

# TECHNICAL BULLETIN

## LOAD RATINGS FOR MANUALLY OPERATED FUNCTIONAL SWITCHES



# COMPANIES INVOLVED IN THE PREPARATION OF THIS BULLETIN



**BG Electrical**  
Luceco plc, Caparo House. 103 Baker Street  
London W1U 6LN  
Tel: +44 (0) 1922 238 18  
Email: [technical.support@bgelectrical.co.uk](mailto:technical.support@bgelectrical.co.uk)  
[www.bgelectrical.uk](http://www.bgelectrical.uk)



**Contactum**  
Victoria House, Croxley Green Business Park, 2  
Blackmoor Ln, Watford WD18 8GA  
Tel: +44 (0) 20 8208 7419  
Email: [technical@contactum.co.uk](mailto:technical@contactum.co.uk)  
[www.contactum.co.uk](http://www.contactum.co.uk)



Lighting Controls & HVAC Controls  
**Danlers**  
Danlers Business Centre, Vincients Rd,  
Chippenham SN14 6NQ  
Tel: + 44 (0) 1249 443377  
Email: [sales@danlers.co.uk](mailto:sales@danlers.co.uk)  
[www.danlers.co.uk/](http://www.danlers.co.uk/)



**Eaton Electric Limited**  
270 Bath Road, Slough, Berkshire SL1 4DX  
Tel: +44 (0) 8700 545 333  
Email: [ukcommorders@eaton.com](mailto:ukcommorders@eaton.com)  
[www.eaton.com/uk](http://www.eaton.com/uk)



**Electrium Sales Ltd (a Siemens Company)**  
Sharston Road, Wythenshawe Manchester M22  
4RA  
Tel: +44(0)1619453956  
[www.electrium.co.uk](http://www.electrium.co.uk)



**GreenBrookElectrical**  
62 West Road, Harlow,  
Essex CM20 2BG  
Tel+44(0)1279772772  
[www.greenbrook.co.uk](http://www.greenbrook.co.uk)



**Hager Ltd**  
Hortonwood 50, Telford, Shropshire TF1 7FT  
Tel: +44 (0)1952 675 689  
Email: [Technical@hager.co.uk](mailto:Technical@hager.co.uk) [www.hager.co.uk](http://www.hager.co.uk)



**Legrand Electric Ltd**  
Great King Street North,  
Birmingham B19 2LF  
Tel: +44 (0) 370 608 9020  
Email: [powersales.uk@legrand.co.uk](mailto:powersales.uk@legrand.co.uk)  
[www.legrand.co.uk](http://www.legrand.co.uk)



by Honeywell  
**MK Electric**  
The Arnold Centre, Paycocke Road Basildon,  
Essex SS14 3EA  
Tel: +44 (0) 1268 563 000  
Email: [MK.Technical@Honeywell.com](mailto:MK.Technical@Honeywell.com)  
[www.mkelectric.com/en-gb](http://www.mkelectric.com/en-gb)



**Schneider Electric Ltd**  
Stafford Park 5, Telford, Shropshire TF3 3BL  
Tel: +44 (0) 1952 290029  
Fax: +44 (0) 1952 292238  
[www.schneider-electric.co.uk](http://www.schneider-electric.co.uk)



A **theben** Group Company  
**Timeguard Ltd**  
Victory Park, 400 Edgware Road London NW2 6ND  
Tel: +44 (0) 20 8450 0515  
Email: [hehelpline@timeguard.com](mailto:hehelpline@timeguard.com)  
[www.timeguard.com](http://www.timeguard.com)

## Scope of this technical bulletin

This technical bulletin applies to manually operated mechanical general purpose functional switches conforming to BS EN 60669-1:2018, which are typically used in dwellings, offices, hotels and similar fixed electrical installations.

This technical bulletin does not apply to electronic switches which fall within the scope of the BS EN 60669-2 series such as dimmer switches or occupancy / automatic switches. The standards for these switches are currently being revised with respect to load ratings.

BS EN 60669-1:2018 will supersede BS EN 60669-1:1999+A2:2008 on the 13th February 2021. During this period of time, switches can conform to the 2008 edition, and may not have the marking or rating described in this technical bulletin and designers should contact the switch manufacturer for information on load ratings such as for LED lighting.

## BS EN 60669-1:2018 types of load

Switches to BS EN 60669-1:2018 are intended to control one or more of the following types of load:

- a) a circuit for a tungsten filament lamp load;
- b) a circuit for an externally ballasted lamp load (for example LED, CFL, fluorescent lamp load);
- c) a circuit for a self-ballasted lamp load (for example LEDi or CFLi);
- d) a circuit for a substantially resistive load with a power factor not less than 0.95;
- e) a single phase circuit for a motor load with a rated current not exceeding 3 A at 250 V (750 VA) and at a power factor of not less than 0.6.

## Establishing the maximum design current for a switch

The electrical installation designer will need to ensure that the circuit design current is compatible with the maximum rating of the switch, taking into account any load characteristics e.g. inrush currents. The ratings and marking(s) prescribed in BS EN 60669-1:2018 will be of assistance, and will be the basis of the switch manufacturer's information. The following summarizes some of the rated currents.

### Switch load ratings

#### 1. Tungsten and halogen incandescent filament lamps

Switches are capable of switching their marked rated current in amperes (A) e.g. a switch marked 10 A can switch a total of 10 A tungsten and halogen filament lamps. For example, a 2,300 W halogen load at 230 V would equate to  $2300 / 230 = 10$  A.

- Example: for a switch marked 10 AX = The "A" is for a maximum 10 A tungsten / halogen load.

#### 2. Inductive loads and motor loads

Switches are tested at their rated current with a power factor of  $0.6 \pm 0.05$ .

- Example: for a switch marked "10 AX" = The "A" is for a maximum 10 A inductive load having a power factor of  $0.6 \pm 0.05$ .
- For a single phase motor load, momentary switches 6 A and above and other switches rated 10 A and above, are suitable for a maximum rated current of 3 A at 250 V (750 VA) but need not be marked 3 A.

#### 3. LED and fluorescent externally ballasted lamps

An externally ballasted lamp is a lamp other than an incandescent lamp controlled by separate lamp control gear which includes externally ballasted LEDs and fluorescent luminaires.

Excluding three pole, three pole switched neutral and momentary contact switches, all switches with a rated current up to and including **16 A must have** an externally ballasted lamp current rating equal to the rated current.

- Example: for a switch marked "10 AX" = The "X" is for a maximum 10 A externally ballasted lamp load.

Switches above 16 A can have a dual rating "A AX"

- Example: for a switch marked "20 A 10 AX" = The "A" is for a maximum 20 A; tungsten / halogen load (see 1 above) or inductive load (see 2 above). The "AX" is for a maximum 10 A externally ballasted lamp load.

#### 4. LED and CFL self-ballasted lamps

Incandescent lamps are being phased out and replaced by more energy efficient self-ballasted lamps. One of the main impacts for switches is the change in inrush currents when switching these energy efficient lamps in comparison to incandescent lamps.

A self-ballasted lamp (SBL) is a Compact Fluorescent Lamp (CFL) or Light Emitting Diode lamp (LED), where the control gear is incorporated in the lamp.

Switches up to and including **20 A must be** capable of switching the rated power of an SBL circuit according to Table 1.

**Table 1** Relationship between rated current of the switch and rated power of the SBL circuit.

Rated current of the switch [A]	Rated power of the SBL circuit [W]
Up to and including 10	100
Above 10 up to and including 13	150
Above 13 up to and including 16	200
Above 16 up to and including 20	250

#### Notes

1. Higher values of rated power of SBL circuits can be declared by the manufacturer.
2. The values in Table 1 relate to the load characteristics specified in BS EN 60669-1:2018. It should be noted that lamp characteristics could be more onerous.

For a switch suitable for SBL loads, the rated power in watts and the type of load must be given in the manufacturer's documentation.

- › Example: "100 W SBL" = Maximum 100 W self-ballasted lamp(s).

#### Summary of switch marking and/or manufacturer's documentation

- **"A"** means; rated current for resistive, incandescent filament lamps (tungsten, halogen) and inductive with a power factor of 0.6.
- **"X"** means; rated current for externally ballasted LEDs and fluorescent luminaires.
- **Watts "W" & "SBL"**; means; rated power of the self-ballasted lamp circuit (SBL) such as a Compact Fluorescent Lamp (CFL) or Light Emitting Diode lamp (LED). The minimum rating is as Table 1 above.

#### Summary of mandatory switch ratings

- Switches with a rated current up to and including 16 A must be marked "AX", (rated power in watts and load type (SBL)<sup>1</sup> must be given in the manufacturer's documentation.)
- Switches with a rated current above 16 A, up to and including 20 A must be marked "A"<sup>2</sup>, (rated power in watts and load type (SBL)<sup>1</sup> must be given in the manufacturer's documentation.)
- Switches with a rated current above 20 A must only be marked "A".

#### Domestic installations

The domestic building services compliance guide<sup>3</sup> (for use in England amended 2018) recommends that for fixed internal lighting, a single switch should normally operate no more than six light fittings with a maximum total load of 100 circuit-watts. This means that a single switch should not control more than a total of 100 circuit-watts LED lighting. Circuit-watt means the power consumed in lighting circuits by lamps and, where applicable their associated control gear (including transformers and drivers) and power factor correction equipment.

<sup>1</sup> Excluding three pole, three pole switched neutral and momentary contact switches.

<sup>2</sup> May be marked "AX" if tested and declared by the switch manufacturer.

<sup>3</sup> HM Government Domestic Building Services Compliance Guide ISBN 978 1 85946 880 7.

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Rotherwick House  
3 Thomas More Street  
London E1W 1YZ

[www.beama.org.uk](http://www.beama.org.uk)