

# Features

## Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 84%
- Fixed Operating Frequency
- Six-Sided Continuous Shield

**RECOM**  
DC/DC Converter

## RP10-EW

10 Watt

2" x 1"

Single & Dual Output



### Description

The RP10-EW series wide input range DC/DC converters are certified to UL 60950-1 and cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The industry standard 2" x 1" package meets military standards for thermal shock and vibration tolerance and is available with an optional remote on/off control pin.

### Selection Guide

| Part Number                    | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Input Current [mA] <sup>(1)</sup> | Efficiency <sup>(1)</sup> typ. [%] | Max. Capacitive Load <sup>(2)</sup> [μF] |
|--------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|------------------------------------------|
| RP10-243.3SEW <sup>(3,4)</sup> | 9-36                      | 3.3                  | 2500                | 441                               | 78                                 | 6800                                     |
| RP10-2405SEW <sup>(3,4)</sup>  | 9-36                      | 5                    | 2000                | 521                               | 80                                 | 4700                                     |
| RP10-2412SEW <sup>(3,4)</sup>  | 9-36                      | 12                   | 830                 | 494                               | 84                                 | 690                                      |
| RP10-2415SEW <sup>(3,4)</sup>  | 9-36                      | 15                   | 670                 | 517                               | 81                                 | 470                                      |
| RP10-483.3SEW <sup>(3,4)</sup> | 18-75                     | 3.3                  | ±333                | 30                                | 76                                 | 6800                                     |
| RP10-4805SEW <sup>(3,4)</sup>  | 18-75                     | 5                    | 2500                | 322                               | 81                                 | 4700                                     |
| RP10-4812SEW <sup>(3,4)</sup>  | 18-75                     | 12                   | 2000                | 595                               | 84                                 | 690                                      |
| RP10-4815SEW <sup>(3,4)</sup>  | 18-75                     | 15                   | 830                 | 309                               | 84                                 | 470                                      |
| RP10-2405DEW <sup>(3,4)</sup>  | 9-36                      | ±5                   | 416                 | 508                               | 82                                 | ±680                                     |
| RP10-2412DEW <sup>(3,4)</sup>  | 9-36                      | ±12                  | ±1000               | 520                               | 80                                 | ±330                                     |
| RP10-2415DEW <sup>(3,4)</sup>  | 9-36                      | ±15                  | ±416                | 520                               | 80                                 | ±110                                     |
| RP10-4805DEW <sup>(3,4)</sup>  | 18-75                     | ±5                   | 670                 | 254                               | 82                                 | ±680                                     |
| RP10-4812DEW <sup>(3,4)</sup>  | 18-75                     | ±12                  | 416                 | 267                               | 78                                 | ±330                                     |
| RP10-4815DEW <sup>(3,4)</sup>  | 18-75                     | ±15                  | ±1000               | 257                               | 81                                 | ±110                                     |

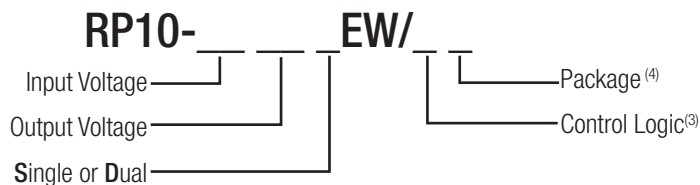


### Notes:

Note1: Maximum value at nominal input voltage and full load.

Note2: Test by minimum Vin and constant resistor load.

### Model Numbering



### Ordering Examples:

RP10-1205SEW/P = 12V Input, 5V Output, Positive Logic CTRL pin fitted

RP10-4805DEW-HC = 48V Input, 5V Output, No CTRL pin, Heatsink fitted

### Notes:

Note3: add suffix "P" for CTRL function with Positive Logic (1=ON, 0=OFF)

add suffix "N" for CTRL function with Negative Logic (0=ON, 1=OFF)

Note4: add suffix -HC for premounted Heat-sink and clips



**UL**  
E196683

UL60950-1 Certified

**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

### BASIC CHARACTERISTICS

| Parameter                                     | Condition                                       | Min.                  | Typ.                                               | Max.            |
|-----------------------------------------------|-------------------------------------------------|-----------------------|----------------------------------------------------|-----------------|
| Input Voltage Range                           | nom. Vin = 24V<br>nom. Vin = 48V                | 9VDC<br>18VDC         | 24VDC<br>48VDC                                     | 36VDC<br>75VDC  |
| Under Voltage Lockout (UVLO)                  |                                                 | none                  |                                                    |                 |
| Input Filter                                  |                                                 | Pi-Type               |                                                    |                 |
| Input Reflected Ripple Current <sup>(5)</sup> | nominal Vin and full load                       |                       | 30mA <sub>p-p</sub>                                |                 |
| Input Surge Voltage                           | Vin = 24V, 100ms max.<br>Vin = 48V, 100 ms max. |                       |                                                    | 50VDC<br>100VDC |
| Start-up time                                 | nominal Vin and constant resistor load          |                       | 20ms                                               |                 |
| Operating Frequency Range                     |                                                 | 270kHz                | 300kHz                                             | 330kHz          |
| Minimum Load <sup>(6)</sup>                   | of full load                                    | 10%                   |                                                    |                 |
| Ripple and Noise                              | 20MHz bandwidth                                 | Single<br>Dual        | 50mV <sub>p-p</sub><br>75mV <sub>p-p</sub>         |                 |
| Remote ON/OFF <sup>(7)</sup>                  | Positive Logic                                  | DC-DC ON<br>DC-DC OFF | Open or 3.5V < Vr < 12V<br>Short or 0V < Vr < 1.2V |                 |
|                                               | Negative Logic                                  | DC-DC ON<br>DC-DC OFF | Short or 0V < Vr < 1.2V<br>Open or 3.5V < Vr < 12V |                 |
| Input current of Remote pin (CTRL)            |                                                 | DC-DC OFF             | 20mA                                               |                 |
|                                               |                                                 | DC-DC ON              | -0.5mA                                             | 1.0mA           |

#### Notes:

Note5: Simulated source impedance of 12μH. 12μH inductor in series with +Vin.

Note6: The RP10 (W) series required a minimum 10% loading on the output to maintain specified regulation.

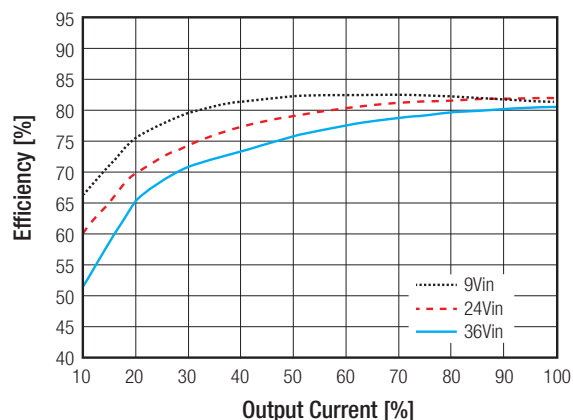
Operation under no-load condition will not damage these devices, however they may not meet all listed specification.

Note7: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.

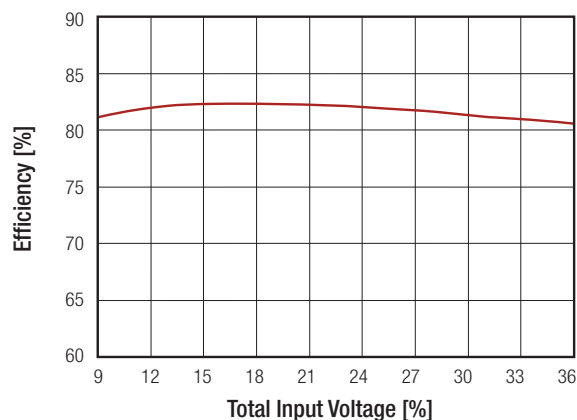
If no suffix is specified, the control pin will be omitted.

### RP10-2405SEW

Efficiency vs. Output Current



Efficiency vs. Input Voltage

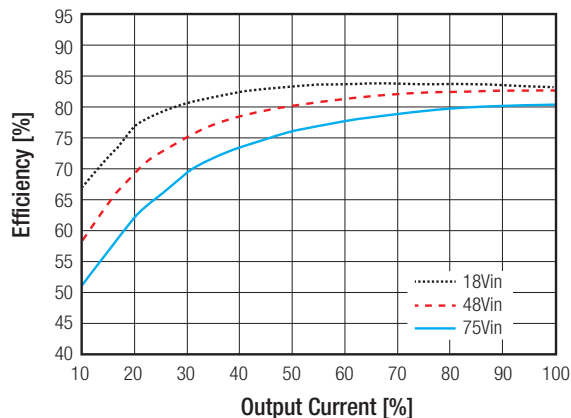


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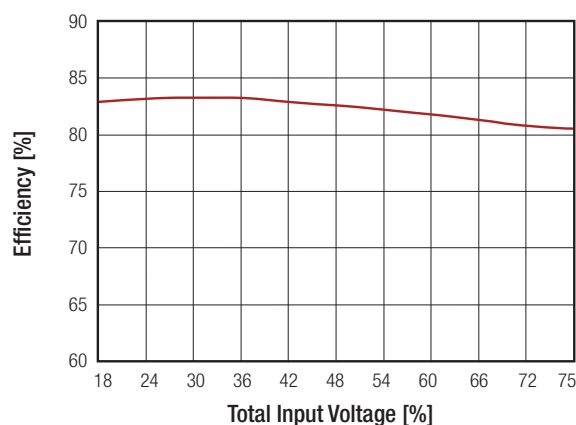
**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

## RP10-4805SEW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



## REGULATIONS

| Parameter                        | Condition                        |        | Value |
|----------------------------------|----------------------------------|--------|-------|
| Output Voltage Accuracy          |                                  |        | ±1%   |
| Load Voltage Regulation          | 0% to 100% load                  | Single | ±0.5% |
|                                  |                                  | Dual   | ±1.0% |
| Line Voltage Regulation          | low line to high line, full load |        | ±0.2% |
| Cross Regulation                 | asymmetrical 25%<->100% load     |        | ±5%   |
| Transient Response recovery time | 25% load step change             |        | 250µs |

## PROTECTIONS

| Parameter                      | Condition         |        | Value                          |
|--------------------------------|-------------------|--------|--------------------------------|
| Short Circuit Protection (SCP) |                   |        | Continuous, automatic recovery |
| Over Voltage Protection (OVP)  | Zener Diode Clamp | 5Vout  | 6.2VDC                         |
|                                |                   | 12Vout | 15VDC                          |
|                                |                   | 15Vout | 18VDC                          |
| Over Load Protection (OLP)     | %of lout rated    |        | 150% typ.                      |
| Isolation Voltage              | I/P to O/P        |        | 1.6kVDC/1 minute               |
|                                | I/P (O/P) to case |        | 1.6kVDC/1 minute               |
| Isolation Resistance           | 500VDC            |        | 1GΩ min.                       |
| Isolation Capacitance          |                   |        | 300pF max.                     |

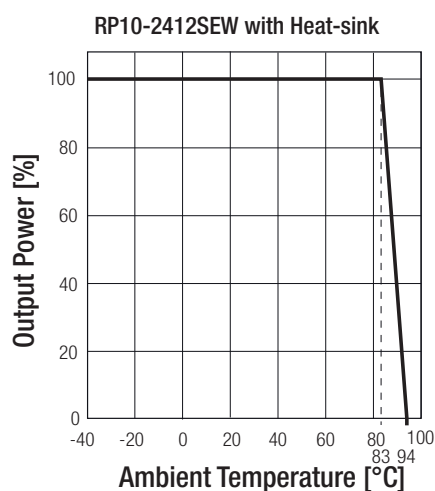
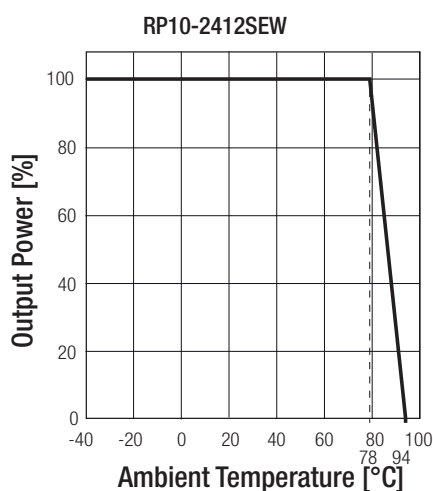
### Notes:

Note8: This power module is not internally fused. An input line fuse must always be used.

**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

| ENVIRONMENTAL                    |                                          |                              |
|----------------------------------|------------------------------------------|------------------------------|
| Parameter                        | Condition                                | Value                        |
| Operating Temperature Range      | without derating                         | -40°C to +78°C               |
|                                  | with derating                            | -40°C to +94°C               |
| Maximum Case Temperature         |                                          | +105°C                       |
| Temperature Coefficient          |                                          | ±0.02%/°C max.               |
| Thermal Impedance <sup>(9)</sup> | Natural convection (20LFM)               | 12°C/Watt                    |
|                                  | Natural convection (20LFM) with heatsink | 10°C/Watt                    |
| Operating Humidity               | non-condensing                           | 5% - 95% RH                  |
| Thermal Shock                    |                                          | MIL-STD-810F                 |
| Vibration                        |                                          | MIL-STD-810F                 |
| MTBF                             | MIL-HDBK-217F, Full Load                 | 3342 x 10 <sup>3</sup> hours |
|                                  | Bellco TR-NWT-000332 <sup>(10)</sup>     | 1976 x 10 <sup>3</sup> hours |

**Derating Graph<sup>(11)</sup>**



**Notes:**

- Note9: Heatsink is optional and P/N 7G-0020C. Powerline DC/DC Converters can be ordered with pre-mounted heatsinks including antivibration fixing clips (add suffix -HC). See application notes for further details.
- Note10: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment).
- Note11: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact our technical support service at techsupportAT@recom-power.com

| SAFETY AND CERTIFICATIONS      |                            |                                                           |
|--------------------------------|----------------------------|-----------------------------------------------------------|
| Certificate Type (Safety)      | Report / File Number       | Standard                                                  |
| UL General Safety              | E196683                    | UL60950-1 1st Ed.: 2003<br>C22.2 No. 60950 1st. Ed.: 2003 |
| EMC Compliance                 | Condition                  | Standard / Criterion                                      |
| EMI Standard <sup>(12)</sup>   | with external filter       | EN55022, Class A or B                                     |
| ESD                            | Air ±8kV and Contact ± 6kV | EN61000-4-2, Criteria B                                   |
| Radiated Immunity              | 10 V/m                     | EN61000-4-3, Criteria A                                   |
| Fast Transient <sup>(13)</sup> | ±2kV                       | EN61000-4-4, Criteria B                                   |
| Surge <sup>(13)</sup>          | ±2kV                       | EN61000-4-5, Criteria B                                   |
| Conducted Immunity             | 10 Vr.m.s                  | EN61000-4-6, Criteria A                                   |
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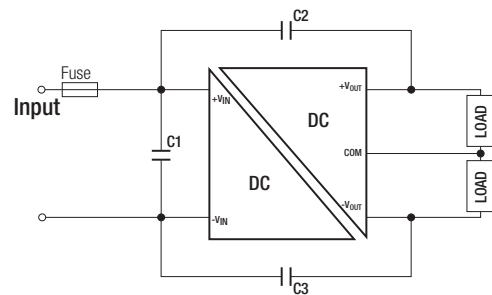
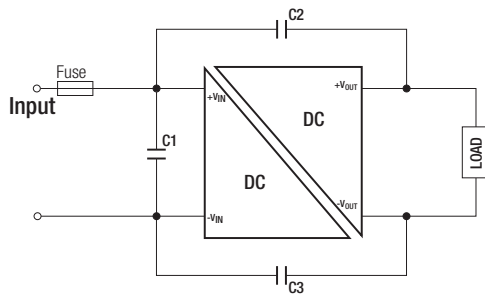
**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

**Notes:**

Note12: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

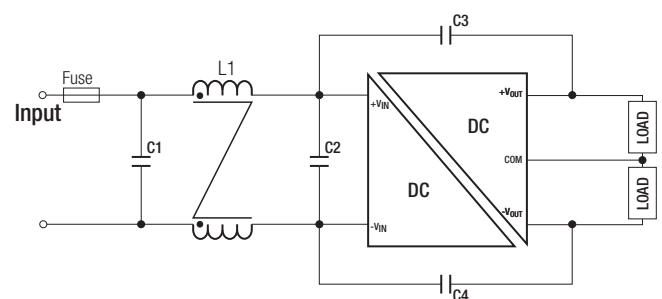
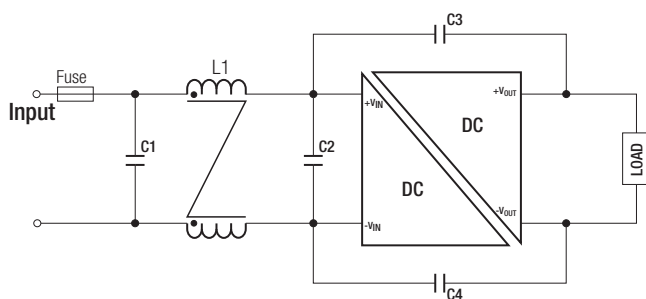
Note13: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220 $\mu\text{F}$ /100V

### EMC Filtering Class A



| MODEL          | C1                                   | C2                      | L1                      |
|----------------|--------------------------------------|-------------------------|-------------------------|
| RP10-24xxS_DEW | 1 $\mu\text{F}$ /50V<br>1210 MLCC    | 1000pF/2kV<br>1808 MLCC | 1000pF/2kV<br>1808 MLCC |
| RP10-48xxS_DEW | 1.5 $\mu\text{F}$ /100V<br>1812 MLCC | 1000pF/2kV<br>1808 MLCC | 1000pF/2kV<br>1808 MLCC |

### EMC Filtering Class B



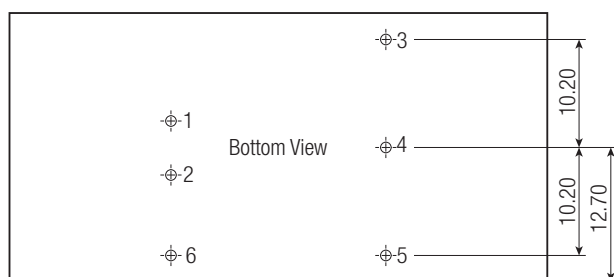
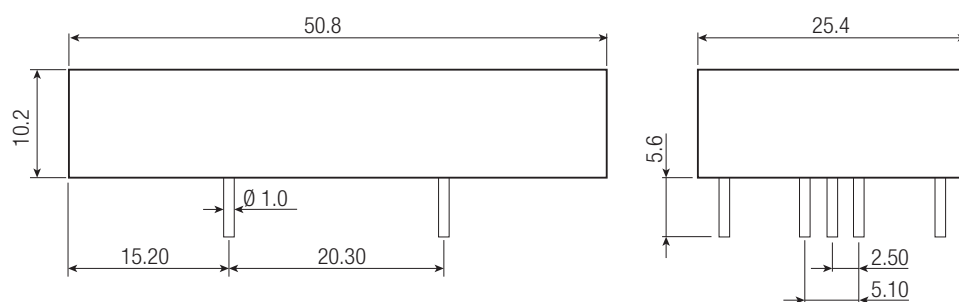
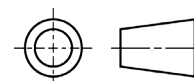
| MODEL          | C1                                  | C2                                   | C3/C4                   | L1                                                          |
|----------------|-------------------------------------|--------------------------------------|-------------------------|-------------------------------------------------------------|
| RP10-24xxS_DEW | 2.2 $\mu\text{F}$ /50V<br>1812 MLCC | N/A                                  | 1000pF/2kV<br>1808 MLCC | CMC: 325 $\mu\text{H}$<br>ref: WE 744290321<br>ref.: CMC-06 |
| RP10-48xxS_DEW | 2.2 $\mu\text{F}$ /50V<br>1812 MLCC | 2.2 $\mu\text{F}$ /100V<br>1812 MLCC | 1000pF/2kV<br>1808 MLCC | CMC: 325 $\mu\text{H}$<br>ref: WE 744290321<br>ref.: CMC-06 |

**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

### DIMENSIONS and PHYSICAL CHARACTERISTICS

| Parameter                  | Type              | Value                        |
|----------------------------|-------------------|------------------------------|
| Material                   | Case              | Nickel coated copper         |
|                            | Base              | Non-conductive black plastic |
|                            | Potting           | Epoxy (UL94-V0)              |
| Package Dimensions (LxWxH) | without Heat-sink | 50.8 x 25.4 x 10.2mm         |
|                            | with Heat-sink    | 56.8 x 25.4 x 16.8mm         |
| Package Weight             | without Heat-sink | 27g                          |
|                            | with Heat-sink    | 37.89g                       |

### Dimension Drawing (mm)

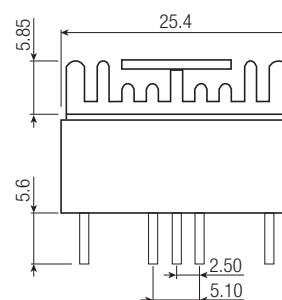
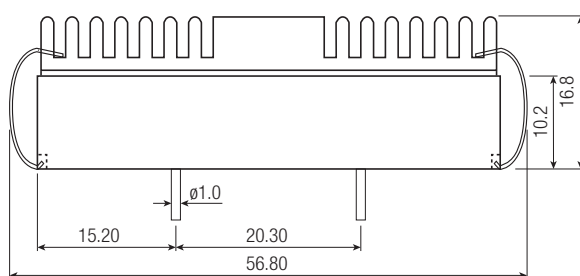
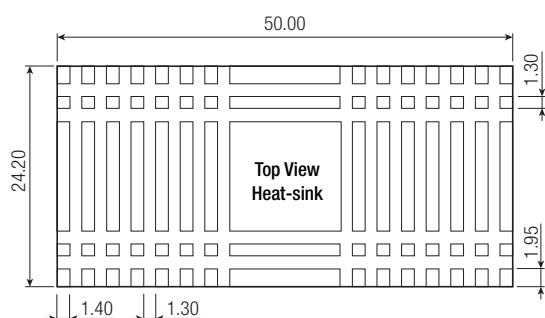


### Pin Connections

| Pin # | Single | Dual  |
|-------|--------|-------|
| 1     | +Vin   | +Vin  |
| 2     | -Vin   | -Vin  |
| 3     | +Vout  | +Vout |
| 4     | No Pin | Com   |
| 5     | -Vout  | -Vout |
| 6*    | CTRL*  | CTRL* |

\*optional see Note7  
Pin Pitch Tolerance  $\pm 0.25\text{mm}$   
Pin Dimension Tolerance  $\pm 0.1\text{mm}$   
XX.X  $\pm 0.5\text{mm}$   
XX.XX  $\pm 0.25\text{mm}$

### Dimension Drawing (mm) with Heat-sink



**Specifications** measured at Ta = 25°C, nominal input voltage, full load otherwise noted

### PACKAGING INFORMATION

| Parameter                 | Type              |      | Value           |
|---------------------------|-------------------|------|-----------------|
| Packaging Quantity        | without Heat-sink | Tube | 9pcs.           |
|                           | with Heat-sink    | Foam | 20pcs.          |
| Storage Temperature Range |                   |      | -55°C to +125°C |
| Storage Humidity          |                   |      | 5% - 95% RH     |