

## ThermoSetter™ Recirculation Thermal balancing valve

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**116 Series**

### Installation, commissioning and servicing instructions

#### Function



The ThermoSetter™ adjustable thermal balancing valve is used for automatic balancing of recirculation loops in domestic hot water systems, to speed hot water delivery, reduce water waste and save energy. The internal thermostatic balancing cartridge automatically modulates flow to ensure a constant temperature in the recirculation piping system. The 116 Series has an adjustment knob with 95°F to 140°F (35°C to 60°C) temperature scale indication. An integral dry-well holds a slide-in temperature gauge for local indication, or a sensor for remote temperature sensing. The optional check valve protects against circuit thermo-siphoning.

The 1162xx Series is available with a “disinfection” by-pass cartridge, for use in systems which are designed to perform thermal disinfection for prevention of Legionella. When the disinfection cartridge senses 160°F (70°C) water, indicating disinfection control mode, it automatically opens a by-pass flow path to allow sufficient flow for disinfection to occur. When the temperature drops back to normal range, the disinfection by-pass cartridge closes to return flow control to the balancing cartridge.

The 1163xx Series is also available with a “disinfection” valve that is controlled by a 24V spring return normally-closed thermo-electric actuator, rather than thermostatically, thus allowing thermal disinfection mode to be controlled remotely by an automation system.

The valve is certified to NSF/ANSI 372-2011, low lead laws and listed by ICC-ES, file PMG-1360.

#### Product range

1161 series	ThermoSetter™ w/o disinfection function, models w/ and w/o temperature gauge, w/ and w/o check valve.....connections ½” and ¾” NPT female
1162 series	ThermoSetter™ w/ disinfection function, models w/ and w/o temperature gauge, w/ and w/o check valve.....connections ½” and ¾” NPT female
1163 series	ThermoSetter™ w/ actuator disinfection function, models w/ and w/o temperature gauge, w/ and w/o check valve.....connections ½” and ¾” NPT female



## SAFETY INSTRUCTION

This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**



**WARNING:** This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



**CAUTION:** All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of systems in accordance with all applicable codes and ordinances.



**CAUTION:** Over-tightening and breakage can occur with the use of Teflon® pipe joint compounds. Teflon® provides lubricity so that care must be exercised not to over-tighten joints. Failure to follow these instructions could result in property damage and /or personal injury.



**WARNING:** System fluids are under pressure or temperature can be hazardous. Be sure the pressure has been reduced to zero and the system temperature is below 100°F (38°C). Failure to follow these instructions could result in property damage and/or personal injury.



**CAUTION:** If the series ThermoSetter™ balancing valve is not installed, commissioned and maintained properly, according to the instructions contained in this manual, it may not operate correctly and may endanger the user.



**CAUTION:** Make sure that all the connecting pipework is water tight.

Caleffi shall not be liable for damages resulting from stress corrosion, misapplication or misuse of its products.

**LEAVE THIS MANUAL FOR THE USER.**



## CONSIGNE DE SÉCURITÉ

Ce symbole d'avertissement servira dans ce manuel à attirer l'attention sur la sécurité concernant instructions. Lorsqu'il est utilisé, ce symbole signifie. **ATTENTION! DEVEZ-VOUS ÊTRE ALERTES ! VOTRE SÉCURITÉ EST EN JEU ! NE PAS SUIVRE CES INSTRUCTIONS PEUT PROVOQUER UN RISQUE DE SÉCURITÉ.**



**AVERTISSEMENT:** Ce produit peut vous exposer à des produits chimiques comme le plomb, qui est connu dans l'État de Californie pour causer le cancer, dommages à la naissance ou autre. Pour plus d'informations rendez-vous [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



**ATTENTION:** Tous les travaux doivent être effectués par du personnel qualifié formé à la bonne application, installation et maintenance des systèmes conformément aux codes et règlements locaux.



**ATTENTION:** Un serrage excessif et la rupture peut se produire avec l'utilisation de composés à joint de tuyau en Téflon®. Pouvoir lubrifiant Teflon® permet de sorte qu'il faut prendre soin de ne pas trop serrer les articulations. Le non-respect de ces instructions peut entraîner des dommages matériels et/ou des blessures.



**AVERTISSEMENT:** Les liquides du système sont sous pression ou de la température peuvent être dangereux. Être sûr que la pression a été réduite à zéro et la température du système est inférieure à 100°F (38°C). Le non-respect de ces instructions peut entraîner des dommages matériels et/ou des blessures. Le non-respect de ces instructions peut entraîner des dommages matériels et/ou des blessures.



**ATTENTION:** Si le vanne d'équilibrage, Série ThermoSetter™, n'est pas installé, mis en service et entretenu correctement, selon les instructions contenues dans ce manuel, il peut ne pas fonctionner correctement et peut mettre en danger l'utilisateur.



**ATTENTION:** S'assurer que tous les raccords sont étanches.

Caleffi ne pourra être tenue responsable des dommages résultant de la corrosion, d'une mauvaise utilisation ou une mauvaise utilisation des produits.

**LAISSEZ CE MANUEL AVEC L'UTILISATEUR**

## Technical specifications

### Materials

Body:	DZR low-lead brass EN 12165 CW724R
Adjustable cartridge:	Stainless steel & copper
Springs:	Stainless steel EN 10270-3 (AISI 302)
Hydraulic seals:	EPDM
Adjustment knob:	ABS

### Performance

Suitable fluid:	water
Max. working pressure:	230 psi (16 bar)
Max. differential pressure:	15 psi (1 bar)
Adjustable temperature range:	95–140°F (35 – 60°C)
Factory setting:	130°F (55°C)
Disinfection temperature:	160°F (70°C)
Closing temperature:	170°F (75°C)
Max. inlet temperature:	195°F (90°C)

Cv (Kv) max:	2.1 (1.8)
Cv (Kv) dis:	1.2 (1.0)
Cv (Kv) min:	0.23 (0.2)
Cv (Kv) design:	0.52 (0.45)

### Certifications

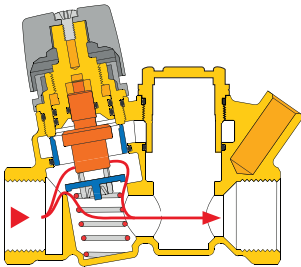
NSF/ANSI 372-2011, Drinking Water System Components-Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction in Drinking Water Act, certified by ICC-ES, file PMG-1360.

### Connections

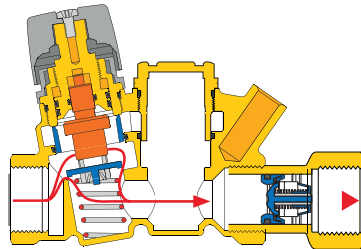
Main connections:	½" NPT female
	¾" NPT female
Temperature gauge/probe pocket:	Ø 10 mm metric

### Temperature gauge code 116010

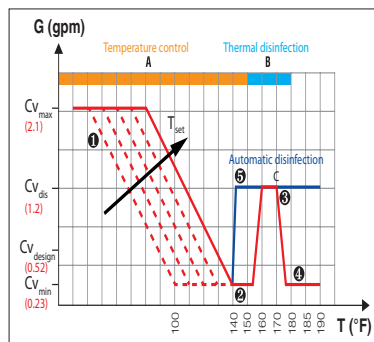
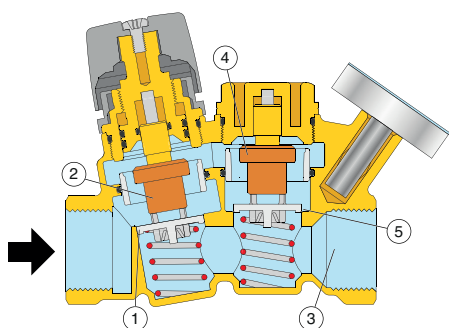
Scale:	30 - 180°F (0–80°C)
Diameter:	1½" (40 mm)
Stem diameter:	0.35" (9 mm)



Thermostatic control,  
1161xxA series

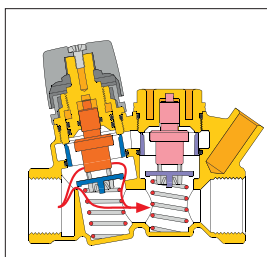


Thermostatic control with check valve,  
1161xxAC series

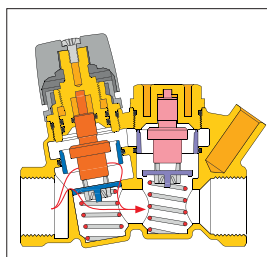


### Function A - Temperature control

At the set temperature, the valve plug, controlled by the thermostatic balancing cartridge, gradually closes the outlet to the minimum. The outlet never fully closes to always allow a minimum flow for temperature sensing and to prevent recirculation pump dead-heading. If the temperature decreases, the outlet increases, causing flow and thus temperature to increase back to the set temperature as shown in curve 1. If temperature exceeds the set-point, the plug stays in the minimum closed position as shown in curve 2. The balancing cartridge has a throttling range of 60°F, from full open to minimum position.



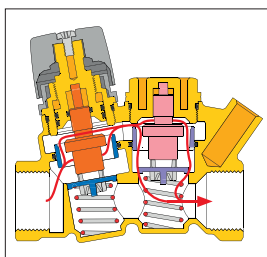
① Thermostatic control



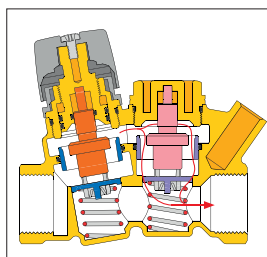
② Minimum flow rate

### Function B - Automatic thermostatic disinfection

The 1162xx series operating characteristic curves for operating mode B are curves 1, 2, 3 and 4. When a temperature higher than about 155°F (68°C) is reached, a by-pass passage begins to open to activate the second thermostatic cartridge which controls the thermal disinfection process, allowing flow independent of the operation of the thermostatic balancing cartridge. This allows water flow through a special by-pass port, opening the flow path up until the temperature of 160°F (70°C) is attained shown in curve 3. If the temperature continues rising beyond this point, the flow is reduced through the by-pass port to allow thermal balancing even during the disinfection process. When temperature reaches about 170°F (75°C), the disinfection by-pass port to protect the system fixtures from the effects of excessive temperatures, as shown in curve 4.



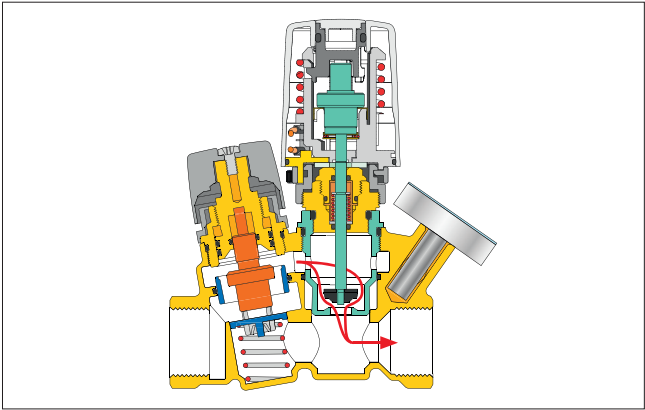
③ Thermostatic disinfection



④ Thermal shut-off

**Function C - Actuator-controlled disinfection**

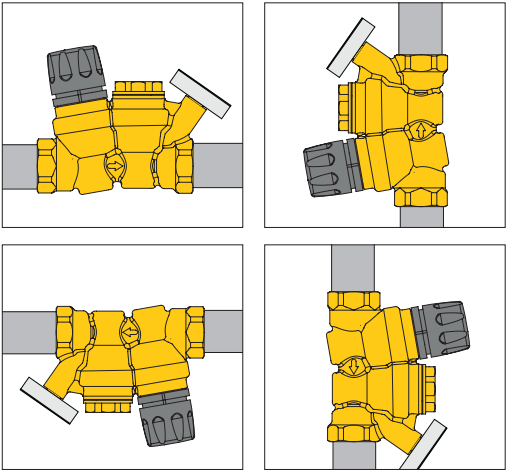
The 1163xx series operating characteristic curves for operating mode C are curves 1, 2 and 5. When the disinfection operating temperature setting of the electronic disinfection system is reached, the thermo-electric actuator 656 series (which is controlled by a dedicated electronic control system), is energized to operate the by-pass valve to control the disinfection process, allowing flow independent of the operation of the thermostatic balancing cartridge shown in curve 5. In this case, the minimum head loss is produced during this thermal disinfection process.



⑤ Electrically controlled disinfection

**Installation**

Before installing the ThermoSetter™, flush the pipes to make sure that impurities in system will not interfere with valve performance. Strainers of sufficient capacity at the inlet from the water main are highly recommended. The ThermoSetter™ can be installed in any position, vertical or horizontal, following the flow direction indicated by the arrow on the valve body. The ThermoSetter™ must be installed according to the diagrams given in this manual. It must be installed to allow free access to for checking on operation and maintenance procedures.



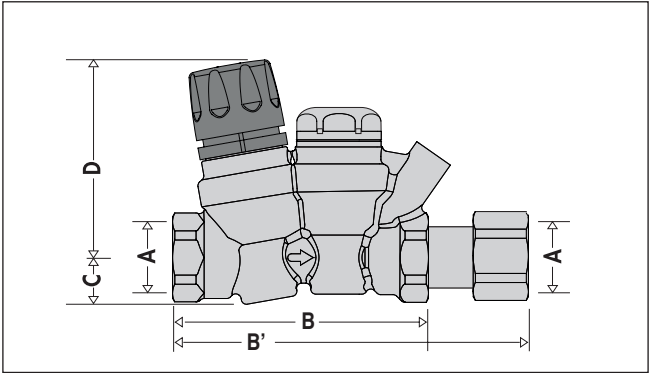
Scan to view



116 ThermoSetter™

Installation Tip

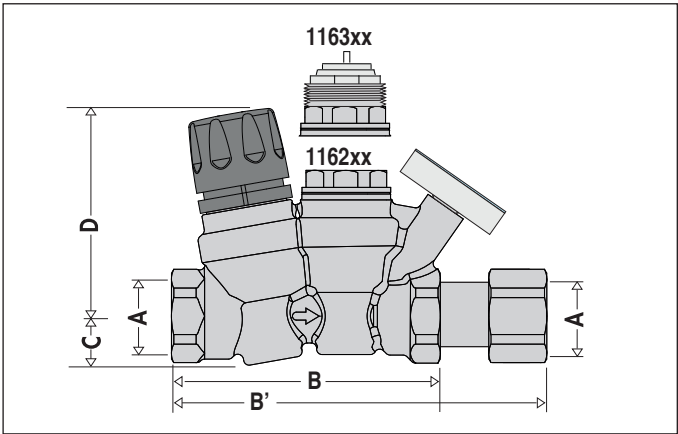
Dimensions



Code	A	B	B*	C	D	Wt (lb/kg)
116140A(C)	½" NPT F	4"	5 ⅞"	¾"	3"	1.7 / 0.75
116141A(C)**	½" NPT F	4"	5 ⅞"	¾"	3"	1.7 / 0.75
116150A(C)	¾" NPT F	4"	5 ⅞"	¾"	3"	1.5 / 0.70
116151A(C)**	¾" NPT F	4"	5 ⅞"	¾"	3"	1.5 / 0.70

\*Models with check valve tail-piece (C) end-to-end dimension is B'.

\*\*with integral outlet temperature gauge.

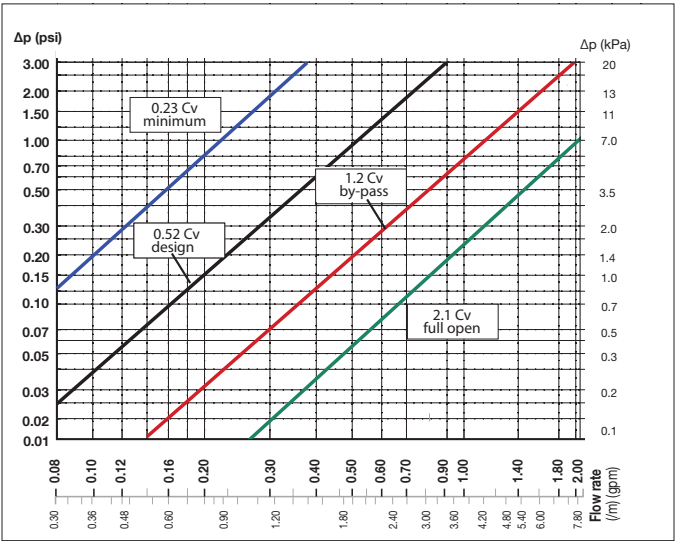


Code	A	B	B*	C	D	Wt (lb/kg)
116240A(C)	½" NPT F	4"	5 ⅞"	¾"	3"	1.7 / 0.75
116250A(C)	¾" NPT F	4"	5 ⅞"	¾"	3"	1.5 / 0.70
116340A(C)	½" NPT F	4"	5 ⅞"	¾"	3"	1.7 / 0.75
116350A(C)	¾" NPT F	4"	5 ⅞"	¾"	3"	1.5 / 0.70

**Flow characteristics**

The ThermoSetter™ thermostatic balancing valve is designed to balance individual branches of domestic hot water recirculation systems, based on the temperature at the valve. It automatically modulates flow to maintain hot water availability to all fixtures in the branch circuit. The valve is at minimum flow (Cv = .23) when the incoming water temperature is equal to the set-point position of the adjustment dial. The valve opens as incoming water temperature drops.

For pressure loss calculations in the recirculation system, follow traditional pipe sizing and head loss practices. For pressure loss calculations across the ThermoSetter™ valve, use the design curve shown in the graph below. This line represents a typical valve position under normal working conditions ( $\Delta T = 10^{\circ}\text{F}$ ). Determine the pressure drop across the valve by selecting the branch design GPM on the graph X-axis, draw a vertical line up to the “design” curve, then go across to the Y-axis to find the design pressure drop. Include that pressure drop in your head loss calculations for the circuit.

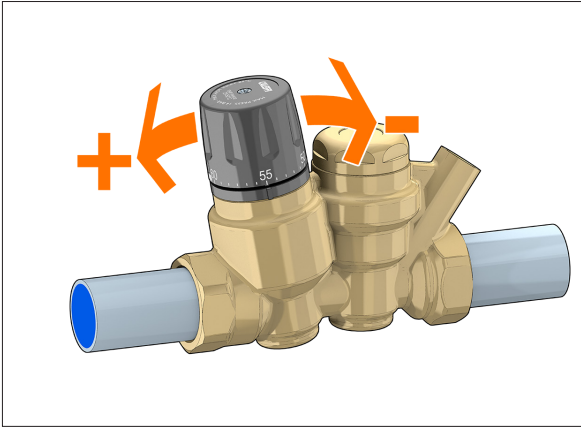


The “by-pass mode” curve in the chart above shows the head loss of the valve when it is in by-pass thermal disinfection mode for Legionella control.



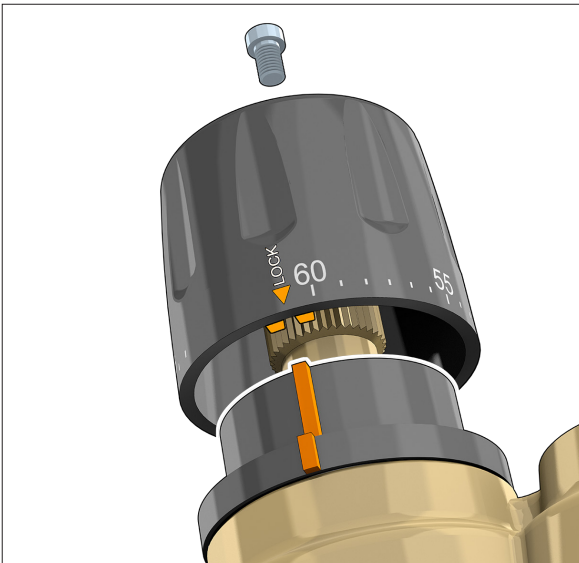
## Temperature adjustment

Set the desired recirculation system temperature by turning the adjustment knob. The graduated scale shows the temperatures at which the indicator can be set. A valve temperature setting at about 10°F (5°C) higher than the water temperature at the valve inlet is recommended, accounting for heat losses along the line, to limit the head required at the recirculation pump. Be sure this is the minimum flow rate at the mixing valves in the central heating system.



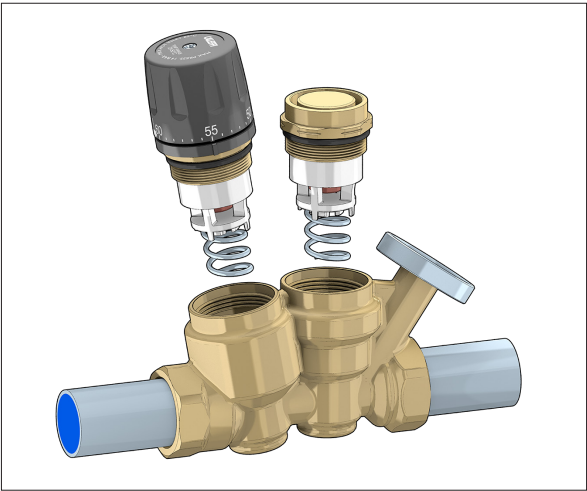
## Adjustment locking

After adjusting the temperature, the setting can be locked at the desired value using the adjustment knob. Unscrew the locking screw at the top of the adjustment knob, remove the knob and then put it back on so that the internal groove couples with the protrusion on the knob holder nut. When this block is used, the reference of the indication of the temperature values on the knob is lost. To restore it, completely unscrew the locking screw. Reposition the knob on MAX value. Tighten the locking screw.



**Maintenance**

Both the balancing adjustment cartridge and the disinfection control cartridge can be removed from the valve body for periodic inspection, cleaning or replacement.



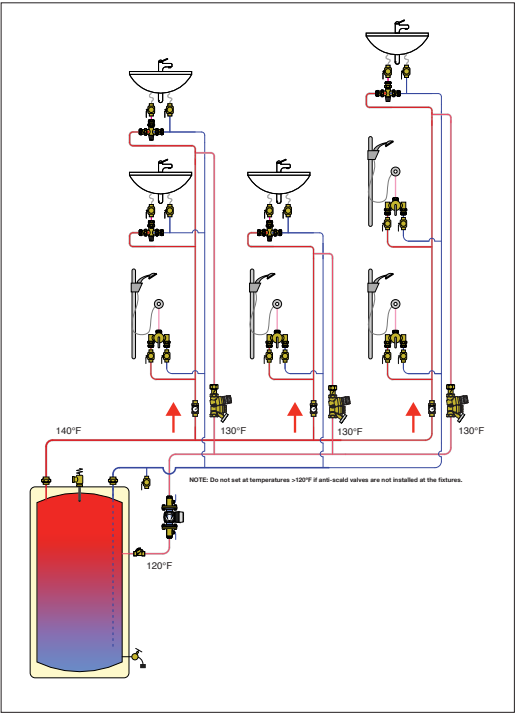
**Innsulation shell**

The ThermoSetter™ thermal balancing valve can be supplied with an optional insulation shell, code CBN116140 purchased separately, to minimize heat loss.

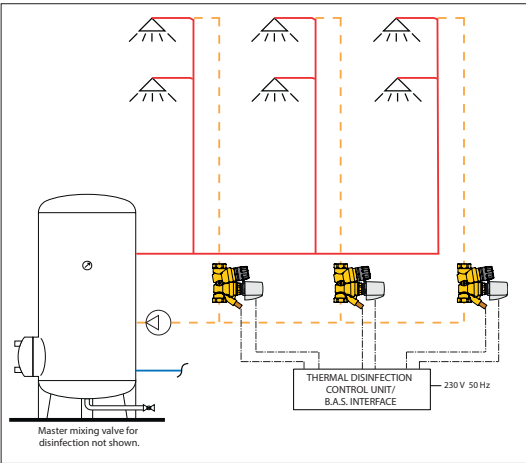


**Application diagram**

**Hot water recirculation with thermal balancing valves**



**Hot water recirculation with actuator controlled disinfection**





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