

Example: Digital Signal Requirements

Nominal values for voltage difference between Coil+ and Coil-: **OFF** 0 vDC; **ON** 11 to 13 vDC

1. DIGITAL SIGNAL REQUIREMENTS — BACKGROUND

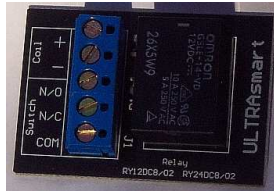
Our Basic Relay modules RY12DC8/02 and RY24DC8/02, and RelayPair modules RP12DC8/03 and RP24DC8/03 rely entirely on the coil properties of their respective OMRON G5LE-14 relays to determine the voltage (and current) of the digital signal that will operate or release the relay(s) on each module.

Looking at the Specifications⁽¹⁾ for Coil Ratings 400-mW Type, we find the following for the 12 vDC rated coil (the type used in Basic12 (**RY12DC8/02**), and RelayPair12 (**RP12DC8/03**) modules):

- ❑ Rated voltage: 12 VDC
- ❑ Rated current: 33.3 mA
- ❑ Max voltage: 130% of rated voltage (= 15.6 VDC)
- ❑ Must operate voltage: 75% of rated voltage (= 9 VDC)
- ❑ Must release voltage: 10% of rated voltage (= 1.2 VDC)

2. DIGITAL SIGNAL — BASICRELAY12: RY12DC8/02

This tells us everything we need to know for the properties of a digital input to our **BasicRelay12** modules (**RY12DC8/02**) via terminals Coil+ and Coil- .



- ❑ To operate (or switch) the relay, the voltage difference between the Coil+ and Coil- terminals must be at least 9 VDC (must operate voltage), but less than 15.6 VDC (max voltage). Preferred is nominal 12 VDC (but within the range 11 to 13 VDC should normally be fine).
- ❑ When active, the module consumes 33.3 mA. A safety margin above this current should be considered to cover possible in-rush currents etc.
- ❑ To ensure the relay is released, the voltage difference across the Coil+ and Coil- terminals must be less than 1.2 VDC. 0 VDC is normally preferred.

3. DIGITAL SIGNAL — RELAYPAIR12: RP12DC8/03

Each **individual unit** of the **RelayPair12** modules (**RP12DC8/02**) has a Relay On indicator LED. The associated circuitry is in parallel with the relay coil and consumes about 12mA.

So properties of the digital input via terminals Coil+ and Coil- of each **individual unit** are the same as Item 2 above (BasicRelay12), but with an extra 12mA due to the LED.



Notes:

1. Specifications can be found at OMRON's European web site—<http://www.europe.omron.com/> (If you can't find the specs on OMRON's site, we have a PDF copy on our website at <http://www.ultrasmart.org/Relays.html>).
2. Examples should be read in conjunction with the generic manual instructions for the BasicRelay12 (RY12DC8/02) and the RelayPair12 (RP12DC8/03). No warranty is expressed or implied. In no event will the authors, ULTRAsmart, Jarvis (Australia) Pty Ltd or its employees or directors be held liable for any damages arising from the use of examples. Examples are not intended as technical advice. It is the user's responsibility to use our modules safely, correctly, and appropriately.

HOW TO TURN A "STANDARD" RELAY MODULE ON (OR OFF)

What is a Standard Relay Module?

"Standard" (or basic) relay modules are those modules in which the relay coil is powered directly via the Coil+ and Coil- connections. There is no Trigger (TRG) connection (which, for example, you find on the DualTimer12 module).

This means that the *Digital On/Off* signal is also the *Power On/Off*.

In other words, the relay gets turned On when current is supplied via the Coil+ and Coil- terminals.

The *Digital Signal Requirements* information to the left provides assistance in understanding the voltage and current needed to power the coil of the OMRON G5LE-14 relays used on our "standard" relay modules.

Modern relays (even power relays such as the OMRON G5LE) are very sensitive and require very little current to operate. And they work across a surprisingly wide voltage range.

Some Wiring Information

Polarity: Wiring of the standard relay module Coil+ and Coil- terminals is very important to ensure that the back EMF protection diode works properly. The higher voltage connection must always be to the Coil+ terminal.

Example Circuitry⁽²⁾

The document *Some Standard Relay Module Circuitry* is available on our web site under Example Applications. It includes discussion of Open Collector Outputs like that shown in the diagram below. Also check out other documents such as *Simplified Traffic Lights*.

