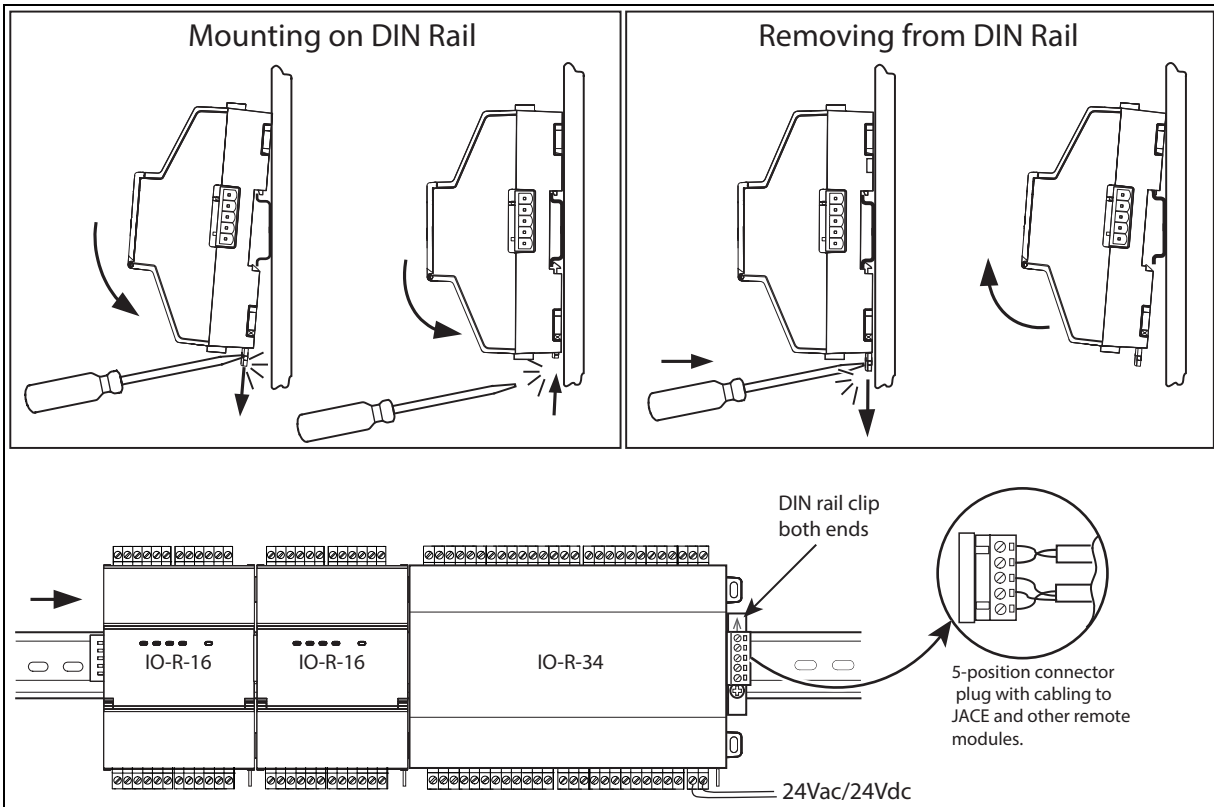
The following items are warnings of a general nature relating to the installation and start-up of a compatible JACE controller. Be sure to heed these warnings to prevent personal injury or equipment damage.



Warning

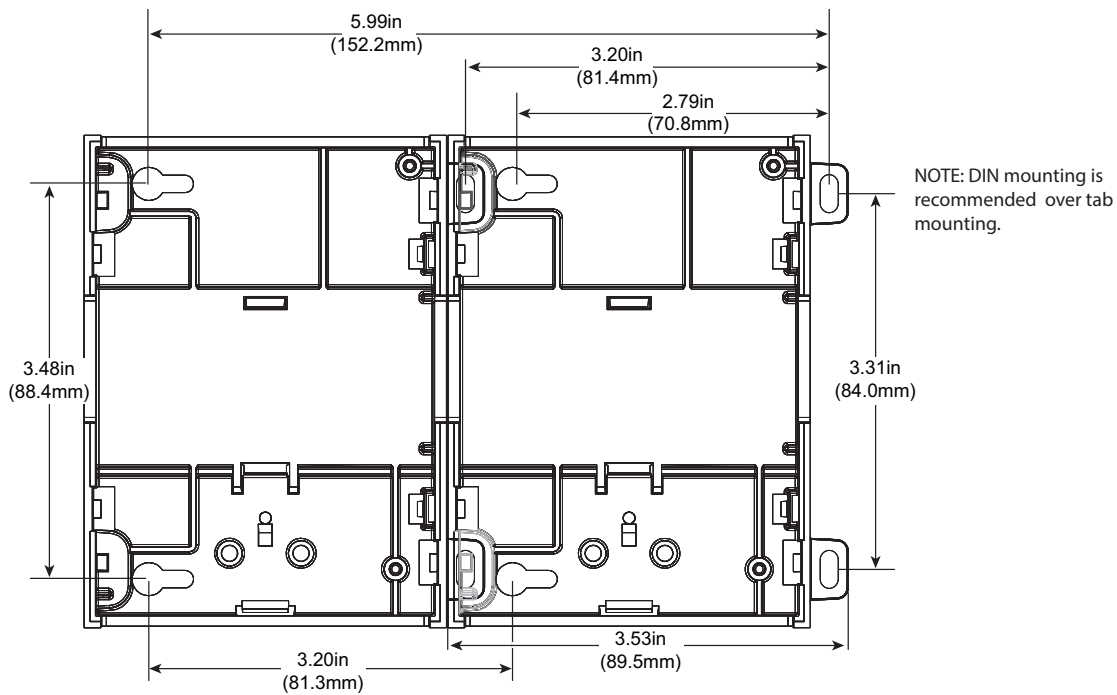
- **A 15Vdc circuit powers the IO-R-16 module. Disconnect power before installation or servicing to prevent electrical shock or equipment damage.**
 - **Make all connections in accordance with national and local electrical codes. Use copper conductors only.**
 - **To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants.**
 - **JACE controllers and I/O modules are only intended for use as monitoring and control devices. To prevent data loss or equipment damage, do not use them for any other purposes.**
-

Figure 1 IO-R-16 module DIN mounting details.



Note To remove an IO-R-16 module from a DIN rail, remove DIN rail end clips and (if applicable) slide it away from other modules. Move the plastic locking tab down to open position then lift unit outwards.

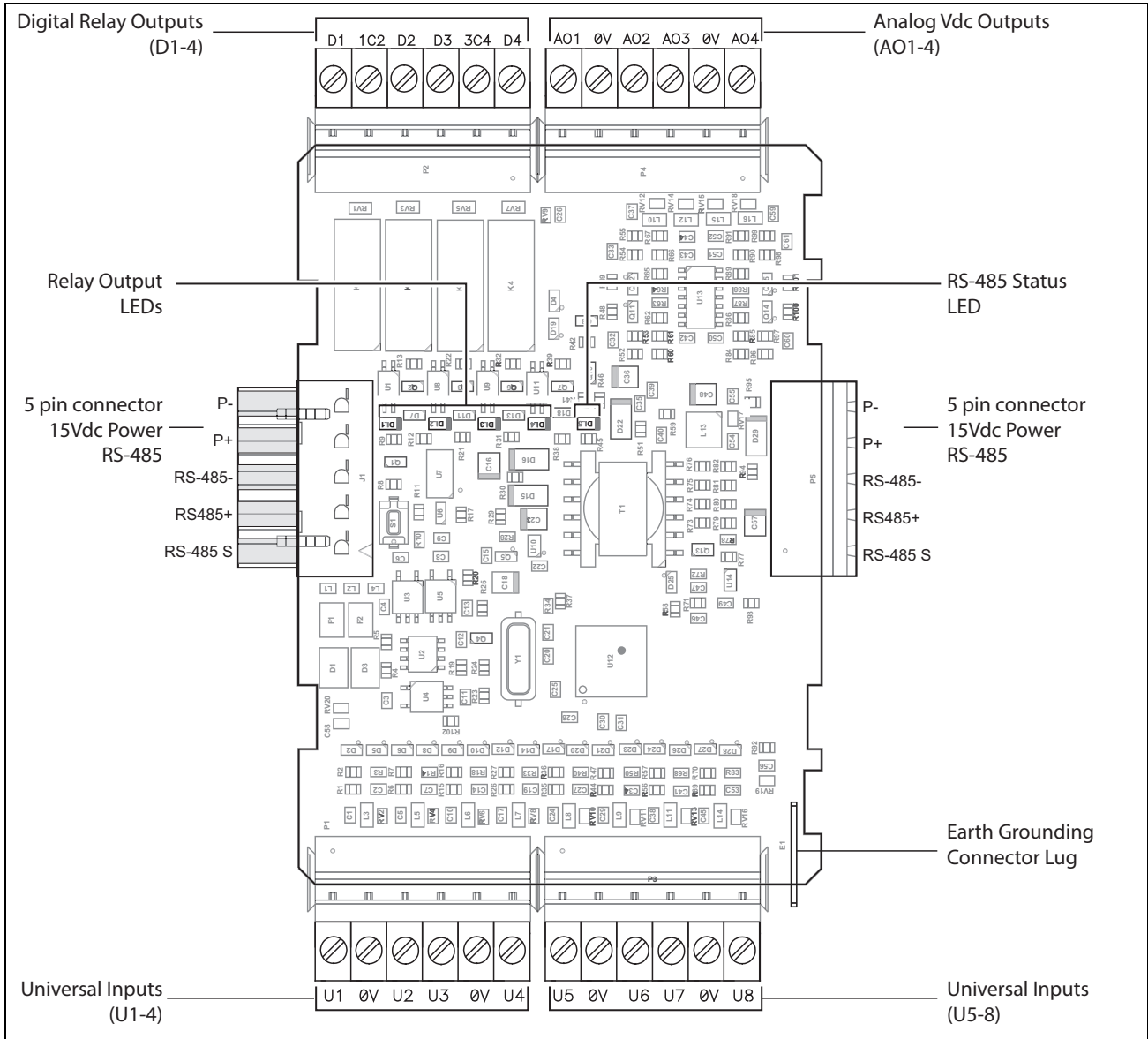
Figure 2 Tab Mounting Dimensions.



IO-R-16 Board Layout and Terminals

The IO-R-16 module provides 8 universal **inputs**, 4 digital **relay outputs**, and 4 0–10Vdc **analog outputs**. Wiring terminal positions are shown below (Figure 3), along with LED locations.

Figure 3 Remote I/O Module Wiring Terminal Locations (screw terminal connectors shown installed).



Wiring Details

See [Figure 3](#) to locate connectors and other components on the Remote I/O Module.

Make connections to the Remote I/O Module in the following order.

1. Connect the earth grounding wire (with spade connector) from the earth ground lug on the IO-R-16 to a nearby earth grounding point. See the “[Grounding](#)” section on page 9 for details.
2. Wire the supply power to the IO-R-16, but *do not energize the power source* until all other wiring is completed. Depending on how you are powering the IO-R-16, methods differ:
 - a. If powering the IO-R-16 from an IO-R-34, slide the two modules together to mate the connectors.
 - b. If powering the IO-R-16 from a third-party 13.5-15.75 Vdc power supply, wire the positive and negative lines from the power supply to the P+ and P- terminals of the 5-position end connector plug. See “[Power from third party 13.5-15.75 Vdc power supply](#)” on page 10.
3. Connect RS-485 wiring between the IO-R-16 and the JACE, and (if applicable) to other remote IO-R-16, or IO-16-485 modules, in a continuous multidrop fashion. See “[RS-485 Communications](#)” on page 11.



Caution

Connect S terminal wiring as shown in [Figure 7](#) or communication errors may result. S terminal serves as reference ground between isolated RS-485 ports on JACE-8000 and IO-R-16 and IO-R-34 modules.

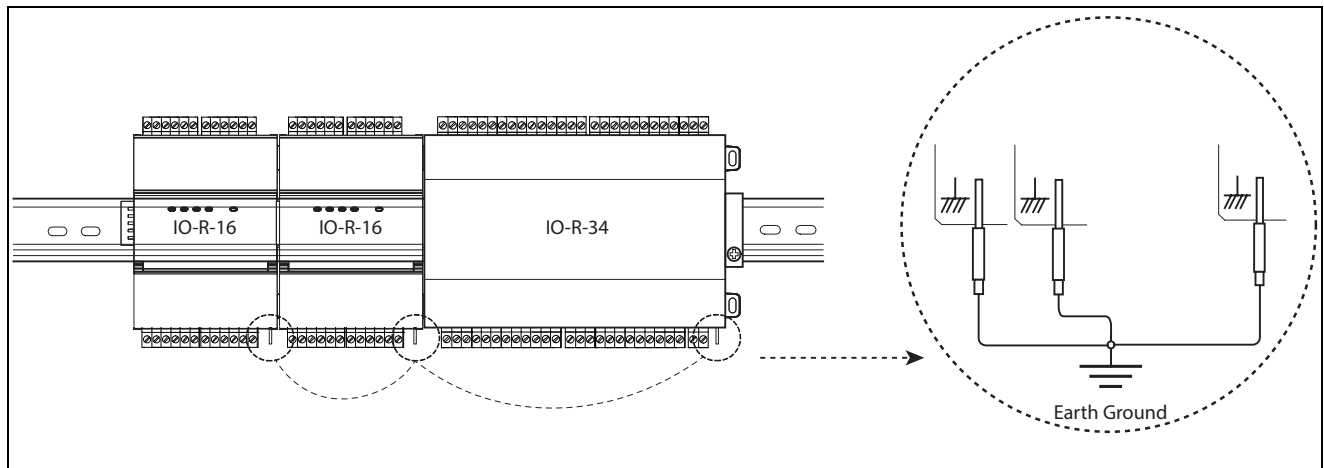
4. Connect I/O wiring. See sections “[Inputs](#)” on page 12, and “[Outputs](#)” on page 15.
5. Apply power to the unit. See “[Power up and Initial Checkout,](#)” page 17.

Grounding

An earth ground spade lug (0.187") is provided on the circuit board of the IO-R-16 for connection to earth ground. For maximum protection from electrostatic discharge or other forms of EMI, connect **each** device’s earth ground using a #16 AWG or larger wire. Keep these wires as short as possible.

See [Figure 3](#) for the location of the earth grounding wire.

Figure 4 Earth ground connection required to each IO-R-16 module as well as IO-R-34, if used.



Note

Connect any remote IO-R-16 modules to a nearby earth ground in the same manner.

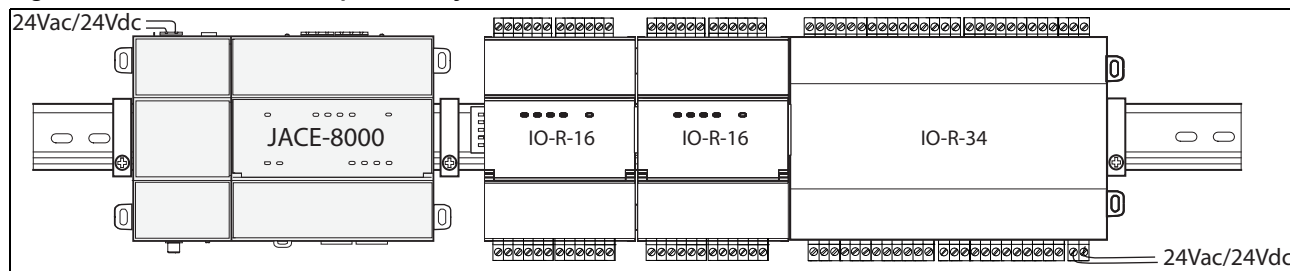
Power from IO-R-34

Power from IO-R-34

If powering one or more IO-R-16 modules from a IO-R-34 module, simply connect the modules as shown in [Figure 5](#). Power and RS-485 communication connection is provided through the 5-position “Powered RS-485” connector.

- Each IO-R-34 can power up to four (4) IO-R-16 modules.
- Do not apply power (at any location) until all other wiring is completed. See “[Power up and Initial Checkout,](#)” page 17.

Figure 5 IO-R-16 modules powered by IO-R-34 connection.



In some cases, some number of IO-R-16 modules may be powered this way (from IO-R-34), while others may be powered locally using a third-party 13.5-15.75 Vdc power supply. This may be advisable when IO modules are located long distances from the IO-R-34 providing power, to avoid excessive voltage drops due to wiring resistances. See the following sections:

- “[Power from third party 13.5-15.75 Vdc power supply,](#)” page 10

Power from third party 13.5-15.75 Vdc power supply

IO-R-16 modules can be powered by a third-party, 13.5V–15.75Vdc power supply. A “battery backed” power supply is recommended. This provides power to the IO module(s) during AC power loss scenarios.

[Figure 6](#) shows wiring for two assemblies of IO-R-16 modules powered by a battery-backed power supply.



Notes

- For power budgeting purposes, estimate each IO-R-16 module to consume 2W nominal (0.133 A @15V). Typical current will be less— as this estimate factors in all four relays being pulled in.
- Be aware of potential voltage drops when connecting via “trunk power” cabling. Voltage drops are more typical when modules are not located near the power supply. See “[Voltage drop considerations,](#)” page 3.
- For other wiring on the 5-position end connector, see “[RS-485 Communications,](#)” page 11.
- Do not apply power (energize the power supply) until all other wiring is completed. See “[Power up and Initial Checkout,](#)” page 17.

По вопросам продаж и поддержки обращайтесь:

Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48

Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курган (3522)50-90-47
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Ноябрьск(3496)41-32-12

Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Пермь (342)205-81-47
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саранск (8342)22-96-24
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35

Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Улан-Удэ (3012)59-97-51
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70

Казахстан +7(7172)727-132

Киргизия +996(312)96-26-47

сайт: www.honeywell.nt-rt.ru || эл. почта: hwn@nt-rt.ru