LEVITON®

Applications Cookbook

Occupancy Sensors

Version 4.0

FOR REFERENCE ONLY

OCCUPANCY SENSOR COOKBOOK NOTES

1. Refer to manufacturer's data sheets and installation instructions prior to installation
2. Line feed 120/230/277 VAC, 60 Hz
3. Ground not shown, ground devices per applicable national and local codes are best practices
4. For emergency power situations, illustrations assume transfer switch by others upstream of shown devices
5. Line voltage load not to exceed contact rating per device specifications
6. Power packs receiving separate feeds for switched loads and self power must have both feeds on the same phase
7. All low voltage devices consume current. Device power budget is estimated for these details—additional power sources may be required. See product literature for power specifications.
8. Maximum run length for analog wiring is 1000' @ #18 AWC
9. Sensors wired in parallel will cause line voltage relay closure when occupancy is detected by any unit
10. Devices in series requiring contact closure from a single device (clock input, demand response, emergency, etc.) must follow these wiring conventions:
    - First device in sequence provides the +V to the triggering relay
    - Signal from closure attached to all devices in sequence input
    - Com from first device in sequence attached to com on all devices in sequence
11. Applications requiring multiple power packs/power supplies at the same VDC:
    - +V must never be tied together between power packs/power supplies
    - Com/DCC must be tied together to all power packs/power supplies and all powered devices
12. Ultrasonic ceiling mount sensors should be located a minimum of six (6) feet from HVAC supply/return vents
13. Ceiling sensors mounted over doorways should be placed one (1) foot inside the threshold
14. Trough-mounted and pendant-mounted indirect lighting sources affect the operation of locally mounted sensors. Contractor is responsible for adjusting sensor locations to allow for proper operation
15. Contractor is responsible for proper sensitivity and time delay settings for non-adaptive products, following the manufacturer's recommended placement, and field verification of circuits with respect to power pack placement
16. Contractor is responsible for coordinating the operational options of sensors and power packs with the specific work requirements
    - Work relevant energy code requirements affect circuits to be controlled and their control characteristics
    - One controlled relay is required for reach controlled circuit
    - Refer to power pack data sheet for power output and installation guide for maximum number of sensors connected to a control device
    - Multiple control circuits may be controlled by a sensor/multiple sensors. Refer to the product installation manuals for interconnection details
17. Up to 100 Mark VII style ballasts may be controlled per daylighting zone by IRC
18. All relays shown in de-energized state
19. Individually cap off unused leads
20. One-line parenthesis use:
    - (X) Function
    - [#] Terminal
21. N-Way Switching
    - Wireless N-Way Switching/Dimming
        - One device is connected for all control, remaining are connected for device power only. Switching and dimming control are coordinated wirelessly between participating devices.
    - High Voltage 3-Way Switching
        - Per industry standards: (2) high voltage travellers plus (1) high voltage line/load per switch. Switch equal to Leviton 1223-W (Toggle) or 5623-2 (Decora) unless otherwise noted
    - Low Voltage Analog Maintained 3-Way Switching
        - (2) #18 AWG source plus (1) #18 AWG signal per switch. Switch equal to Leviton 1223-W (Toggle) or 5623-2 (Decora) unless otherwise noted
    - Low Voltage Analog Momentary N-Way Switching
        - (1) #18 AWG Source plus (1) #18 AWG signal per switch. Quantity of low voltage momentary switches as required. Terminated in parallel.
    - Digital Stations
        - Digital stations are software programmable and should be wired according to their digital communications
22. Plug Load Control - Commercial receptacle P/Ns:
    - Standard Duplex
        - Split control (1 outlet) CR015-1PX, CR020-1PX
        - Full control (2 outlets) CR015-2PX, CR020-2PX
    - Decora
        - Split control (1 outlet) 16252-1PX,16352-1PX
        - Full control (2 outlets) 16252-2PX, 16352-2PX
23. Control Receptacle:
    - Quantity per applicable codes
    - Termination shown split receptacle. Termination per applicable codes
    - Receptacle markings per applicable energy codes

ABBREVIATIONS:

LC	LumaCAN
LV	Low voltage
HV	High voltage switch (maintained)
LVM	Low voltage switch (momentary) Equal to Leviton 1081 (toggle) OR Leviton 56081 (Decora)
LVT	Low voltage switch (maintained) Equal to Leviton 12021-2 (toggle) or Leviton 56021-2 (Decora)
LV2	IRC low voltage switch
UON	Unless otherwise noted
BLK	Black
WHT	White
BLU	Blue
YEL	Yellow
ORG	Orange
VIO	Violet
BRN	Brown

SYMBOLS:

No Connection

Connection

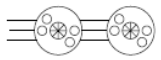
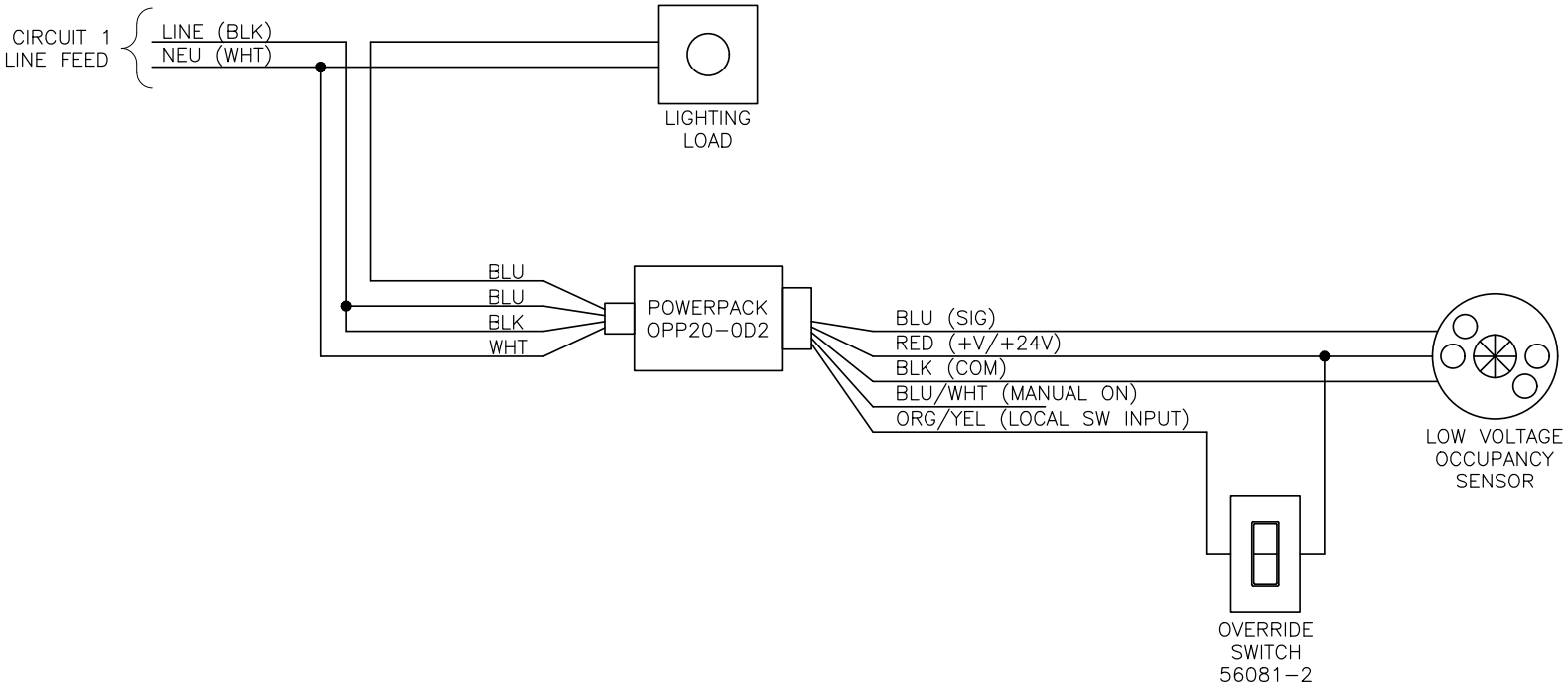

Devices wired in parallel

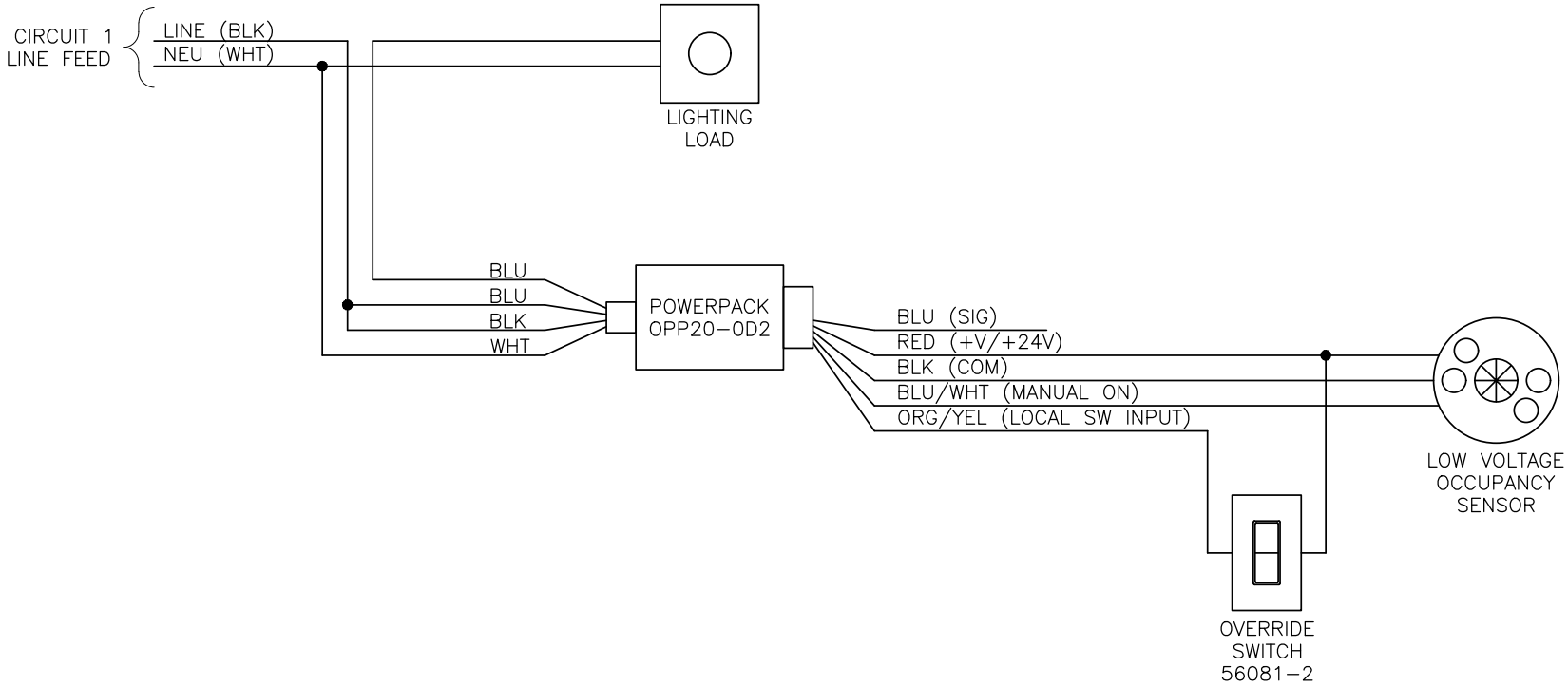
TABLE OF CONTENTS

PAGE	DESCRIPTION
4	Auto ON/OFF, Manual ON/OFF (Occupancy Sensing)
5	Manual ON/OFF, Auto OFF (Vacancy Sensing)
6	Two Circuits, One Zone, One Power Pack Can Power Attached Devices
7	One Circuit, One Zone, Two Power Packs Are Required to Power Area Sensors
8	Low Voltage PIR or Multi-Tech Wallbox Occupancy Sensor
9	Low Voltage PIR or Multi-Tech Wallbox Occupancy Sensor, Receptacle Control
10	2 Zone Manual ON/OFF, Auto OFF (Vacancy Sensor)
11	Restroom With Power Pack
12	Occupancy Sensing ,Two Separate Restrooms With Shared Exhaust Fan
13	Energy Code Compliant Plug Load Control
14	Photocell Only Room Control, Switched, ODC0P-S0W, OPP20-RD3
15	Photocell Only Room Control, 0-10V Dimming, ODC0P-D0W, OPP20-RD3
16	Daylighting, Switched, Manual ON/OFF, Auto Off (Vacancy Sensing), ODC0P-S0W, OPP20-RD4
17	Daylighting, 0-10V Dimming, Auto ON/OFF, Manual ON/OFF ODC0P-S0W, OPP20-RD4, 56081-2
18	Daylighting, Switched, Auto ON/OFF, Manual ON/OFF (Occupancy Sensing) ODC0P-S0W, OPP20-RD4, 56081-2
19	Daylighting, 0-10V Dimming, Auto ON/OFF, Manual ON/OFF (Occupancy Sensing) ODC0P-D0W, OPP20-RD4, 56081-2
20	Daylighting, Switched, Manual ON/OFF, Auto OFF (Vacancy Sensing) 2 Zones, ODC0P-S0W, OPP20-RD4, 56081-2
21	Daylighting, 0-10V Dimming, Manual ON/OFF, Auto ON/OFF (Vacancy Sensing) Two Zones, ODC0P-D0W, OPP20-RD4, 56081-2
22	Plug Load Control and Overhead Lighting of Different Voltage
23	Line Voltage and Low Voltage Sensor Control Circuit
24	Hallway GreenMAX®
25	Common Area With HVAC Signal, 0-10V Photocell
26	Occupancy Sensing
27	Occupancy Sensing, Two Legs, Same Zone
28	Occupancy Sensing With Contact Closure to HVAC System
29	OSSMD With Power Pack for Receptacle Control
30	Single Restroom With Separate Fan Circuit (OSSMD, ODS0D)

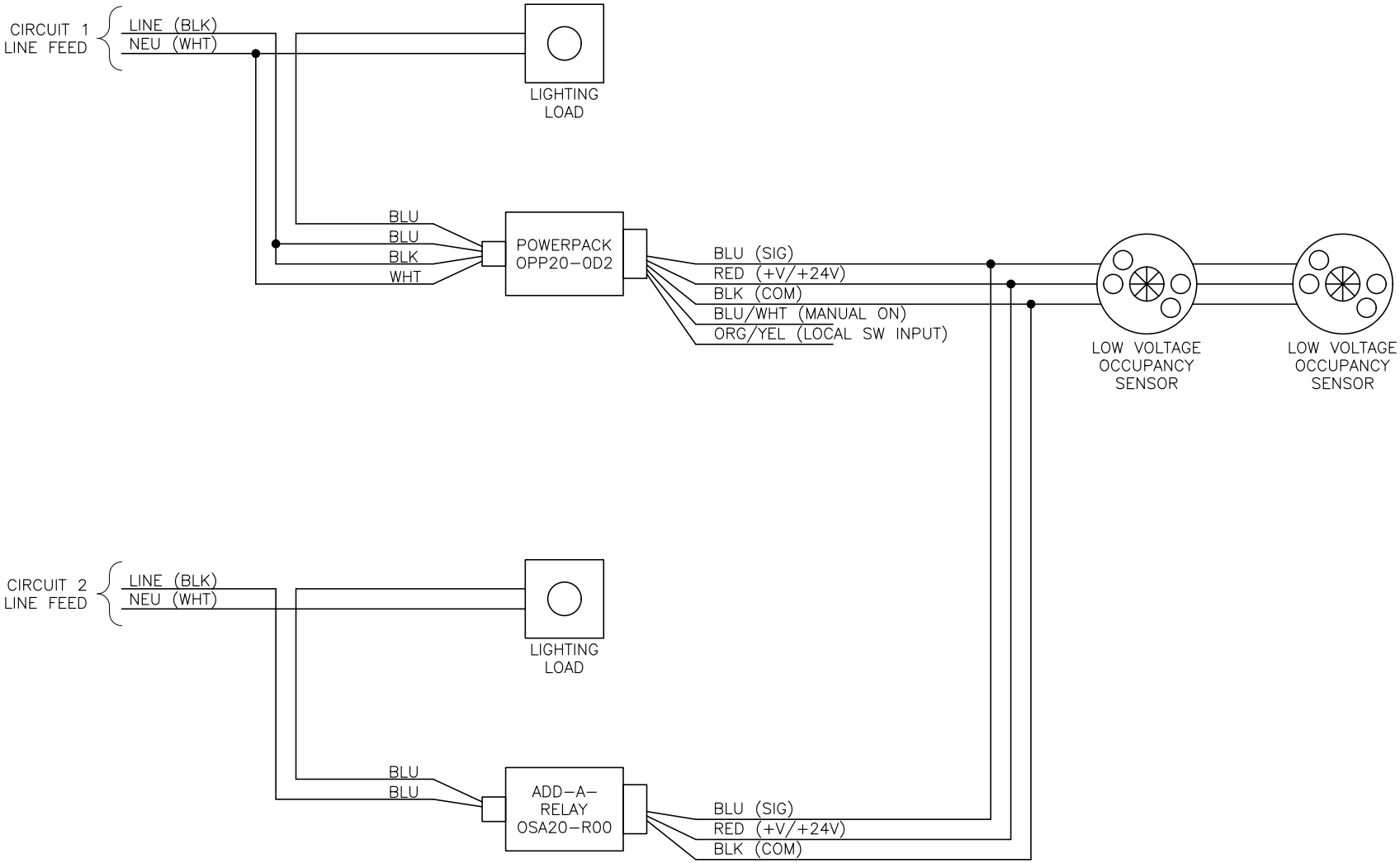
AUTO ON/OFF, MANUAL ON/OFF (OCCUPANCY SENSING)



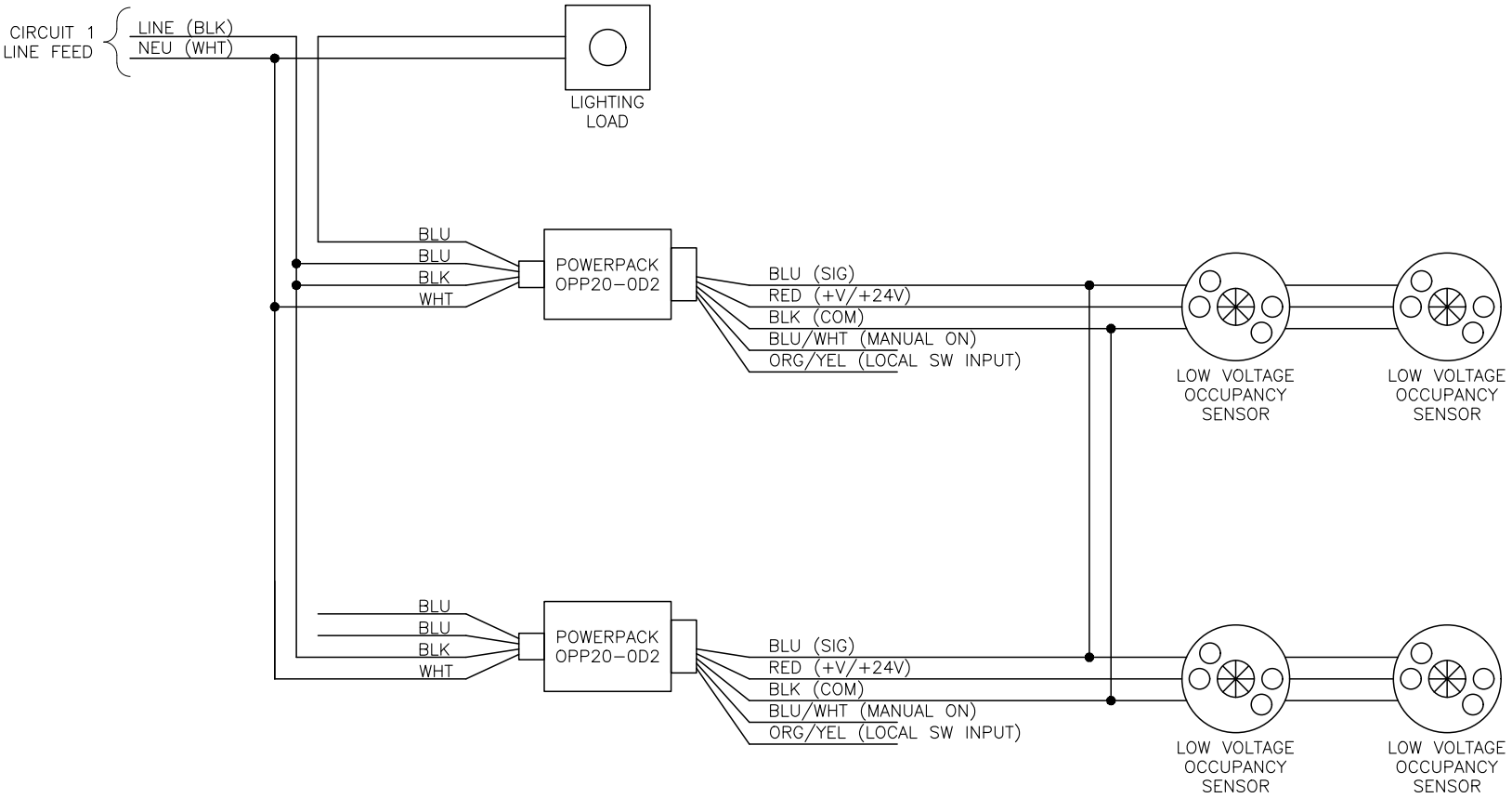
MANUAL ON/OFF, AUTO OFF (VACANCY SENSING)



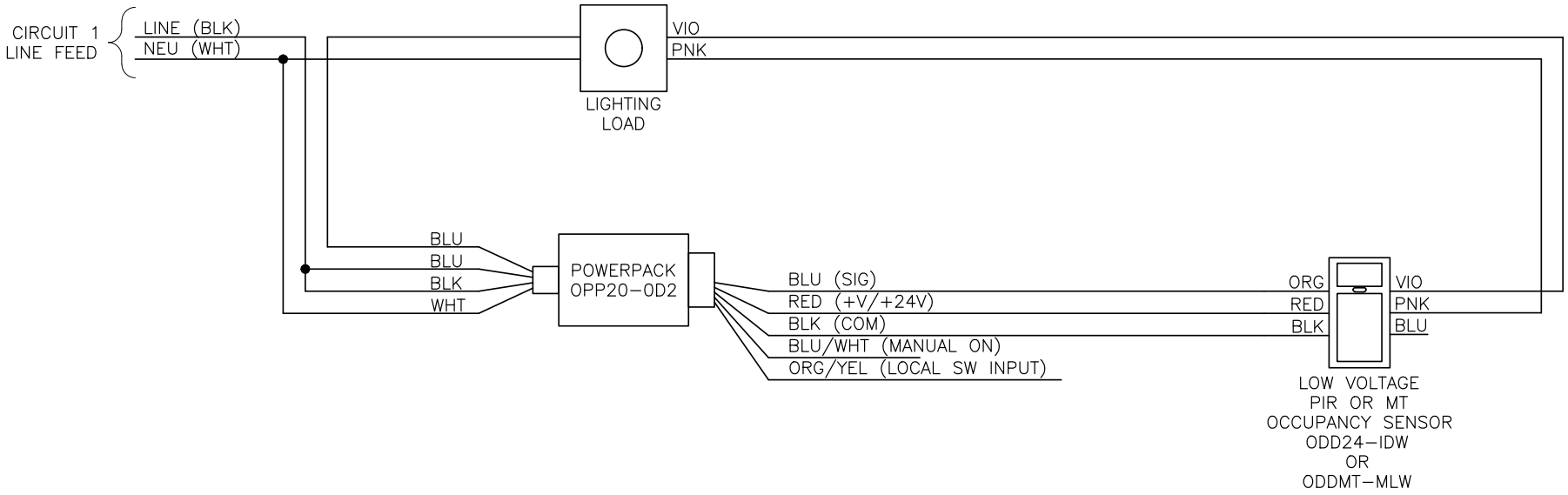
TWO CIRCUITS, ONE ZONE, ONE POWER PACK CAN POWER ATTACHED DEVICES



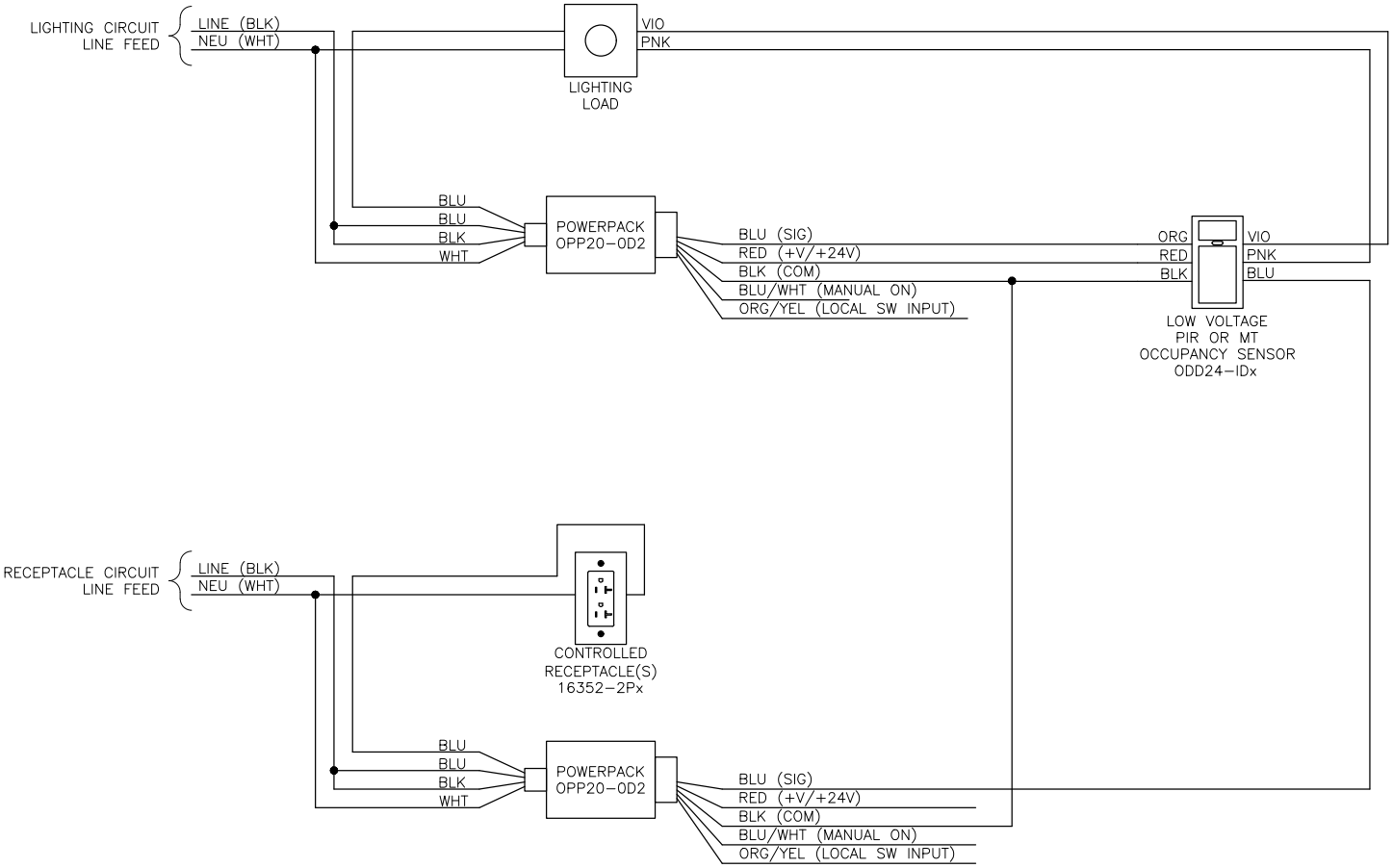
ONE CIRCUIT, ONE ZONE, TWO POWER PACKS ARE REQUIRED TO POWER AREA SENSORS



LOW VOLTAGE PIR OR MULTI-TECH WALLBOX OCCUPANCY SENSOR



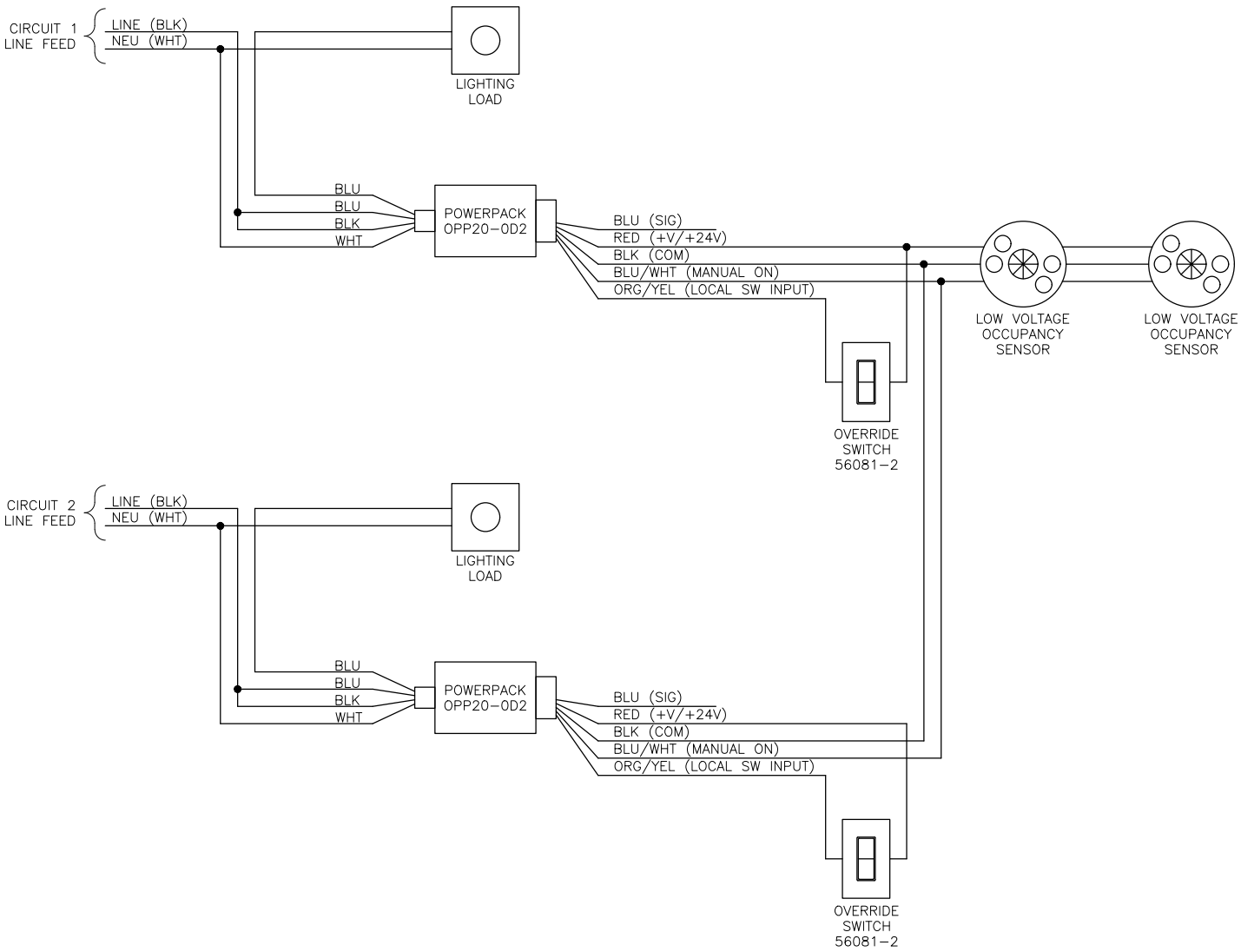
LOW VOLTAGE PIR OR MULTI-TECH WALLBOX OCCUPANCY SENSOR, RECEPTACLE CONTROL



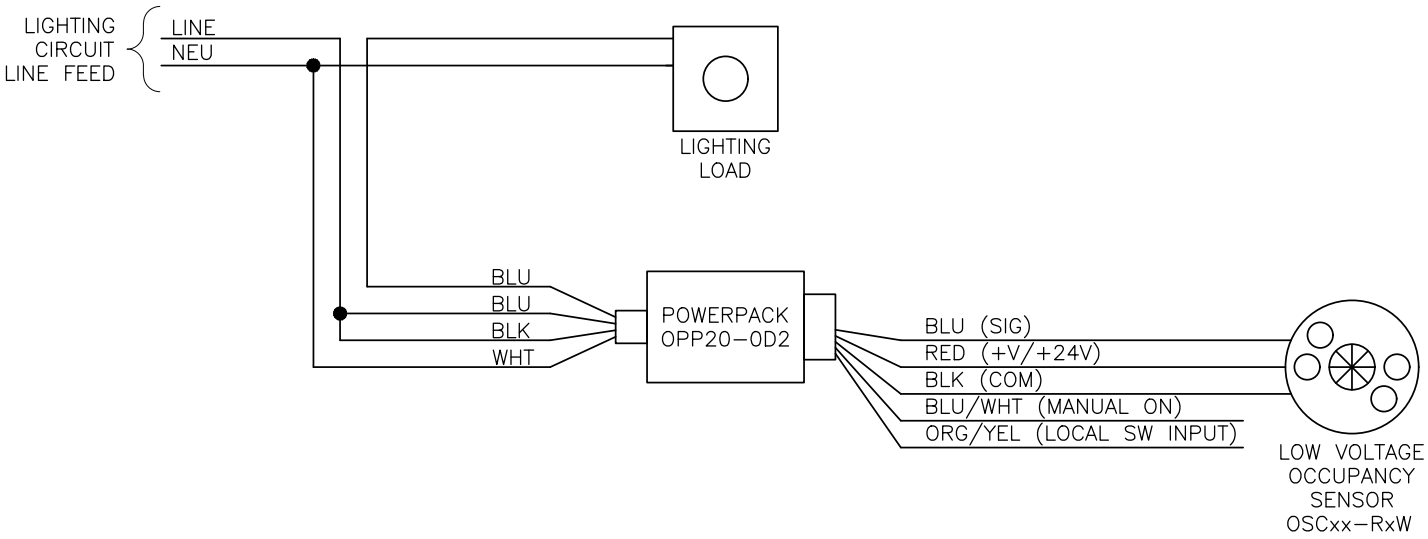
NOTES:

1. AREA LIGHTING CONTROLLED FROM SENSOR. CONFIGURE SENSOR FOR OCCUPANCY OR VACANCY OPERATION.
2. LOCAL TASK RECEPTACLE CONTROLLED AUTO ON/OFF BY SENSOR. SENSOR MANUAL CONTROL DOES NOT EFFECT RECEPTACLE CONTROL.

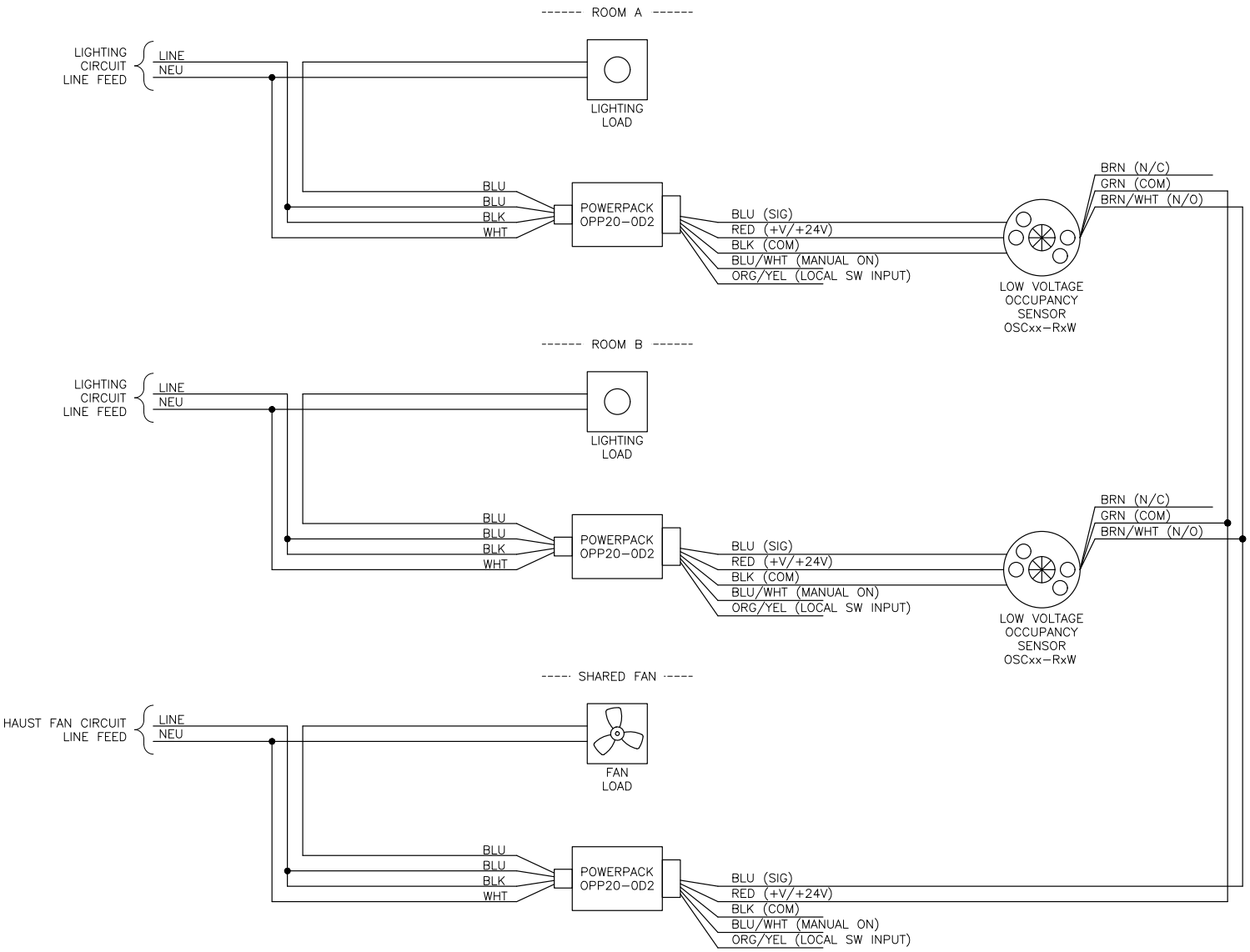
2 ZONE MANUAL ON/OFF, AUTO OFF (VACANCY SENSOR)



RESTROOM WITH POWER PACK



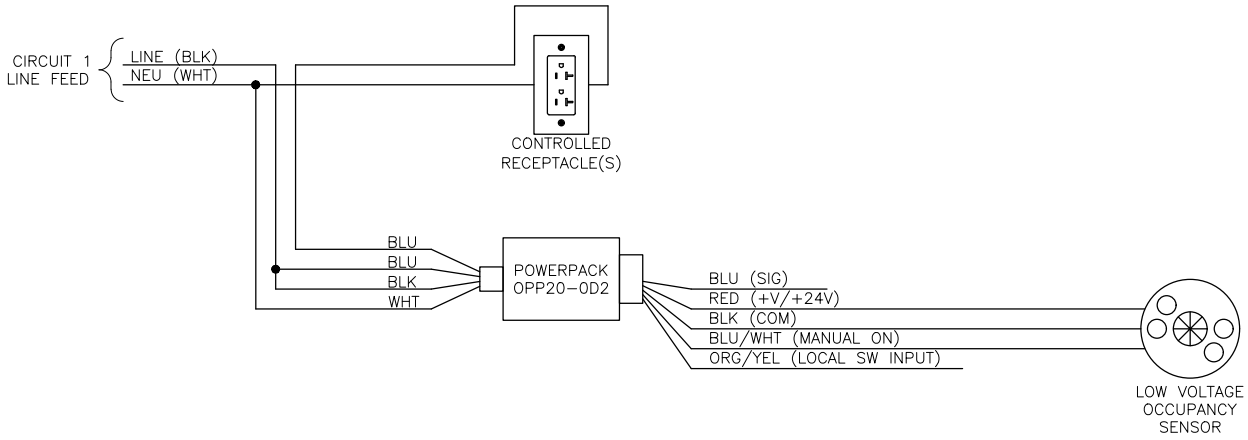
OCCUPANCY SENSING TWO SEPARATE RESTROOMS WITH SHARED EXHAUST FAN



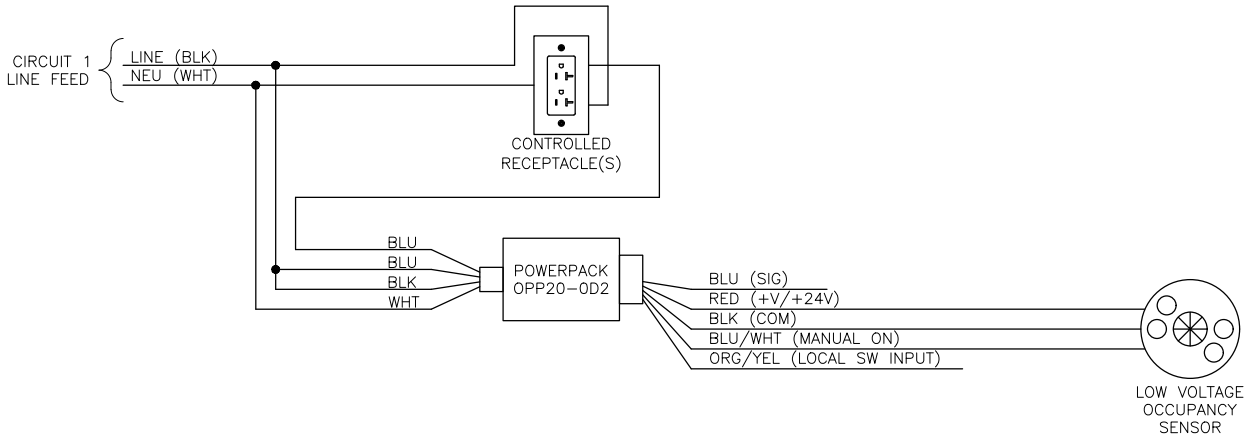
NOTES:

1. OCCUPANCY (AUTO ON/OFF MANUAL ON/OFF) CONFIGURATION SHOWN.
2. EITHER ROOM'S STATE IN OCCUPANCY WILL CAUSE FAN TO BE ENERGIZED.
3. FAN AND LIGHTING CIRCUITS SHOW AS SEPARATE FEEDERS. FEEDER APPLICATION PER PROJECT'S ENGINEER OF RECORD.
4. INDIVIDUALLY CAP UNUSED LEADS.

CONFIGURATION 1: WHOLE DUPLEX RECEPTACLE CONTROL



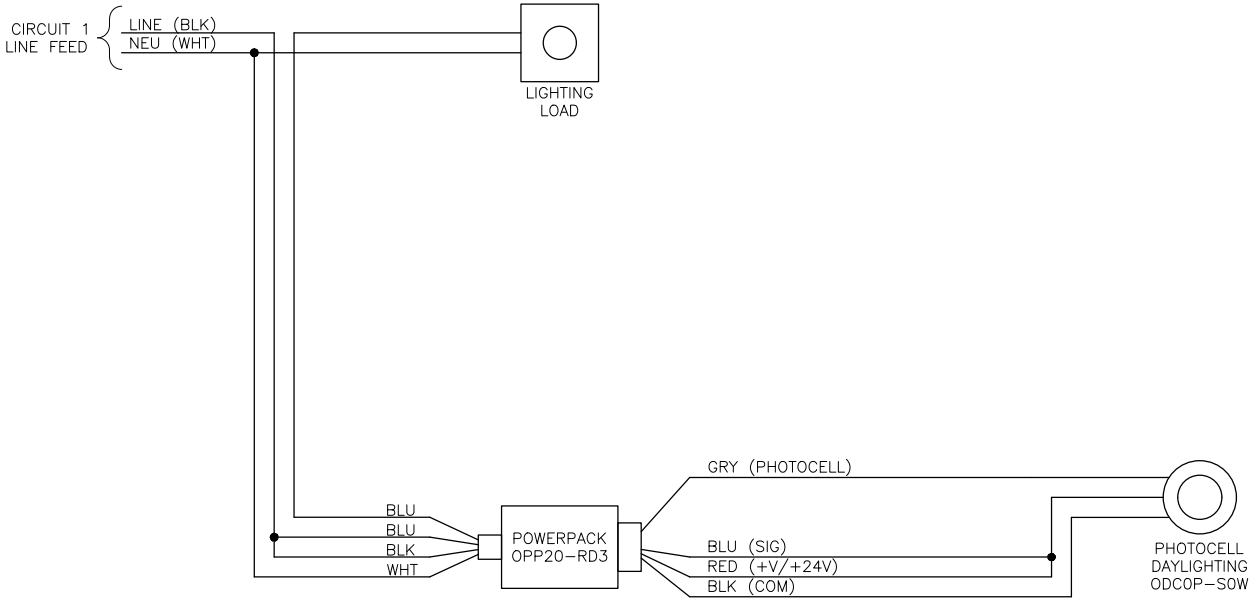
CONFIGURATION 2: SPLIT DUPLEX RECEPTACLE CONTROL



NOTES:

1. RECEPTACLES MARKED PER ENERGY CODE REQUIREMENTS.

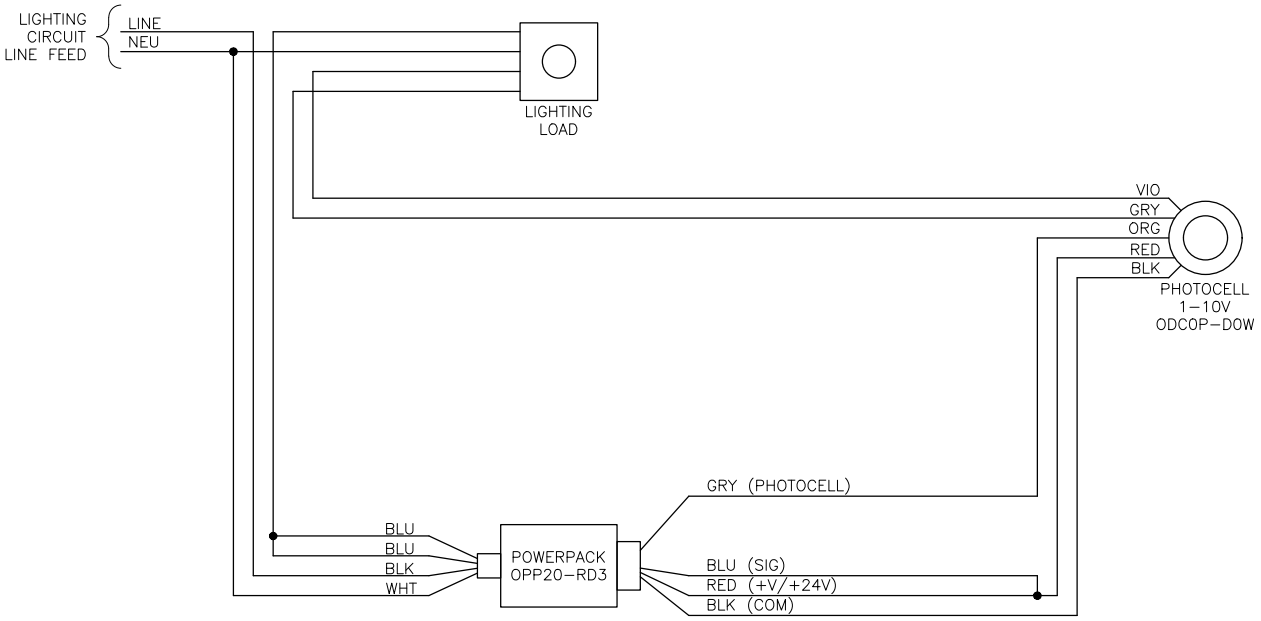
PHOTOCELL ONLY ROOM CONTROL, SWITCHED, ODCOP-SOW, OPP20-RD3



OPERATIONAL NOTE:

1. SWEEP OFF WILL PREVENT AUTO ON/OFF FUNCTIONALITY WHEN OFF.
2. REFER TO EQUIPMENT DATA SHEETS TO ENSURE RELAY RATINGS ARE NOT EXCEEDED.
3. INDIVIDUALLY CAP UNUSED LEADS.

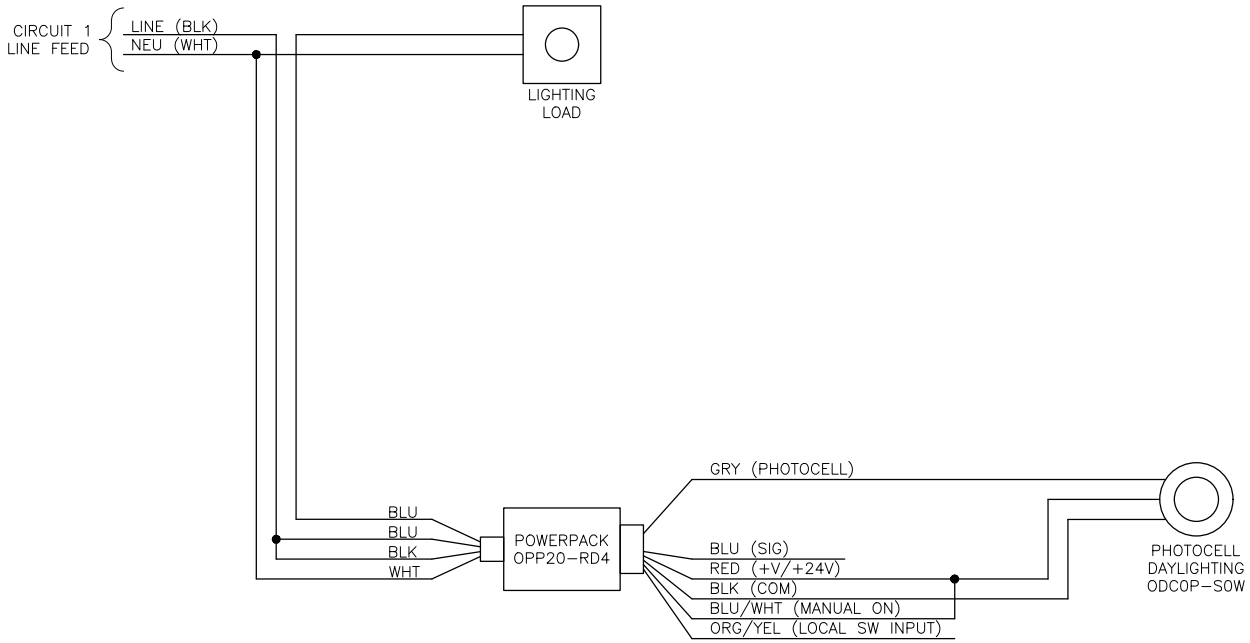
PHOTOCELL ONLY ROOM CONTROL, 0-10V DIMMING ODCOP-D0W, OPP20-RD3



NOTES:

1. FOR 0–10V CONTROL, LOWEST LIGHTING LEVEL TAKES PRECEDENCE.

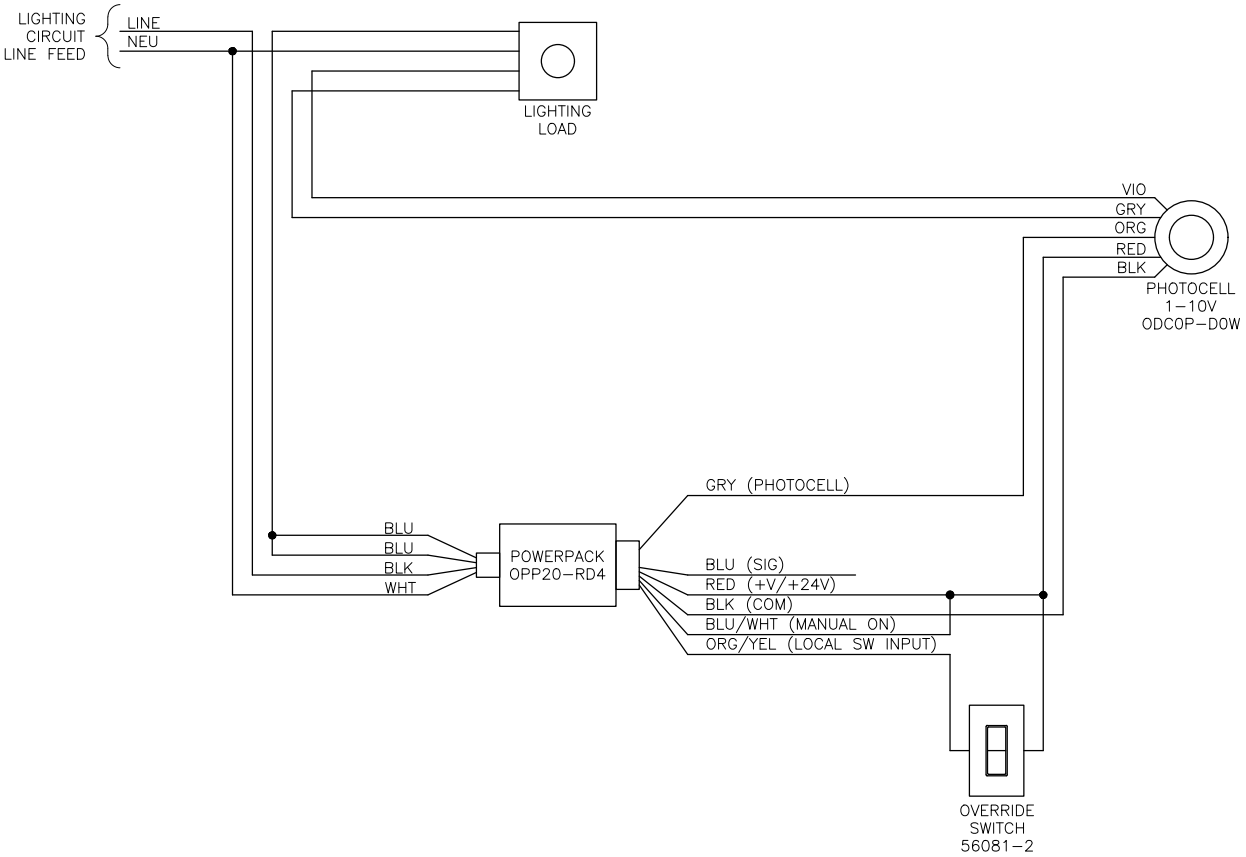
DAYLIGHTING, SWITCHED, MANUAL ON/OFF, AUTO OFF (VACANCY SENSING), ODC0P-S0W, OPP20-RD4



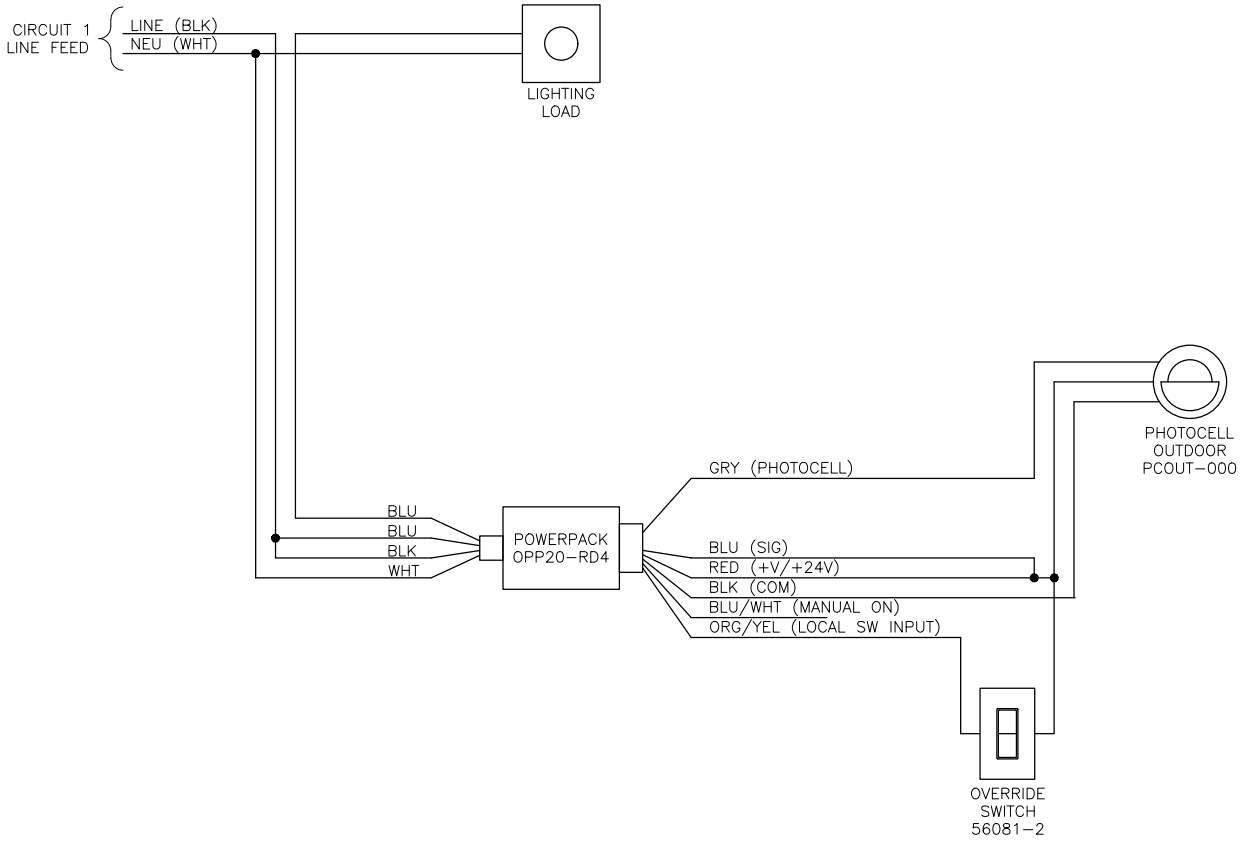
NOTES:

1. FOR 0-10V CONTROL, LOWEST LIGHTING LEVEL TAKES PRECEDENCE.

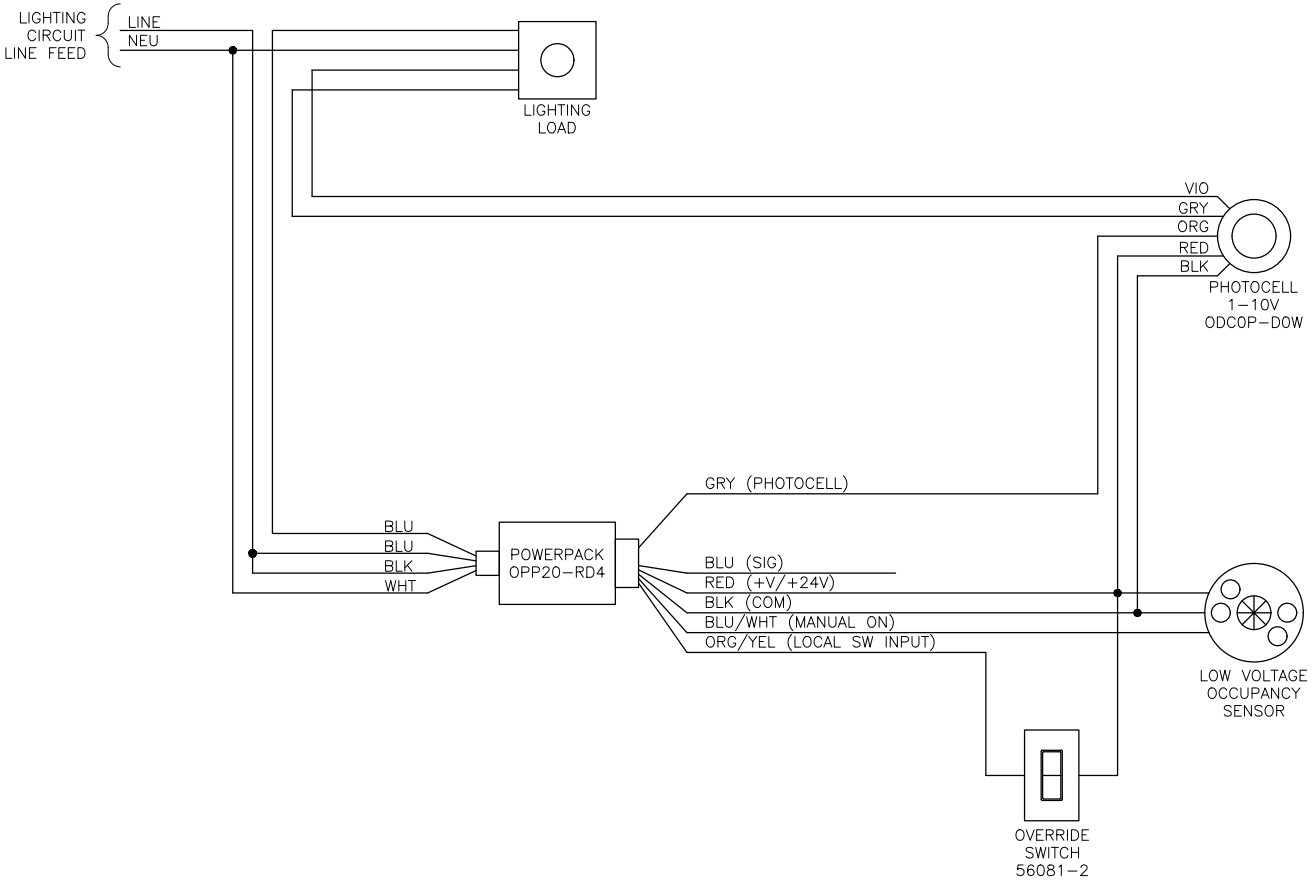
DAYLIGHTING, 0-10V DIMMING, AUTO-ON/OFF, MANUAL-ON/OFF, ODC0P-D0W, OPP20-RD4, 56081-2



DAYLIGHTING, SWITCHED, AUTO ON/OFF, MANUAL ON/OFF (OCCUPANCY SENSING), ODC0P-S0W, OPP20-RD4, 56081-2



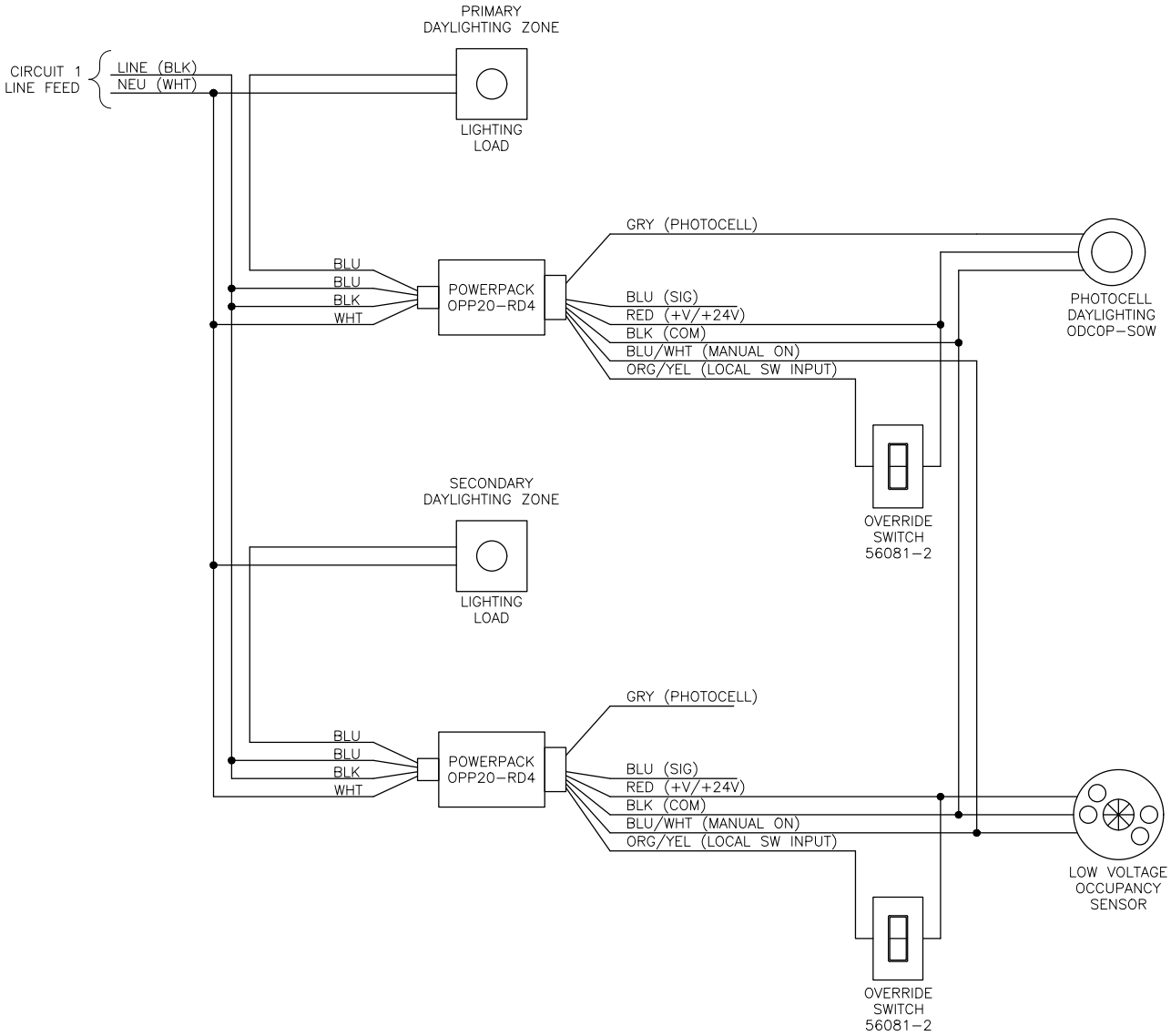
DAYLIGHTING, 0-10V DIMMING, AUTO ON/OFF, MANUAL ON/OFF (OCCUPANCY SENSING) ODCOP-D0W, OPP20-RD4, 56081-2



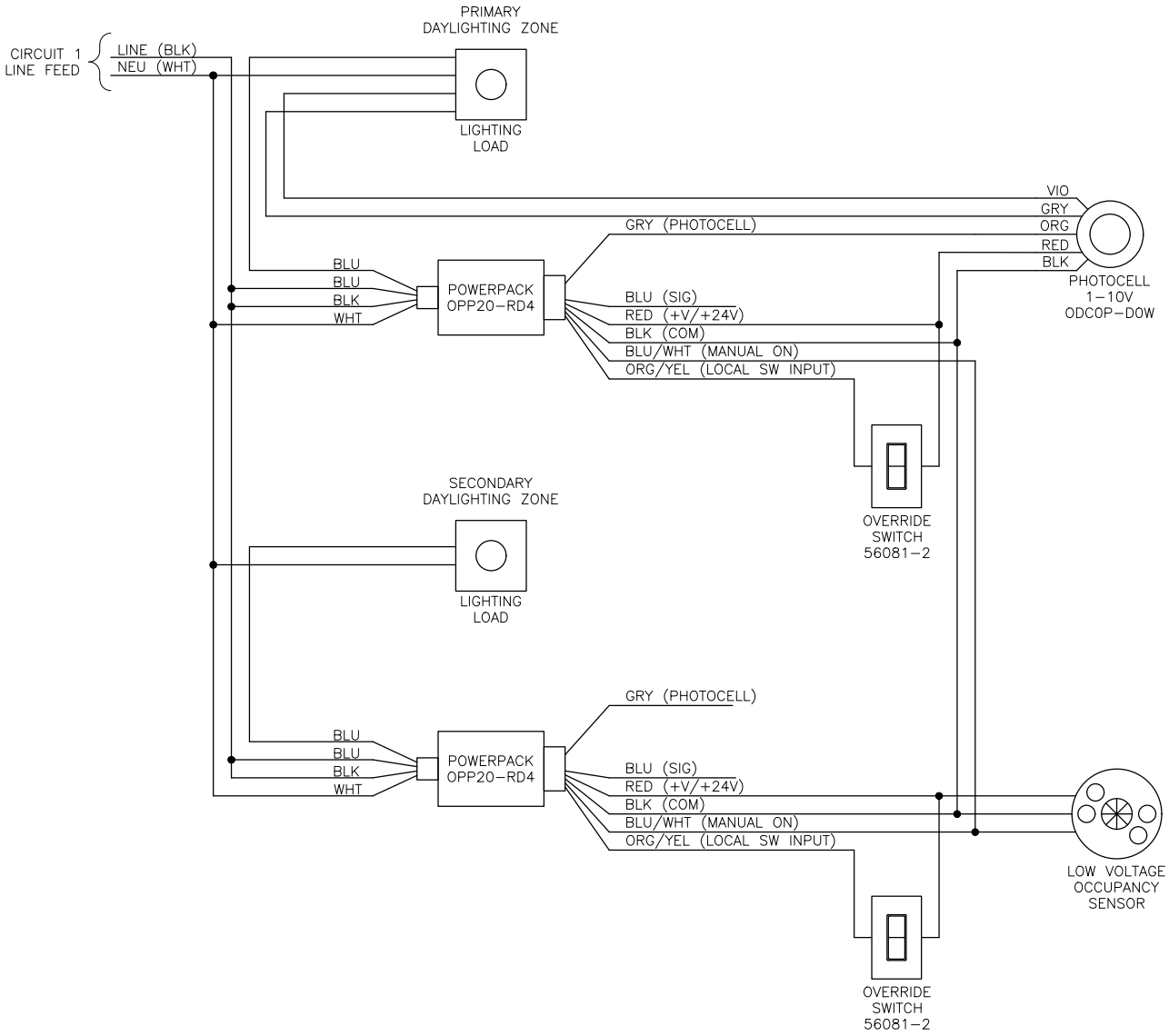
NOTES:

1. INDIVIDUALLY CAP UNUSED LEADS.
2. POWER PACK DE–ENERGIZES LIGHTING CIRCUIT WHEN SUFFICIENT LIGHT IS SENSED.

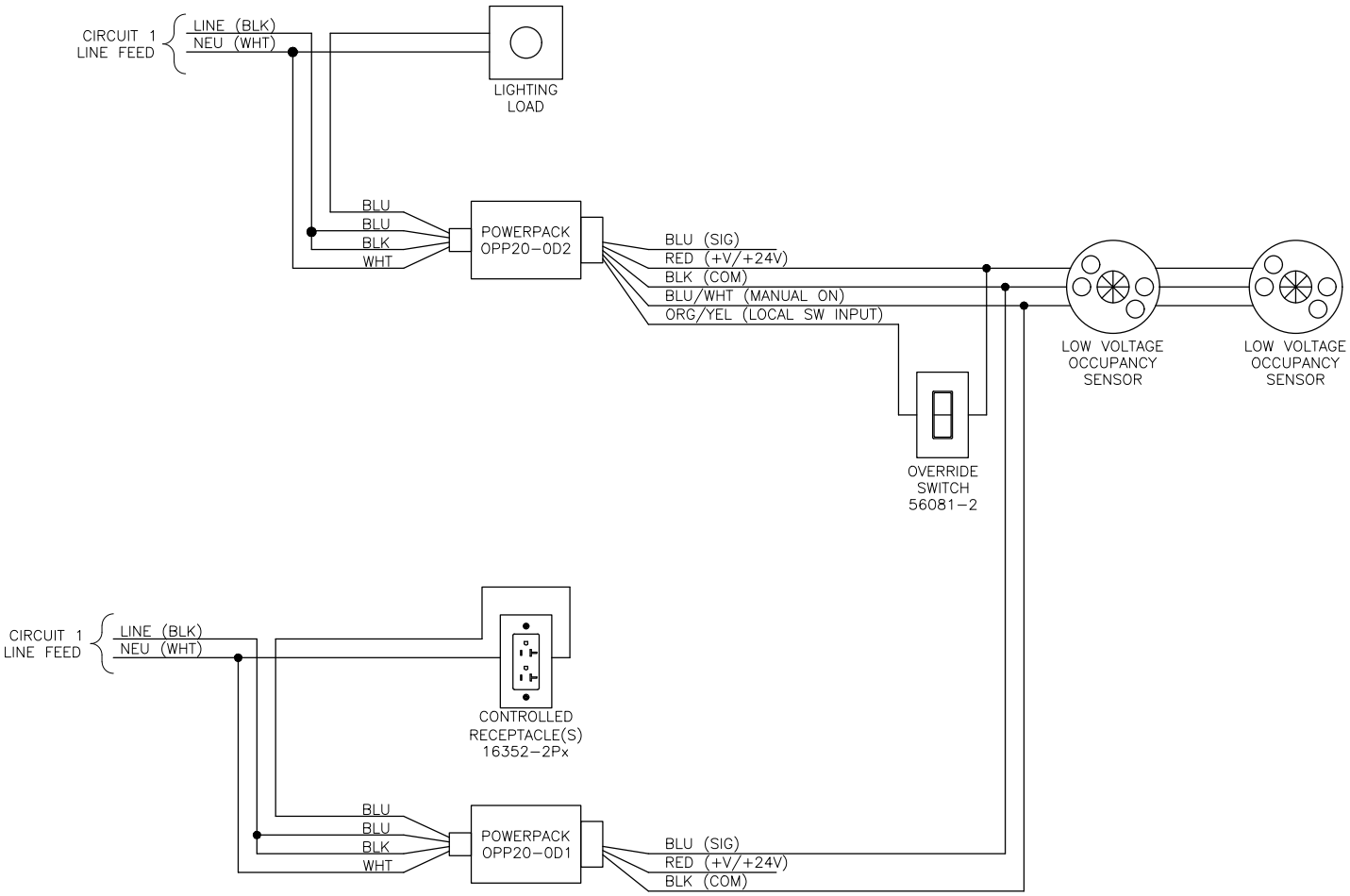
DAYLIGHTING, SWITCHED, MANUAL ON/OFF, AUTO OFF (VACANCY SENSING) 2 ZONES ODCOP-S0W, OPP20-RD4, 56081-2



DAYLIGHTING, 0-10V DIMMING, MANUAL ON/OFF, AUTO OFF (VACANCY SENSING) TWO ZONES ODC0P-D0W, OPP20-RD4, 56081-2



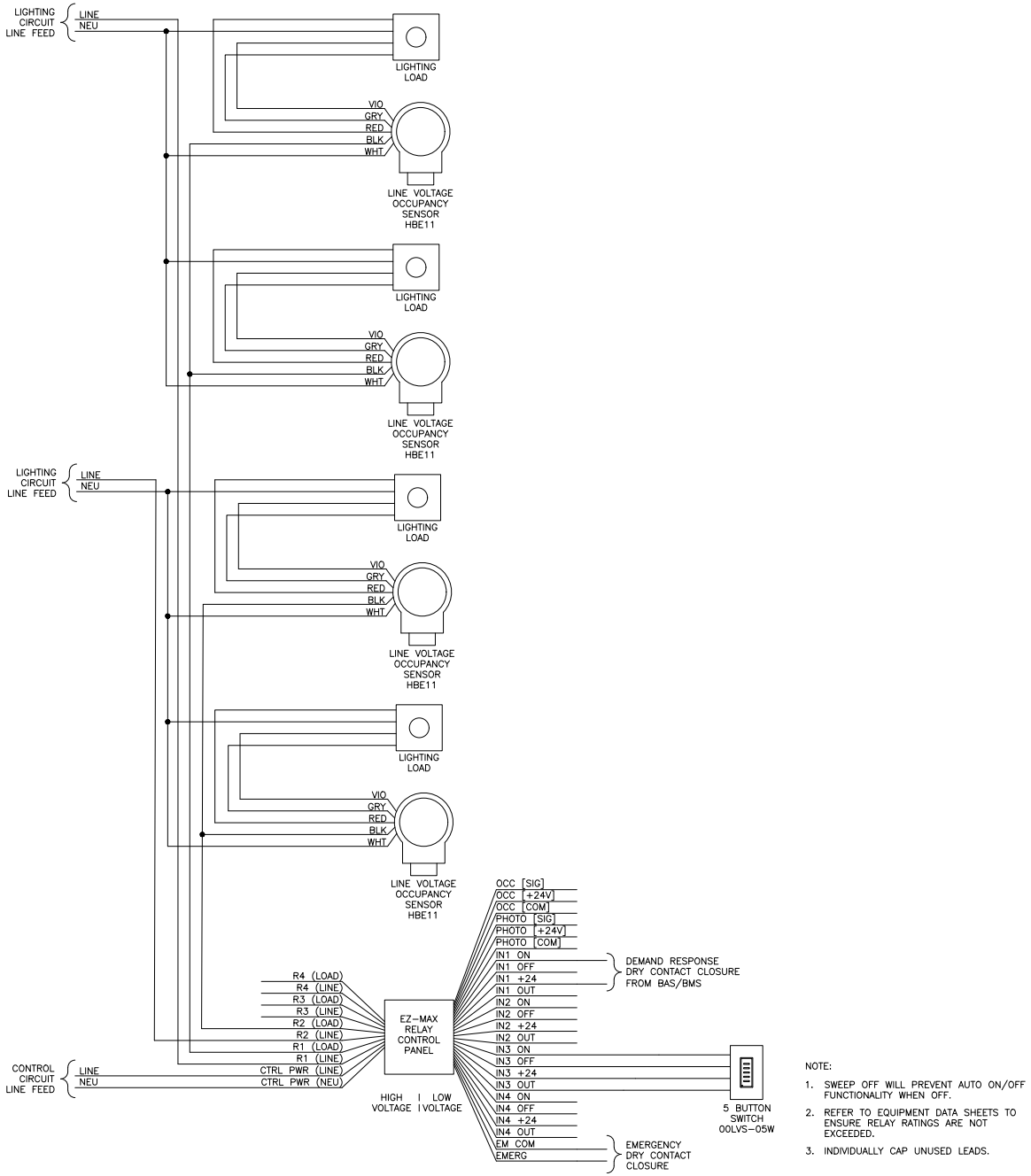
PLUG LOAD CONTROL AND OVERHEAD LIGHTING OF DIFFERENT VOLTAGE



NOTES:

1. AREA LIGHTING CONTROLLED BY MANUAL ON/ OFF, AUTO OFF FROM SENSORS.
2. LOCAL TASK RECEPTACLE CONTROLLED AUTO ON/OFF BY SENSOR.
3. AREA LIGHTING OPERATION MAY BE CHANGED TO BE AUTO ON/OFF, MANUAL ON/OFF BY TERMINATING ON POWER PACK BLU (SIG) INSTEAD OF BLU/WHT (MANUAL ON) AS SHOWN.

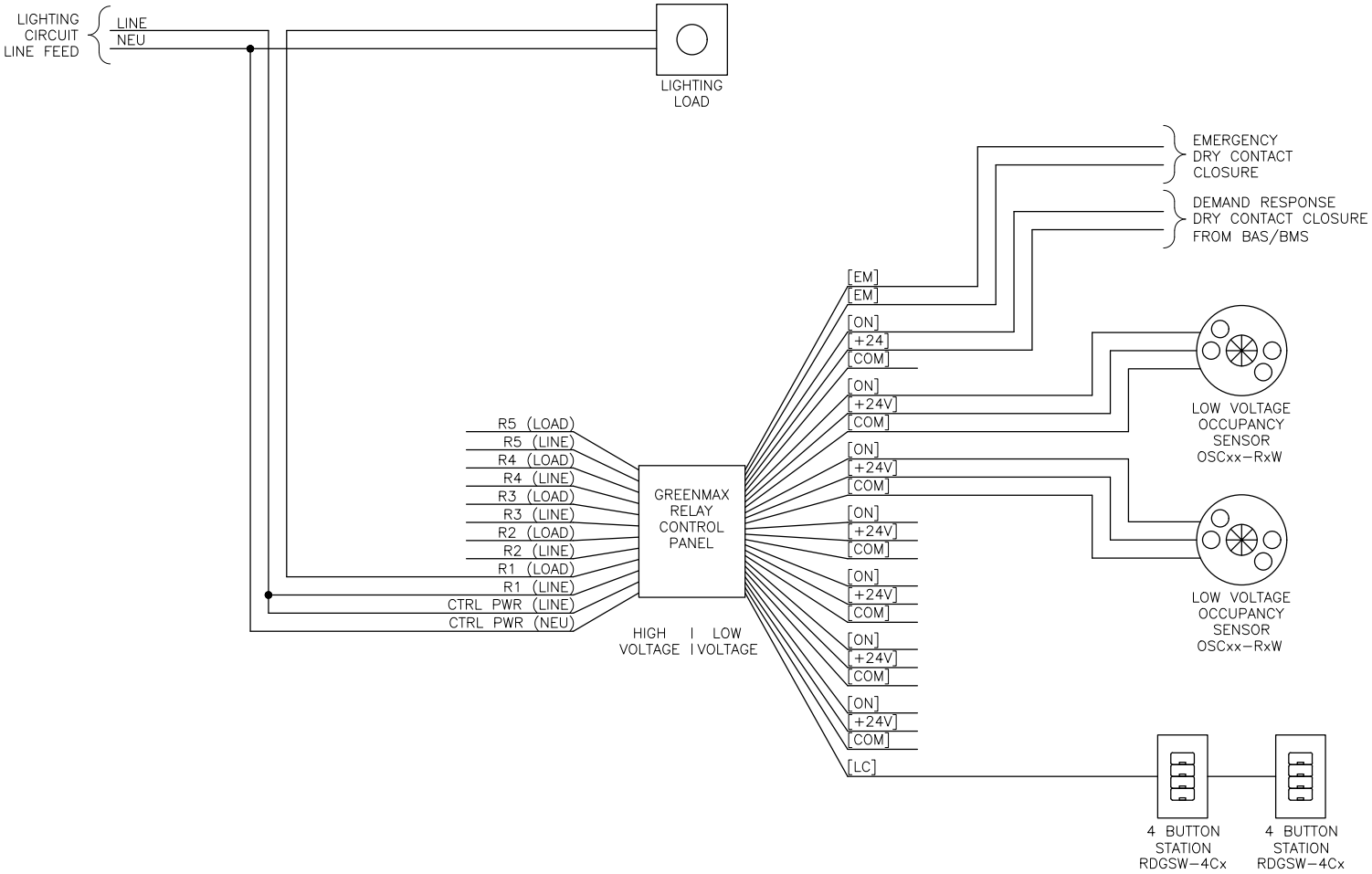
LINE VOLTAGE AND LOW VOLTAGE SENSOR CONTROL CIRCUIT



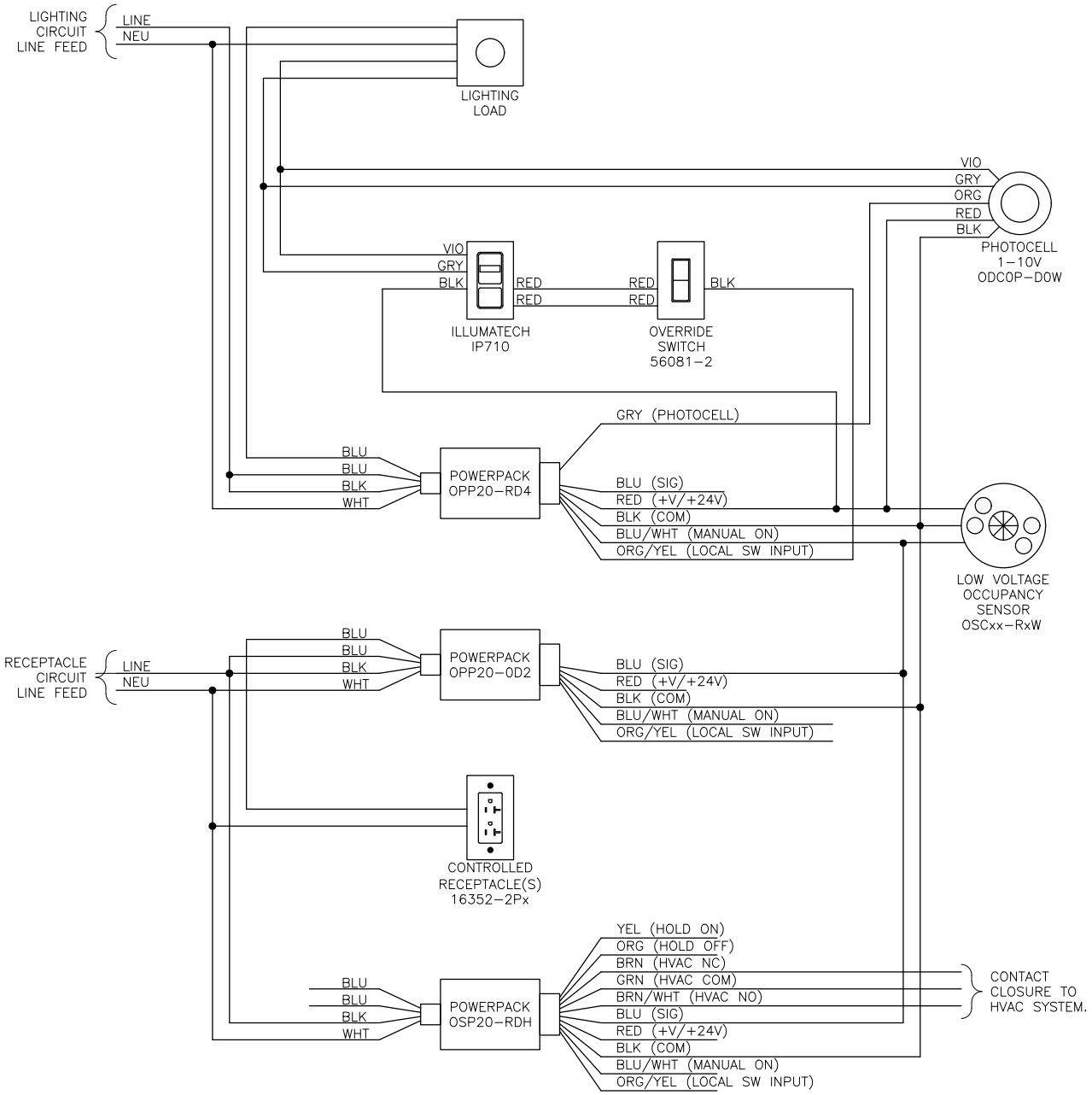
NOTE:

1. SWEEP OFF WILL PREVENT AUTO ON/OFF FUNCTIONALITY WHEN OFF.
2. REFER TO EQUIPMENT DATA SHEETS TO ENSURE RELAY RATINGS ARE NOT EXCEEDED.
3. INDIVIDUALLY CAP UNUSED LEADS.

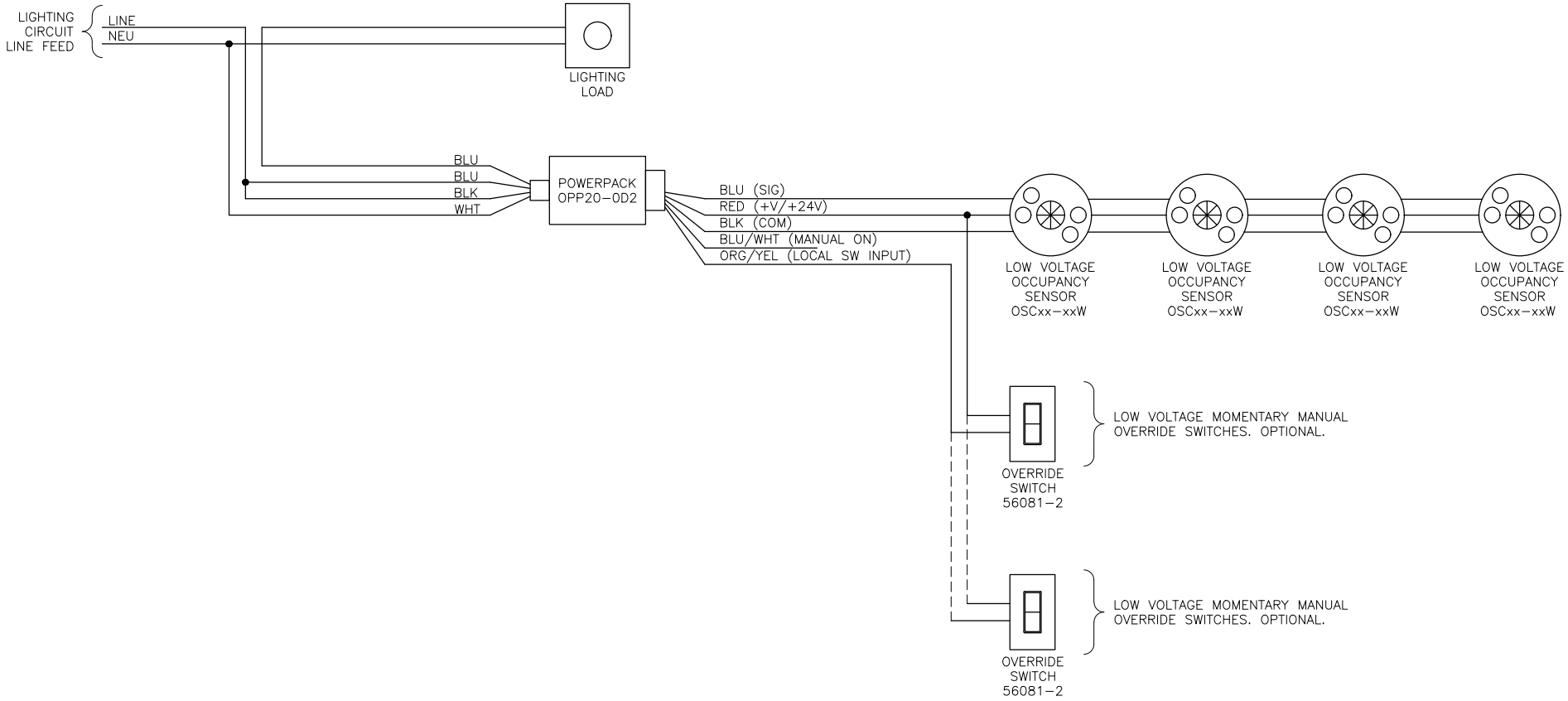
HALLWAY GREENMAX



COMMON AREA WITH HVAC SIGNAL, 0-10V PHOTOCELL



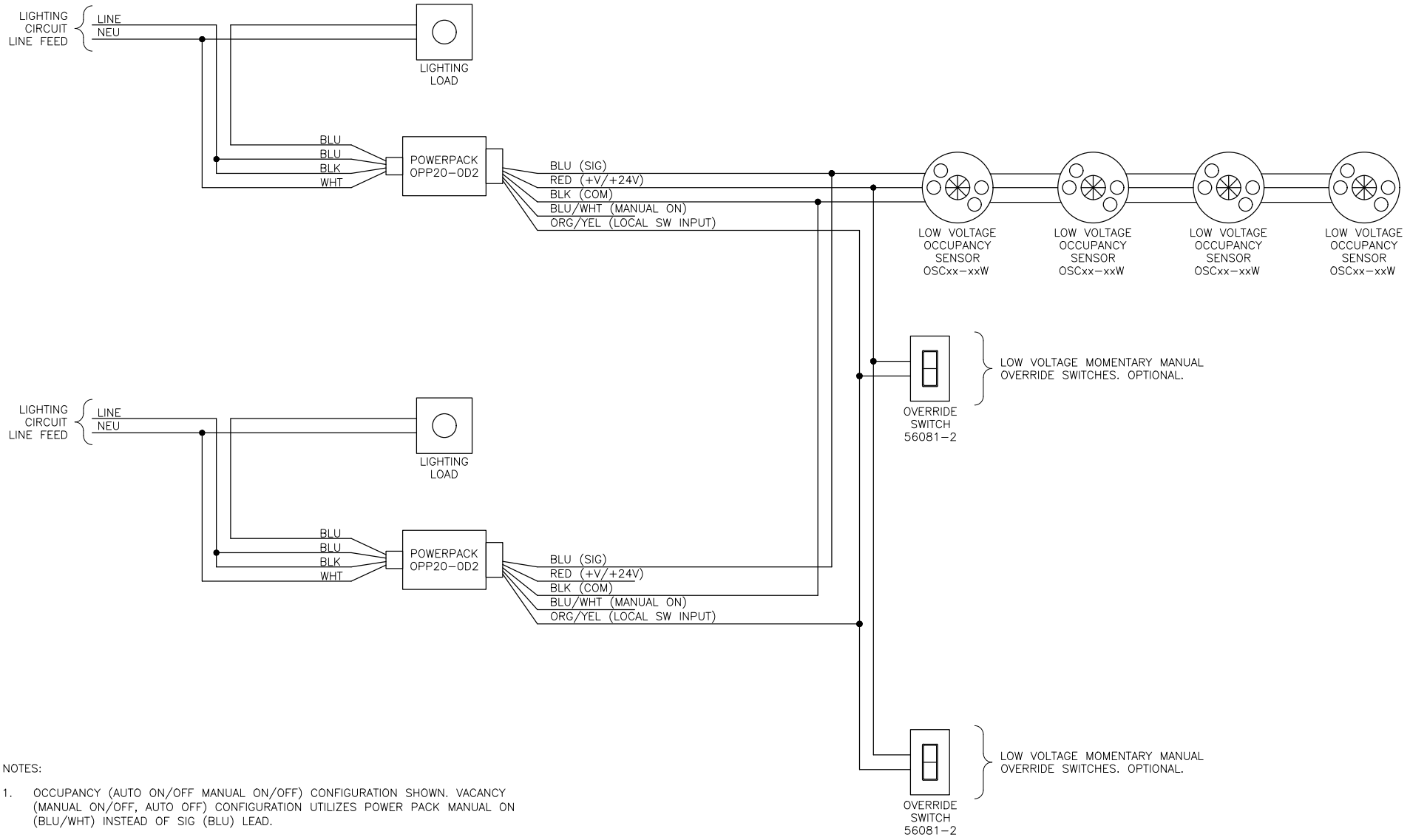
OCCUPANCY SENSING



NOTES:

1. OCCUPANCY (AUTO ON/OFF MANUAL ON/OFF) CONFIGURATION SHOWN. VACANCY (MANUAL ON/OFF, AUTO OFF) CONFIGURATION UTILIZES POWER PACK MANUAL ON (BLU/WHT) INSTEAD OF SIG (BLU) LEAD.
2. FOUR SENSORS SHOWN. QUANTITY OF SENSORS MAY BE CONNECTED IN PARALLEL UP TO THE LOAD RATING OF THE POWER PACK.
3. OPTIONAL SWITCH REQUIRED FOR ANY MANUALLY OPERATED CONFIGURATION. ADDITIONAL SWITCHES MAY BE ADDED IN PARALLEL FOR 3-WAY, 4-WAY, N-WAY OPERATION.
4. INDIVIDUALLY CAP UNUSED LEADS.

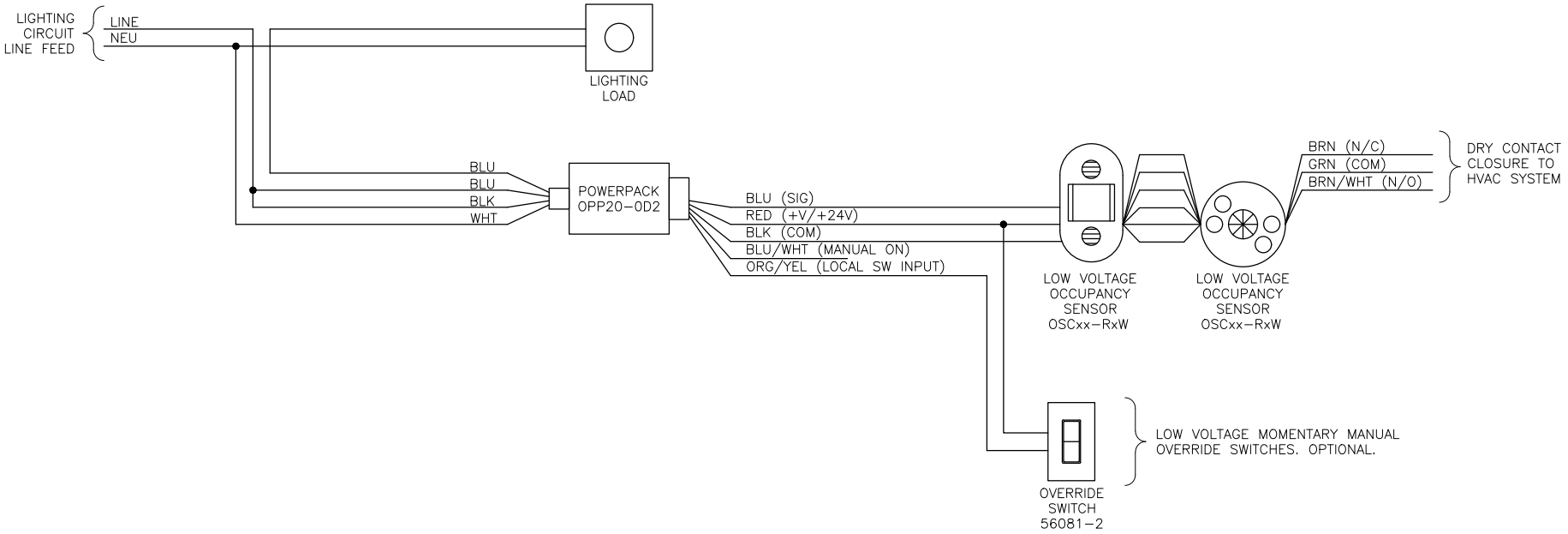
OCCUPANCY SENSING, TWO LEGS SAME ZONE



NOTES:

1. OCCUPANCY (AUTO ON/OFF MANUAL ON/OFF) CONFIGURATION SHOWN. VACANCY (MANUAL ON/OFF, AUTO OFF) CONFIGURATION UTILIZES POWER PACK MANUAL ON (BLU/WHT) INSTEAD OF SIG (BLU) LEAD.
2. CONFIGURATION SHOWN WILL CONTROL BOTH FED/LOAD COMBINATIONS THE SAME FOR OCCUPANCY AND MANUAL SWITCH OPERATION.
3. FOUR SENSORS SHOWN. QUANTITY OF SENSORS MAY BE CONNECTED IN PARALLEL UP TO THE LOAD RATING OF THE POWER PACK.
4. OPTIONAL SWITCH REQUIRED FOR ANY MANUALLY OPERATED CONFIGURATION. ADDITIONAL SWITCHES MAY BE ADDED IN PARALLEL FOR 3-WAY, 4-WAY, N-WAY OPERATION.
5. INDIVIDUALLY CAP UNUSED LEADS.

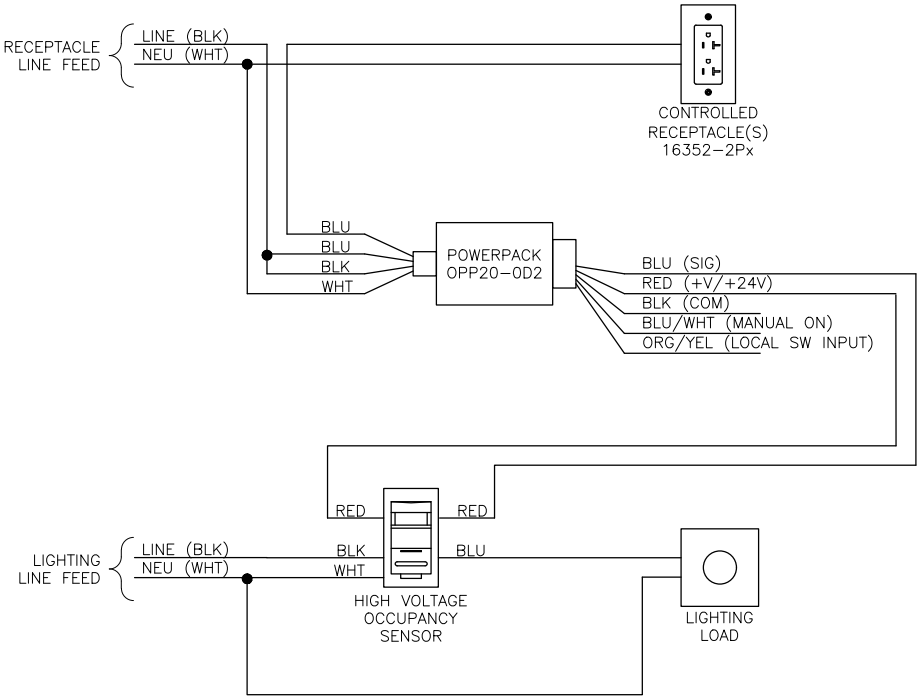
OCCUPANCY SENSING WITH CONTACT CLOSURE TO HVAC SYSTEM



NOTES:

1. OCCUPANCY (AUTO ON/OFF MANUAL ON/OFF) CONFIGURATION SHOWN. VACANCY (MANUAL ON/OFF, AUTO OFF) CONFIGURATION UTILIZES POWER PACK MANUAL ON (BLU/WHT) INSTEAD OF SIG (BLU) LEAD.
2. TWO SENSORS SHOWN. QUANTITY OF SENSORS MAY BE CONNECTED IN PARALLEL UP TO THE LOAD RATING OF THE POWER PACK.
3. DRY CONTACT CLOSURE TO HVAC SYSTEM AVAILABLE AS NORMALLY OPEN OR NORMALLY CLOSED. TERMINATE TO LEADS AS HVAC SYSTEM REQUIRES.
4. HVAC RELAY OPERATION CORRESPONDS TO SENSED ROOM STATE. MANUAL SWITCH OPERATION DOES NOT EFFECT HVAC RELAY STATE.
5. OPTIONAL SWITCH REQUIRED FOR ANY MANUALLY OPERATED CONFIGURATION. ADDITIONAL SWITCHES MAY BE ADDED IN PARALLEL FOR 3-WAY, 4-WAY, N-WAY OPERATION.
6. INDIVIDUALLY CAP UNUSED LEADS.

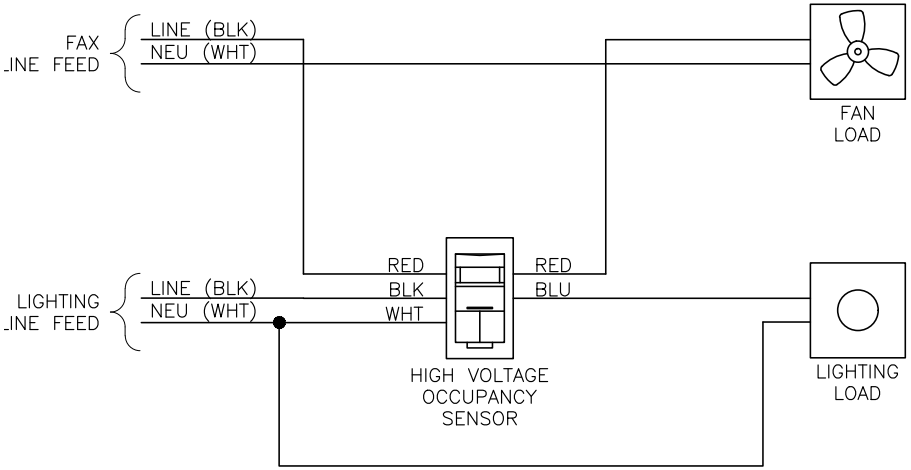
OSSMD WITH POWER PACK FOR RECEPTACLE CONTROL



NOTES:

1. AREA LIGHTING CONTROLLED BY WALLBOX SENSOR.
2. SECOND RELAY ON WALLBOX SENSOR PROVIDES CONTACT CLOSURE FOR POWER PACK.
3. RECEPTACLE ENERGIZATION FOLLOWS LIGHTING ENERGIZATION.
4. LIGHTING AND RECEPTACLE CIRCUITS MAY BE ON DIFFERENT FEEDERS.
5. RECEPTACLE LOAD WILL BE ENERGIZED WHEN LIGHTING LOAD IS ENERGIZED AND DE–ENERGISED WHEN LIGHTING LOAD DE–ENERGIZED.

SINGLE RESTROOM WITH SEPARATE FAN CIRCUIT (OSSMD, ODS0D)



NOTES:

1. WALBOX SENSOR CONTAINS TWO (2) RELAYS.
2. AREA LIGHTING CONTROLLED BY PRIMARY SENSOR.
3. FAN CONTROLLED BY SECONDARY RELAY.
4. FEEDS MAY BE OF DIFFERENT VOLTAGES AND PHASES.
5. RELAY ACTION BASED ON OCCUPANCY INDEPENDENTLY CONFIGURED.

Leviton Manufacturing Co., Lighting & Controls
20497 SW 10385 SW Avery St, Tualatin, OR 97062 **tel** 800-736-6682 **fax** 503-404-5594 **tech line** (6:00AM-4:00PM PT Mon-Fri) 800-959-6004

Leviton Manufacturing Co., Inc. Global Headquarters
201 North Service Road, Melville, NY 11747-3138 **tel** 800-323-8920 **fax** 800-832-9538 **tech line** (8:00AM-10:00PM ET Mon-Fri, 9:00AM-7:00PM ET Sat, 9:00AM-5:00PM ET Sun 800-824-3005

Visit our Website at: www.leviton.com/sensors

©2023 Leviton Manufacturing Co., Inc. All rights reserved. Subject to change without notice.

G-9117C/K23-mm
REV NOV 2023