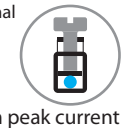
**"Master + Slave" system for dimming multiple lighting loads of either single or mixed lamp technologies**

**Type 15.10 "Master"** - accepts input from a controlling push-button and outputs a dimming signal to a maximum of 32 x 15.11 slave dimmers, or other drivers or luminaires accepting a standardised 0-10 V/1-10 V signal
- Use with 4 wire connection
- "Soft" On and Off transitions
- Linear dimming
- Selectable operating modes with or without previous light level memory
- Staircase timer function

**Type 15.11 "Slave"** - accepts 1-10 V input from a 15.10 or other 0-10 V/1-10 V output device to dim a wide variety of lamps of different technology
- Selector switch for incandescent and halogen lighting loads (with or without transformer or electronic driver)
- Compatible with energy saving dimmable CFL or LED lamps and with all types of electromagnetic transformers
- Thermal protection against overload, thermo-fuse for extreme or short-circuit protection

Screw terminal



* Maximum peak current of the contact 30 A 230 V AC. Use a contactor or power relay to switch loads exceeding this value

For outline drawing see page 11

NEW **15.10**

**"Master" dimmer**
- 0-10 V/1-10 V output to drive up to 32 x 15.11 slave dimmers or other similar devices
- Multi-function (with or without memory, including special "CFL with memory" function)
- Linear dimming
- Dimming speed setting
- Staircase timer function, with switch-off "early warning" signalled by lamps dimming
- 230 V AC supply, 50/60 Hz with automatic adjustment for frequency
- 6 A output relay contact*
- 17.5 mm wide, modular, 35 mm rail mount

NEW **15.11**

**"Slave" dimmer**
- 1-10 V input, driven by 15.10 or by other 0-10 V/1-10 V output devices
- Maximum lamp load 400 W
- 100 W load with energy saving dimmable lamps (LED and CFL)
- Leading and trailing edge dimming methods
- "Transformer" function (for use with electromagnetic transformers)
- Minimum dimming level setting
- 17.5 mm wide, modular, 35 mm rail mount

| | | 15.10 | 15.11 |
|---|---|---|---|
| **"Master Dimmer" output specifications** | | | |
| Driving signal (Output mode automatically configures to match input mode of the connected Driver) | | 0-10 V, +35 mA max (Active current sourcing mode) | — |
| | | 1-10 V, –35 mA max (Passive current sinking mode) | — |
| Contact configuration | A | 1 NO (6 A/230 V AC)* | — |
| **"Slave Dimmer" output specifications** | | | |
| Power max. | W | — | 400 |
| Power min. | W | — | 3 |
| Nominal lamp ratings: | | | |
| 230 V incandescent or halogen | W | — | 400 (1) |
| Toroidal electromagnetic transformers for LV halogen | W | — | 400 (2) |
| E-core electromagnetic transformers for LV halogen | W | — | 400 (2) |
| Electronic transformers (or ballasts) for LV halogen | W | — | 400 (1) |
| Dimmable compact fluorescent (CFL) | W | — | 100 (3) |
| Dimmable 230 V LED | W | — | 100 (3) or (1) |
| Dimmable electronic transformers for LV LED | W | — | 100 (1) |
| **Supply specification** | | | |
| Nominal voltage ($U_N$) | V AC (50/60 Hz) | 110…230 | 230 |
| Operating range | | (0.8…1.1) $U_N$ | (0.8…1.1) $U_N$ |
| Stand-by power consumption | W | 0.5 | 0.5 |
| Dimming operating modes | | — | Trailing edge ( ☼ ) Leading edge ( ▯⊗ ) and ( ⊗ ) |
| **Technical data** | | | |
| Dimming speed (total dimming time) | s | 1.5…10 | — |
| Delay setting (staircase function) | min | 0.5…20 | — |
| Max no. of illuminated push-button (≤ 1 mA) | | 15 | — |
| Ambient temperature range | °C | –10…+50 | –10…+50 (4) |
| Protection category | | IP 20 | IP 20 |
| **Approvals** (according to type) | | CE | |

**Note**
(1) Select "trailing edge" ( ☼ ) position on the front selector.
(2) Select "transformer" ( ▯⊗ ) position on the front selector. Preferably, no more than 2 transformers.
(3) Select "leading edge" ( ⊗ ) position on the front selector, and set the appropriate minimum dimming value (dependent on lamp type).
(4) With lamp load > 300 W (> 75 W for CFL or LED lamps), adequate ventilation must be provided - a gap of 9 mm on both side of the dimmer is suggested. Use the plastic separator type 022.09.

**Electronic dimmers for lamps of various technologies. All compatible with the direct drive of Incandescent/halogen lamps and 230 V dimmable LED lamps** (Other lamps/drivers according to Type)

**Type 15.91**
- Mountable in wall box
- Leading edge dimming
- Linear dimming
- Automatically adjusts for supply frequency

**Type 15.51**
- Wall box or panel mount
- Trailing edge dimming
- Step or linear dimming
- Separate models for 50 and 60 Hz

**Type 15.81**
- 35 mm rail mount
- Leading or trailing edge dimming
- Also compatible with energy saving (CFL or LED) dimmable lamps and with most types of transformer/ballast drivers
- Linear dimming
- Automatically adjusts for supply frequency
- Thermo-fuse for extreme protection

- All Types suitable for incandescent and halogen lighting loads
- Use with 3 or 4 wire connection
- "Soft" On and Off transitions
- Two selectable operating modes: with or without previous light level memory
- Thermal protection against overload

Screw terminal

For outline drawing see page 11

| | 15.91 | 15.51 | 15.81 |
|---|---|---|---|
| | | | |
| | • Suitable for residential wall box mounting<br>• Maximum lamp load 100 W<br>• Leading edge dimming<br>• 2 modes - with or without memory<br>• 230 V AC supply, 50/60 Hz (with automatic adjustment for frequency)<br>• Linear dimming | • Suitable for wall box or panel mounting<br>• Maximum lamp load 400 W<br>• Trailing edge dimming<br>• Step or Linear dimming<br>• 2 modes - with or without memory<br>• 230 V AC supply (separate models for 50 and 60 Hz) | • 17.5 mm modular, 35 mm rail mount<br>• Maximum lamp load 500 W<br>• Multi-function<br>• Leading and trailing edge dimming methods (depending on the function)<br>• Compatible with energy saving (CFL or LED) dimmable lamps and most types of transformer/ballast drivers<br>• 230 V AC supply, 50/60 Hz (with automatic adjustment for frequency) |
| **Output data** | | | |
| Rated voltage V AC | 230 | 230 | 230 |
| Power max. W | 100 | 400 | 500 |
| Power min. W | 3 | 10 | 3 |
| Nominal lamp ratings: | | | |
| 230 V incandescent or halogen W | 100 | 400 | 500 (1) |
| Toroidal electromagnetic transformers for LV halogen W | — | 300 (2) | 500 (3) |
| E-core electromagnetic transformers for LV halogen W | — | — | 500 (3) |
| Electronic transformers (or ballasts) for LV halogen W | — | 400 (4) | 500 (1) |
| Dimmable compact fluorescent (CFL) W | — | — | 100 (5) |
| Dimmable 230 V LED W | 50 (6) | 50 (7) | 100 (5) |
| Dimmable electronic transformers for LV LED W | 50 (6) | 50 (7) | 100 (1) |
| **Supply specification** | | | |
| Nominal voltage ($U_N$) V AC (50/60 Hz) | 230 | 230 (8) | 230 |
| Operating range | $(0.8…1.1)U_N$ | $(0.8…1.1)U_N$ | $(0.8…1.1)U_N$ |
| Stand-by power consumption W | 0.4 | 0.7 | 0.5 |
| Dimming operating mode | Leading edge | Trailing edge | Trailing edge ( ☼ )<br>Leading edge ( ▯◫⊗ ) and ( ≋ ) |
| **Technical data** | | | |
| Ambient temperature range °C | –10…+50 (9) | –10…+50 (9) | –10…+50 (10) |
| Protection category | IP 20 | IP 20 | IP 20 |
| **Approvals** (according to type) | CE EAC | CE EAC | CE EAC |

**Note**
(1) Select "incandescent lamp" ( ☼ ) position on the front selector.
(2) One transformer only. Power-up only with the lamp load connected.
(3) Select "transformer" ( ▯◫⊗ ) position on the front selector. Preferably, no more than 2 transformers.
(4) One transformer only.
(5) Select "CFL" ( ≋ ) position on the front selector, and set the appropriate minimum dimming value (dependent on lamp type).
(6) Only if lamps or electronic transformers are compatible with leading edge method.
(7) Only if lamps or electronic transformers are compatible with trailing edge method.
(8) Specific 60 Hz version available (see ordering information).
(9) It is not recommended to mount more than one dimmer in the same wall box, unless adequate ventilation is provided or the lamp load is less than 100 W (15.51) or 50 W (15.91).
(10) With lamp load > 300 W (> 75 W for CFL or LED lamps), adequate ventilation must be provided - a gap of 9 mm on both side of the dimmer is suggested. Use the plastic separator type 022.09.

Not compatible with illuminated push-buttons.

I-2017, www.findernet.com

## Ordering information

Example: type 15.91, Dimmer, 230 V AC.

| 1 5 | . | 9 | 1 | . | 8 | . | 2 3 0 | . | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Series**

**Type**
1 = Master / slave, 35 mm rail (EN 60715) mount, 17.5 mm wide
5 = Panel or wall box mount
8 = 35 mm rail (EN 60715) mount, 17.5 mm wide, for energy saving lamps
9 = Wall box mount, for LED lamps

**No. of poles**
0 = 0-10 V output (only for 15.10)
1 = 1 output

**Supply version**
8 = AC

**Supply voltage**
230 = 230 V
230 = 110…230 V (only for 15.10)

**Output power**
0 = 100 W (15.91)
4 = 400 W (15.51,15.11)
5 = 500 W (15.81)

**AC input frequency**
0 = 50 Hz (15.51) 50/60 Hz (15.11/81/91)
1 = 50/60 Hz (15.10)
6 = 60 Hz (15.51)

0 = Standard
4 = Only for 15.51 linear dimming

**Codes**
15.10.8.230.0010 master dimmer, 50/60 Hz
15.11.8.230.0400 slave dimmer, 50/60 Hz
15.51.8.230.0400 step dimming, 50 Hz
15.51.8.230.0404 linear dimming, 50 Hz
15.51.8.230.0460 step dimming, 60 Hz
15.81.8.230.0500 linear dimming, 50/60 Hz
15.91.8.230.0000 linear dimming, 50/60 Hz

## Technical data

| **EMC specifications** | | | | | |
|---|---|---|---|---|---|
| Type of test | | **Reference standard** | **15.51/15.91** | **15.10/11/81** | |
| Electrostatic discharge | contact discharge | EN 61000-4-2 | 4 kV | | |
| | air discharge | EN 61000-4-2 | 8 kV | | |
| Radiated electromagnetic field | (80…1000 MHz) | EN 61000-4-3 | 3 V/m | 10 V/m | |
| Fast transients (burst) (5-50 ns, 5 and 100 kHz) | on supply terminals | EN 61000-4-4 | 4 kV | | |
| | on pushbutton connection | EN 61000-4-4 | 4 kV | | |
| Voltage pulses on supply terminals (surge 1.2/50 µs) | differential mode | EN 61000-4-5 | 2 kV | | |
| Radiofrequency common mode voltage (0.15…80 MHz) | on supply terminals | EN 61000-4-6 | 3 V | | |
| | on pushbutton connection | EN 61000-4-6 | 3 V | | |
| Voltage dips | 70% $U_N$, 40% $U_N$ | EN 61000-4-11 | 10 cycles | | |
| Short interruptions | | EN 61000-4-11 | 10 cycles | | |
| Radiofrequency conducted emissions | 0.15…30 MHz | EN 55014 | class B | | |
| Radiated emissions | 30…1000 MHz | EN 55014 | class B | | |

| **Terminals** | | **solid cable** | **stranded cable** |
|---|---|---|---|
| Max. wire size | $mm^2$ | 1 x 6 / 2 x 4 | 1 x 4 / 2 x 2.5 |
| | AWG | 1 x 10 / 2 x 12 | 1 x 12 / 2 x 14 |
| Screw torque | Nm | 0.8 | |
| Wire strip length | mm | 9 | |

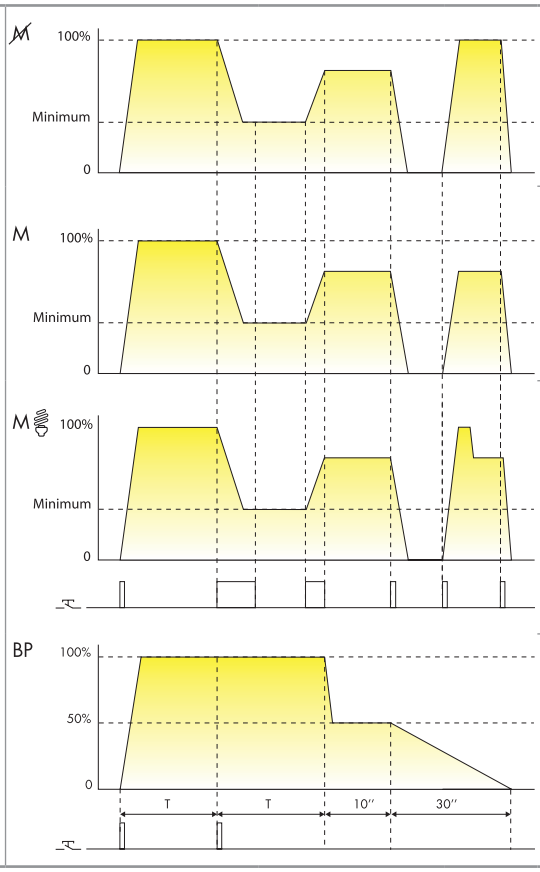
| **Other data** | | | **15.10** | **15.11** | **15.51** | **15.81** | **15.91** |
|---|---|---|---|---|---|---|---|
| Power lost to the environment | without load | W | 0.5 | 0.5 | 0.7 | 0.5 | 0.4 |
| | with rated load | W | 1.7 | 2.5 | 2.2 | 2.6 | 1.2 |
| Max cable length for push-button connection | | m | 100 | 100 | 100 | 100 | 100 |
| Max cable length for Master and Slaves connection | | m | 100 (keep separate from power cables) | | | | |

## Signaling

| LED (15.10 only) | Condition |
|---|---|
| | Stand-by, output voltage < 1 V |
| | Active, output voltage ≥ 1 V |
| | Timing, staircase function |

| LED (15.11 only) | Condition |
|---|---|
| | Stand-by, input voltage < 1 V |
| | Active, input voltage ≥ 1 V |
| | Short circuit or overload, output disabled |
| | Overtemperature, output disabled |

## Functions - Type 15.10 and 15.11

| Type | Linear dimming |
|---|---|
| 15.10 |  |

**Operating mode without memory:** at switch-off, the light level is not memorized.

**Long control pulse:** The light level is progressively raised or lowered in linear way. The lowest value depending on the "minimum dimming level" regulator setting (on 15.11).

**Short control pulse:** Alternately switches between On and Off (maximum light level and the off state).

**Operating mode with memory:** the previous light level is memorized.

**Long control pulse:** The light level is progressively raised or lowered in linear way. The lowest value dependent on the "minimum dimming level" regulator setting (on 15.11).

**Short control pulse:** Alternately switches between On and Off. When switching On, the light level assumes the value set during the previous On state.

**Operating mode with memory:** the previous light level is memorized, specific for CFL Lamp.

**Long control pulse:** The light level is progressively raised or lowered in linear way. The lowest value dependent on the "minimum dimming level" regulator setting (on 15.11).

**Short control pulse:** Alternately switches between On and Off. When switching On, the light level reach the full value for a very short time (in order to guarantee the correct lamp turn-on), then immediately assumes the value set during the previous On state.

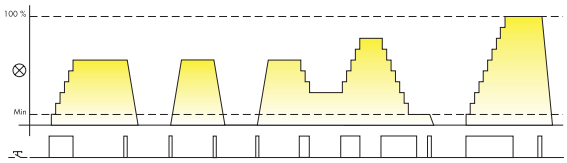
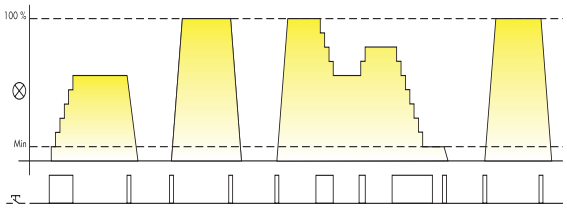
**Staircase relay with early warning**
On initial impulse the output closes and the timing starts for the pre-set duration. After the timing period (T), the output power is reduced to 50% for 10 seconds; then in the last 30 seconds it will be further reduced to the final shutdown. During the pre-set and 40 seconds warning time, it is possible, by a further impulse, to extend the time by the full pre-set value.

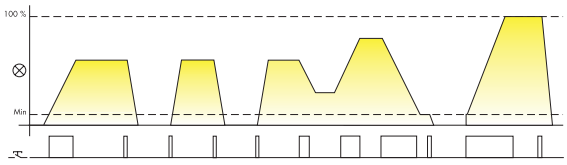
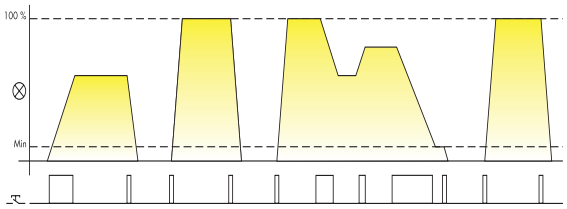
## Type of load - Type 15.11

| Type of load | Selector setting | Regulator setting |
|---|---|---|
| • Incandescent lamps<br>• 230 V halogen lamps<br>• 12/24 V halogen and LED lamps with electronic transformer/ballast | <br>(Trailing Edge) | It is suggested to set the "minimum dimming level" at the lowest value, so that the complete dimming range is available. But if it is necessary to avoid too low a level of illumination, a higher value can be set. |
| • Dimmable compact fluorescent lamps (CFL)<br>• Dimmable LED lamps | <br>(Leading Edge) | It is suggested to initially set the "minimum dimming level" at an intermediate value and then if necessary, readjust for a level found to be compatible with the lamp being used. |
| • 12/24 V halogen lamps with toroidal or E-core electromagnetic transformer | <br>(Leading Edge) | It is suggested to set the "minimum dimming level" at the lowest value, so that the complete dimming range is available. But if it is necessary to avoid too low a level of illumination, a higher value can be set. |

I-2017, www.findernet.com

## Functions - Type 15.51 and 15.91

| Type | Step dimming |
|---|---|
| 15.51…0400 | **Operating mode 1 (with memory):** the previous light level is memorized.<br>  <br>**Long control pulse:** The light level is progressively raised or lowered through a maximum of 10 incremental steps.<br>**Short control pulse:** Alternately switches between On and Off.<br>When switching On, the light level assumes the value set during the previous On state. |
| | **Operating mode 2 (without memory):** on switch off, the light level is not memorized.<br>  <br>**Long control pulse:** The light level is progressively raised or lowered through a maximum of 10 incremental steps.<br>**Short control pulse:** Alternately switches On or Off between the maximum light level and the off state. |

| Type | Linear dimming |
|---|---|
| 15.51…0404<br>15.91…0000 | **Operating mode 3 (with memory):** the previous light level is memorized.<br>  <br>**Long control pulse:** The light level is progressively raised or lowered.<br>**Short control pulse:** Alternately switches between On and Off.<br>When switching On, the light level assumes the value set during the previous On state. |
| | **Operating mode 4 (without memory):** on switch off, the light level is not memorized.<br>  <br>**Long control pulse:** The light level is progressively raised or Lowered.<br>**Short control pulse:** Alternately switches On or Off between the maximum light level and the off state. |

## Operating mode setup

### Type 15.51

On 15.51 operating mode 1 or 3 (with memory) is preset, but it is possible to change it using the following sequence:
a) remove the supply voltage;
b) press the control button;
c) apply the supply to the relay, keeping the button closed for 3 second;
d) on button release, the light will flash twice to indicate the selection of operating mode 2 or 4, or flash once for operating mode 1 or 3.
Repeating the above steps will alternately change between operating modes.

### Type 15.91

On 15.91 operating mode 4 (without memory) is preset, but it is possible to change it using the following sequence:
a) remove the supply voltage;
b) press the control button;
c) apply the supply to the relay, keeping the button closed for 3 second;
d) on button release, the light will flash twice to indicate the selection of operating mode 3, or flash once for operating mode 4.
Repeating the above steps will alternately change between operating modes.

## Thermal protection and signaling

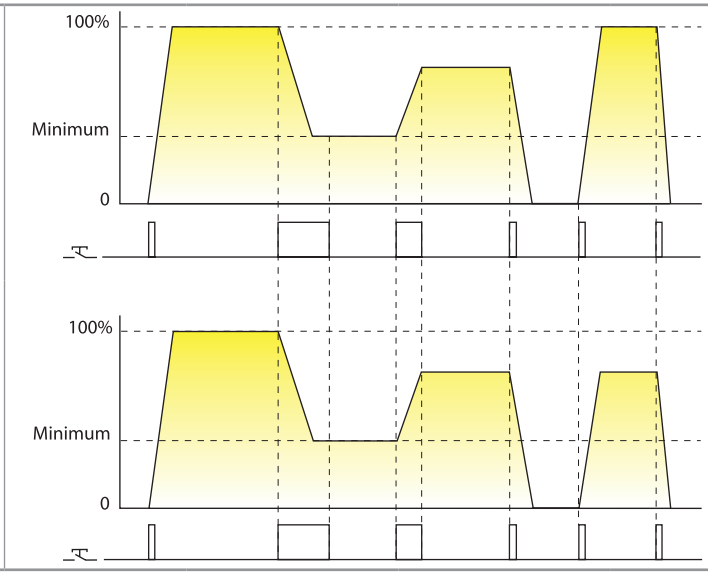
| LED (15.81 type only) | Supply voltage | Thermal protection |
|---|---|---|
|  | OFF | — |
| | ON | — |
| | ON | ALARM |

**ALARM**
The internal thermal protection (active on all dimmer types) will detect an unsafe temperature, due to overload or incorrect installation, and will turn the dimmer output off.
It is possible to turn the dimmer on, by push button, only when the temperature reduces to a safe level (after 1 to 10 minutes, depending on installation conditions) and after removing the cause of the overload.

## Functions - Type 15.81

**Type** **Linear dimming**

**15.81...0500**




**Operating mode without memory:** at switch-off, the light level is not memorized.

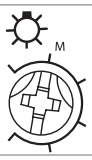
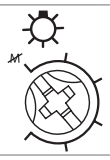
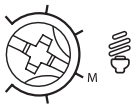
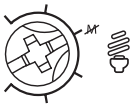
**Long control pulse:** The light level is progressively raised or lowered in linear way. The lowest value depend on the "minimum dimming level" regulator setting.

**Short control pulse:** Alternately switches between On and Off between the maximum light level and the off state.

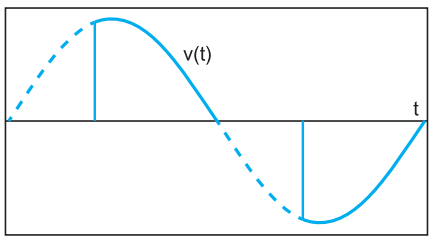
**Operating mode with memory:** the previous light level is memorized.

**Long control pulse:** The light level is progressively raised or lowered in linear way. The lowest value dependent on the "minimum dimming level" regulator setting.

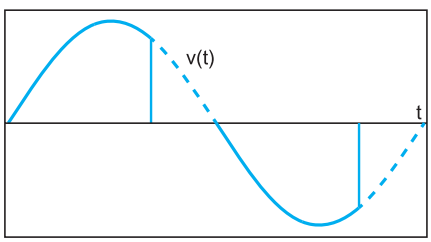
**Short control pulse:** Alternately switches between On and Off. When switching On, the light level assumes the value set during the previous On state.

| Type of load | Selector setting | | Regulator setting |
|---|---|---|---|
| | With memory (M) | Without memory (~~M~~) | |
| • Incandescent lamps<br>• 230 V halogen lamps<br>• 12/24 V halogen lamps with electronic transformer/ballast |  |  | It is suggested to set the "minimum dimming level" at the lowest value, so that the complete dimming range is available. But if it is necessary to avoid too low a level of illumination, a higher value can be set. |
| • Dimmable compact fluorescent lamps (CFL)<br>• Dimmable LED lamps |  |  | It is suggested to initially set the "minimum dimming level" at an intermediate value and then if necessary, readjust for a level found to be compatible with the lamp being used. |
| • 12/24 V halogen lamps with toroidal or E-core electromagnetic transformer | | | It is suggested to set the "minimum dimming level" at the lowest value, so that the complete dimming range is available. But if it is necessary to avoid too low a level of illumination, a higher value can be set. |

**Leading edge dimming**




**Trailing edge dimming**

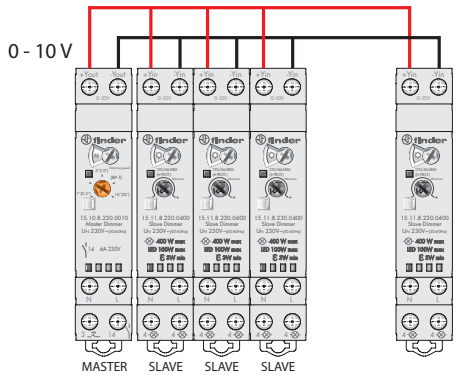



Light dimming is realized with "phase cutting technology", which works by "cutting off" part of the mains voltage waveform in order to reduce the RMS voltage fed to the lamp. When the "cut off" part is at the beginning of each half cycle the dimming method is called Leading Edge. When it is towards the end of each half cycle, it is called Trailing Edge. These 2 methods are suitable for dimming different lamp types: Trailing Edge is, in general, more suitable for electronic transformers for low voltage lamps (halogen or LED). Leading Edge is better suited for electromagnetic transformers for LV lamps, 230 V CFL and 230 V LED lamps. Both methods are, however, suitable for dimming 230 V halogen and incandescent lamps.
In consideration of the different lamp types actually available on the market, it is suggested to refer to the technical specification indicated in page 3 and, if given, to the lamp manufacturer's recommendation.



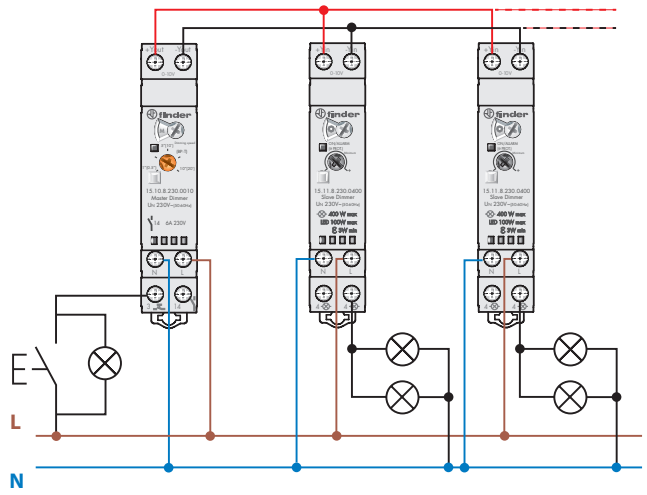
I-2017, www.findernet.com

## Wiring diagrams - Types 15.10 and 15.11

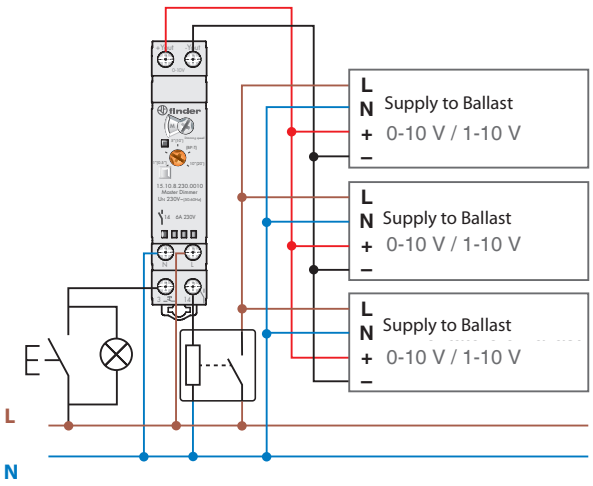



This new system is modular, adaptable to every need and allows control of multiple lamps through a single control device called the "Master Dimmer" Type 15.10.8.230.0010.
The Master Dimmer, produces a 0 - 10 V signal proportional to the dimming value needed:
0 V corresponds to 0% (light off); 5 V equals 50%, 10 V corresponds to the maximum brightness (100% on).
The 0 - 10 V output signal terminals Yout + / Yout of the "Master Dimmer" must be connected to terminals + Yin / Yin of one or more 15.11.8.230.0400, called the "Slave Dimmers", which have the task of changing the voltage applied to the lamps and therefore their brightness.

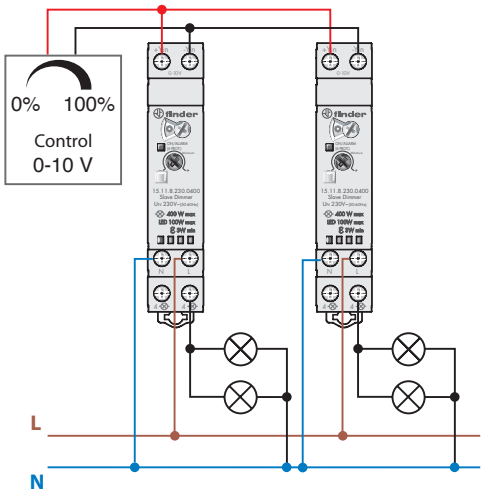
The result is a flexible system that offers a range of solutions from the minimum configuration of a Master Dimmer and a Slave Dimmer, up to the maximum configuration of a Master Dimmer and 32 Slave Dimmers.
Each slave can drive a different lamp type, depending on the appropriate methodology, "Leading Edge" or "Trailing Edge". It can regulate halogen lamps, dimmable LED lamps, dimmable CFL lamps, electronic transformers, and electromagnetic transformers.
For example, one Master Dimmer can control a Slave Dimmer with LED lamps and at the same time a second Slave Dimmer with halogen lamps, and a third with electronic transformers.




**MASTER DIMMER TYPE 15.10 AND SLAVE DIMMER TYPE 15.11**
It is recommended that the Master controls from one to a maximum of 32 Slave units.
The push-buttons (including illuminated push-buttons Max. 15) serve as the ON / OFF (momentary push), or when pressed for a longer time they adjust the brightness level.
Each Slave can drive a different load type.




**MASTER DIMMER + 0 - 10 V ELECTRONIC TRANSFORMER OR BALLAST**
Using only the Master Dimmer it is possible to control electronic transformers or ballasts with a 0 - 10 V / 1 - 10 V input (observing correct polarity).
For 1 - 10 V applications it is suggested to supply the Ballast Live from terminal 14. This will ensure that the supply to the Ballast is cut-off for a signal < 1 V.
Note: Check that the maximum Peak Current of the Ballast does not exceed the 30 A 230 V AC rating of terminal 14. Use a contactor or power relay to switch loads exceeding this value.

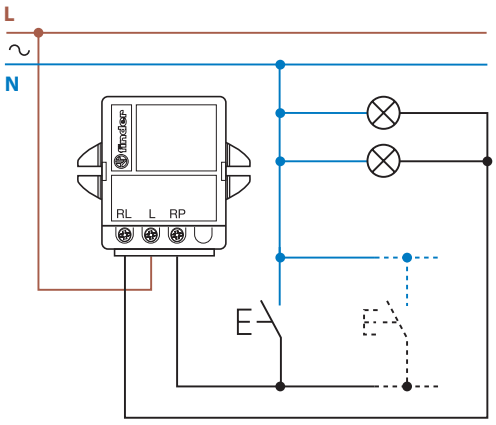



**BMS 0 - 10 V OUTPUTS + SLAVE DIMMERS**
In the case of Home Automation or Building Automation systems you can use just the Slave Dimmer Type 15.11 directly controlled by the 0 - 10 V output of the building management system (BMS), or by 0 - 10 V rotary regulators.

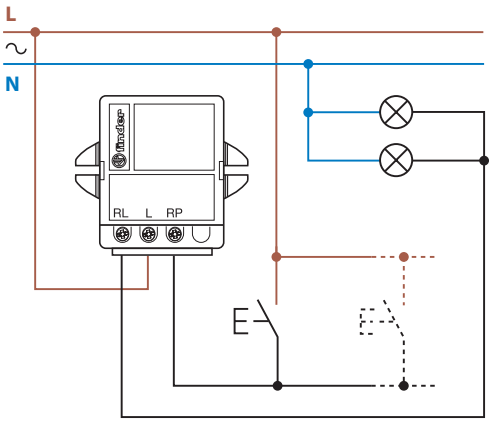
## Wiring diagrams - Types 15.51, 15.81 and 15.91

**Note:** remember to maintain a ground/earth connection for class 1 light fittings.

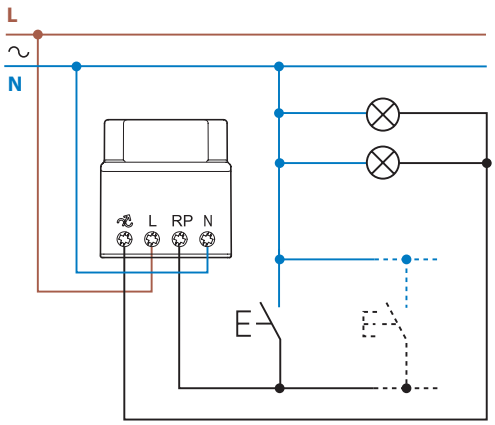
**Type 15.51 -** 3 wire connection



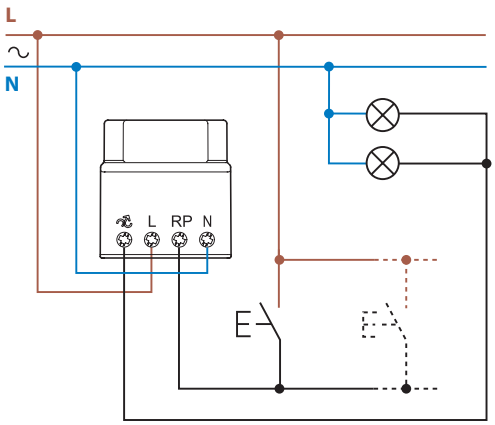

**Type 15.51 -** 4 wire connection



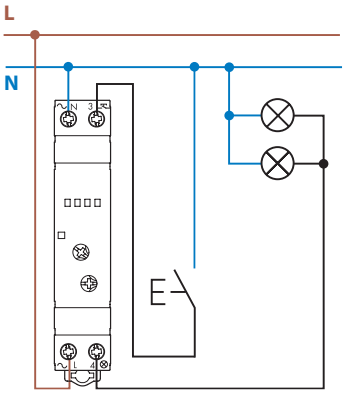

**Type 15.91 -** 3 wire connection



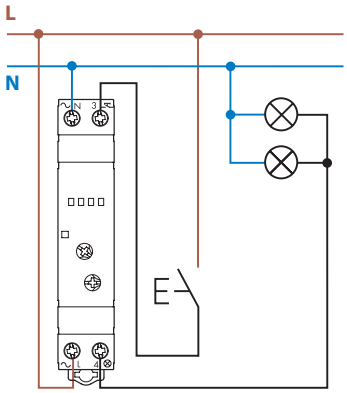

**Type 15.91 -** 4 wire connection




**Type 15.81 -** 3 wire connection




**Type 15.81 -** 4 wire connection

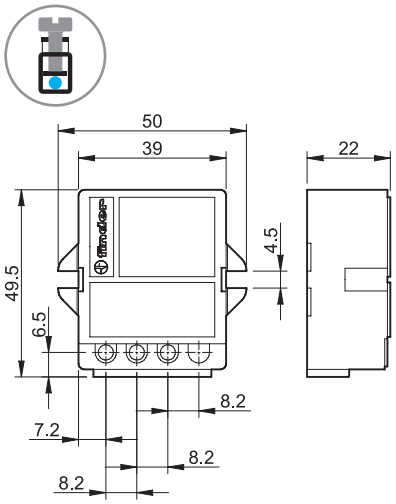




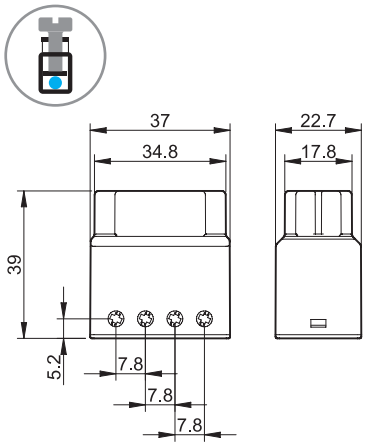

I-2017, www.findernet.com

## Outline drawings

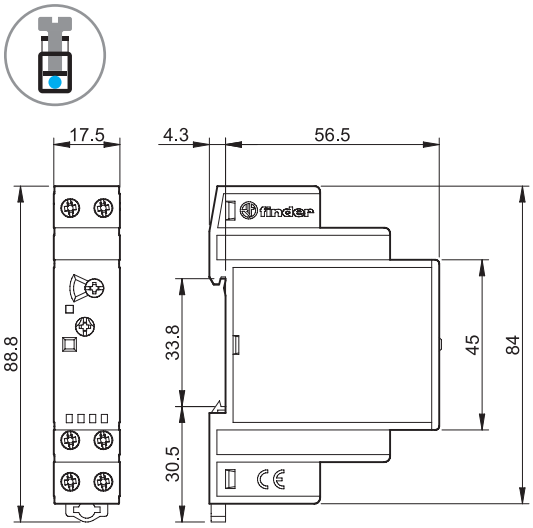
15.51
Screw terminal



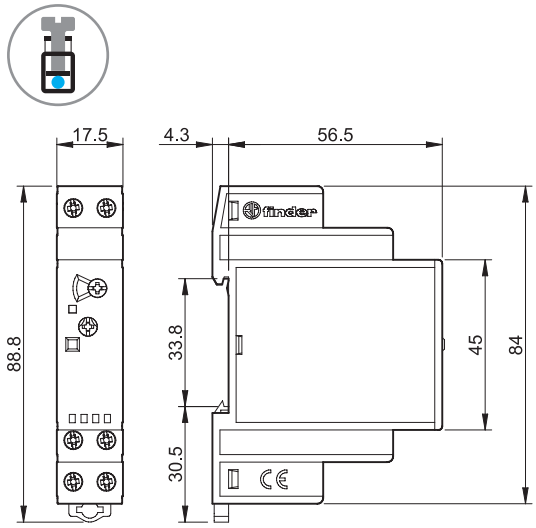

15.91
Screw terminal



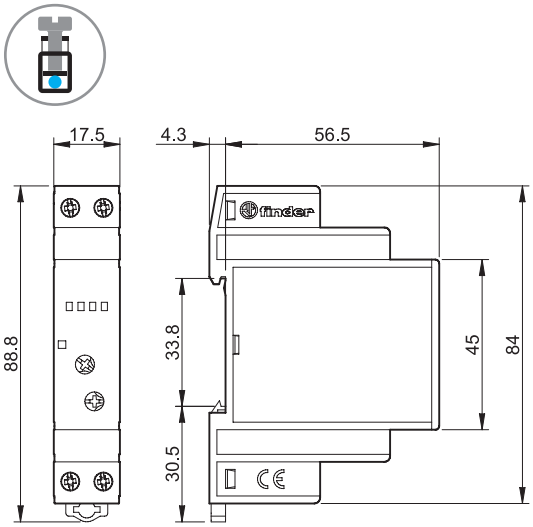

15.10
Screw terminal




15.11
Screw terminal



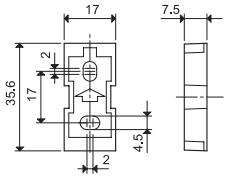

15.81
Screw terminal



## Accessories

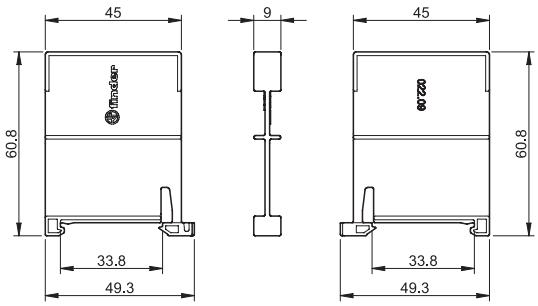
020.01

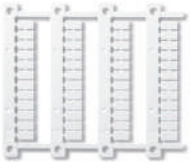
| | |
|---|---|
| **Adaptor for panel mounting** for types 15.10, 15.11 and 15.81, plastic, 17.5 mm wide | 020.01 |



022.09

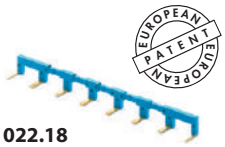
| | |
|---|---|
| **Separator for rail mounting**, plastic, 9 mm wide for types 15.10, 15.11 and 15.81 | 022.09 |



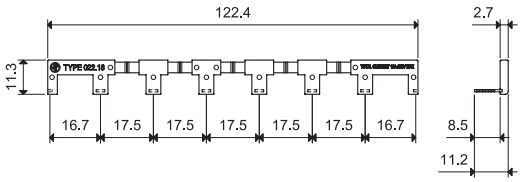
060.48

| | |
|---|---|
| **Sheet of marker tags** for types 15.10, 15.11 and 15.81, plastic, 48 tags, 6 x 12 mm | 060.48 |



022.18

| | |
|---|---|
| **8-way jumper link** for type 15.10 and 15.11 connection, 17.5 mm wide | 022.18 (blue) |
| Rated values | 10 A - 250 V |




I



Please see general technical information

I-2017, www.findernet.com