

**Installation & Operation Manual**



- preheat start ballast for 4-pin lamp operation, optimal preheat settings for soft lamp start
- powers one lamp
- lamp and ballast status indication by LEDs and potential free relay contacts
- metal housing, designed for optimal thermal flow
- high efficiency
- up to 30 m lamp cable length possible
- enhanced protection
- active power factor correction (PFC), low THD according to EN 61000

ballast name:	10-0256
lamp name:	GPHHA1554T6L
lamp power:	320 W
lamp current:	2.1 A
preheat current:	2.8 A
preheat time:	12 s
input power:	max. 350 W
input current:	max. 1.7 A
standby power:	< 5 W

**Read and understand all instructions in this manual before installing and operating the ballast.**

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## 1 Technical specification

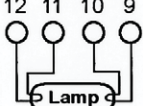
supply voltage:	230V AC +/- 10% 45...65Hz
efficiency:	> 90 %
operating temperature:	max. 50°C (122°F) measured at the T <sub>c</sub> -point; see 'Ballast mounting' on page 4
ambient temperature:	0 - 40°C (32 - 104°F)
altitude:	The maximum installation altitude of 2000m above sea level must not be exceeded.
relay contacts:	potential free, load: 20 - 500mA at 24 - 230V AC; 50 - 500mA at 5 - 60V DC (note the 'Important safety notes' on page 3)
ballast operation:	lamp operation starts when ballast is connected to mains
status indication:	operating status indicated by LEDs and potential free relay contacts
IP code:	IP20
wiring:	max. cable length between ballast and lamp: 30 m, for details on wiring, connectors and cable routing see 'Ballast wiring' on page 5
dimensions:	248 x 105 x 59 mm (9.76 x 4.13 x 2.32 inch) for dimensions drawing see 'Ballast mounting' on page 4
CE-conformity:	yes

**Note:**

- all dimensions and technical data may vary within small tolerances
- no warranty for completeness and correctness of details
- all information provided in this document is subject to change
- **The ballast must not be used for equipment that is used for medical treatment or for life saving measures without prior written permission of the manufacturer.**

## 2 Ballast marking


lamp terminals



12 11 10 9

Lamp


relay terminals



8 7 6

on off / fault

T<sub>c</sub> max. 50 °C



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
10-0256

input power	input current	lamp power	lamp current	preheat current	preheat time
max. 350 W	max. 1.7 A	320 W	2.1 A	2.8 A	12 s

ambient temperature 0 - 40 °C

U<sub>n</sub> 230 V~  
f<sub>n</sub> 45...65 Hz  
U-OUT= 250 V


0.75...1.5mm\*



10mm


(connector manufacturers general data, actual wire size dependent upon electrical specifications)

L N ⊥



1 2 3

mains terminals



yellow: fault  
green: on  
red: off

status LED

see manual for details

### 3 Important safety notes

**Make sure, that all of the following safety rules are fulfilled.**

**The device must only be installed by qualified personnel to make sure all applicable safety rules are fulfilled.**

**Additional safety rules and legal restrictions may apply depending on the country of operation.**

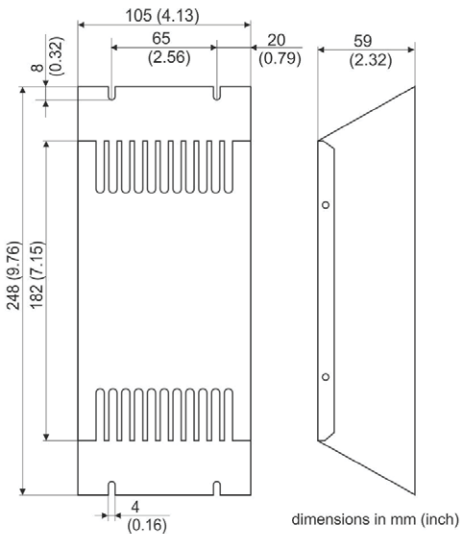
- **Risk of electric shock!**

Lethal high voltage is present inside the ballast and at the ballast terminals. Due to high voltage storage devices lethal voltages may be present inside the ballast and at the ballast terminals if the ballast is switched off or disconnected from supply voltage.

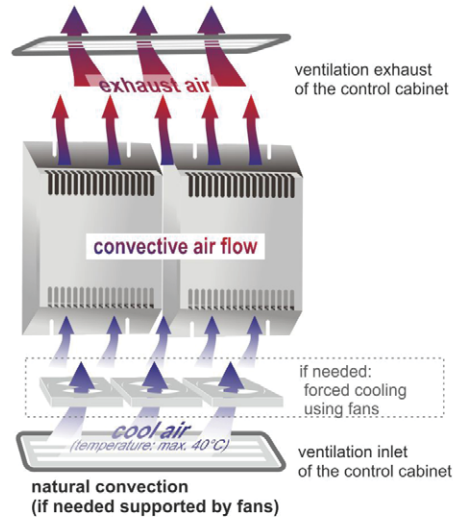
- The ballast must not be operated if there is any damage (e.g. mechanical damage after transport).
- The ballast is intended for use in dry and chemically and biologically inactive environment only. Keep water and humidity away from the whole electrical assembly. Lethal voltages across the complete system can result from contact between lamp and water. A separate protective earthing of the complete system is mandatory.
- Do not, in any case, open the ballast housing. No user serviceable parts inside.
- Disconnect ballast from mains before any maintenance operation.  
Dangerous voltage may be present inside the ballast energy storage devices even if the ballast is disconnected from mains. Wait at least 10 minutes after disconnecting the ballast from mains voltage before starting any service actions.
- Repeated rapid switching might lead to ballast fault. Do not turn off and on the ballast within less than 10 seconds.
- During ballast start up, in case of lamp defects or due to wrong lamp wiring high voltages up to 1200V<sub>eff</sub> may occur at the lamp terminals of the ballast. This high voltage may be present for a couple of milliseconds until the internal protection circuits shuts down the ballast. At each ballast restart, after any temporary disconnection from mains voltage, the ballast will try to ignite the lamp once more, so again, high voltages may occur.
- The ballast does not provide galvanic insulation from mains at the lamp terminals.
- Never cut the lamp wires while the ballast is in operation. **Risk of serious injury or death!**
- The load for the fault detecting contacts has to be kept within the limits specified in the datasheet. It is recommended to use parallel operation of contacts instead of serial operation in case of summarizing fault detection.
- **The insulated contacts of the status relays do not provide protection against electric shock.**  
All wires of the error control loop have to be installed with appropriate protection against contact according to applicable regulations. The wires of the error control loop must never be accessed from outside the earthed cabinet without protection against contact. You may use insulation relays to access the control loop from outside the cabinet.

## 4 Ballast mounting

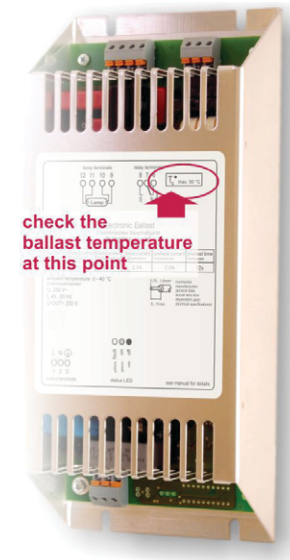
ballast dimensions



example for ballast mounting



- The ballast is to be operated in a closed cabinet.
- Do not mount the ballasts in an environment with high mechanical stress such as vibrating assemblies.
- Ensure the specified ballast operating temperature by:
  - keeping distance between neighbouring ballasts,
  - providing sufficient cooling to power components and ensuring air ventilation around power components,
  - avoiding heat accumulation.
- **This ballast constantly monitors the internal temperature. Lamps will not be started, if high temperature is detected. The ballast will turn off lamps, if high temperature is detected during operation. The ballast will not automatically restart any lamp after temperature safety shutdown.**
- Lifetime of ballasts is determined by the temperature and failure rate of electronic components. High operating temperatures may drastically shorten the lifetime of ballasts or may cause failure.
- max. 10% of ballast input power is thermal dissipation loss leading to ballast heating. Natural convection should be sufficient if the specified ambient temperature and distances between ballasts are maintained.
- The heat dissipation of ballasts must be considered during the design process for the lamp control assembly. The way to provide sufficient heat flow to environment depends on nominal ballast power, number of parallel operated ballasts, size of enclosure or control cabinet and outside temperature range.
- In applications for water or waste water treatment completely sealed cabinets are widely used. The advantage of this solution is to keep moisture and polluted air away from electrical parts. By using forced air circulation all parts of the housing contribute to the heat transfer to environment. For bigger assemblies a special circulating air cooling unit is recommended. Some manufacturers offer special software tools for heat transfer calculation in cabinets.
- The picture indicates the position of the  $T_c$ -point on the ballast label. It is recommended to keep the temperature below the specified value to ensure optimal lifetime and to retain enough safety margin.
- Since the cabinets geometries as well as additional components might affect the cabinet temperature it is strongly recommended to check the ballasts temperature at the  $T_c$ -point. The temperature has to be checked individually for each ballast in the cabinet to evaluate the needs or effects of heat dissipation.



## 5 Ballast wiring

- Make sure that the mains voltage is within the tolerances given in the data sheet.
- Make sure that imbalances in 3 phase mains supply will not lead to mains voltage outside the specified range.
- We recommend slow-blow lead fuses for protection.

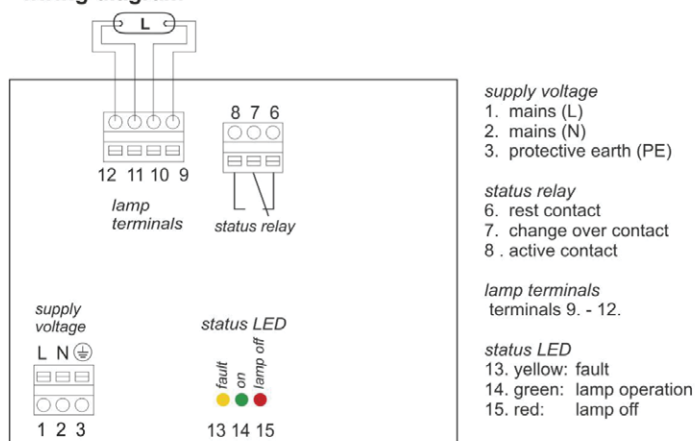
For fuse rating we recommend the specified 'max. input current value' plus at least 15%.

**Note:** After connecting to mains, the inrush current may reach high values of up to 100A in the first 2ms and up to 15A in the first 15ms. (The inrush current depends on the value of the sinusoid mains voltage at the moment of connection.)

If the lamps are lit the specified 'input current' value is present.

- We recommend to connect the ballasts to mains voltage in groups and switch on sequentially to keep the summary inrush current low.

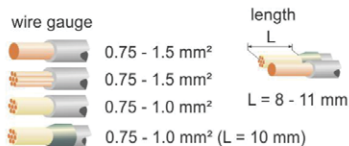
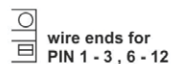
### wiring diagram



- The ballast may only be wired according to the wiring diagram shown here and on the ballast label.
- Do not add any components such as switches, capacitors or ignition devices to the wires between ballast and lamp because this may damage the ballast.
- Make sure that all wires are sufficiently insulated with respect to each other and to earth.

### connection specifics

connector manufacturers general data,  
actual wire size dependent upon electrical specifications



- Wire gauge and length are specified according to connector manufacturers general data. Make sure that the actual wire size complies with the current electrical specifications.
- The terminals of the ballast are designed to clamp rigid and flexible wires without wire termination. If wire termination is used it must comply with the appropriate terminal specification.
- Rigid wiring:
  - may be inserted directly into the terminals without pressing the release lever if specified wire gauge is used
- Flexible wiring (braid wires):
  - may only be inserted direct into the terminals by pressing the release lever on the terminal
  - may not be soldered/tinned (This applies especially to screw terminals. The solder migrates into the contact, resulting in less reliable connection.)
  - wire end ferrules may be used, although not necessary

- Make sure that the ballasts terminals are properly connected.
- Check wiring for secure connection. This is advisable especially after mechanical stress such as transportation. To check the wiring at the terminal try to pull out the cable gently; the terminal should not allow the wire to move.

#### **Lamp/Mains cable routing**

- Do not cross mains and lamp cables. If this is unavoidable, cross the cables at right angles as far apart as possible in order to reduce high frequency coupling.
- Do not route mains cables and lamp cables parallel or close to each other. Keep them as far apart as possible from each other (minimum: 5-10 cm) to avoid radio interference between mains and lamps leads.
- Route a separate wire with size of 4mm<sup>2</sup> that is connected to earth in parallel to the lamp wires to reduce radiated emissions at lamp wires. Do not use multi-core cables with integrated protective earth wires.

#### **Lamp/Mains cable length**

- Keep mains cable short to reduce radio interference.
- Keep the lamp cables as short as possible to reduce electromagnetic interferences and to minimise parasitic capacitances.
- When considering the max. lamp cable length, all cables inside the cabinet and inside the reactor/channel must be included.
- Selection of cable types and layout should be made with respect to the lowest coupling capacity and inductance.
- Multi-core cables may not be used.
- Check for the correct lamp current (esp. during preheating). If needed adjust current settings (see page 7).
- The customer is responsible for checking conformance with EMI/EMC regulations (CE conformance is only valid for cable lengths shorter than 2.90 m under test conditions).

**Note:** The lamp cable has influence to lamp ignition, operation parameter and ballast safety circuits. In case of unexpected behavior the cable type and layout should be checked (e.g. coupling capacities against earth ...);

**Note:** situation may vary for each different site

## **6 Ballast safety mechanisms**

The ballast features enhanced safety mechanisms for shut down under the following fault conditions:

- leaking or broken lamp
- lamp voltage too high during ignition due to old lamps
- no lamp connected to ballast
- broken lamp filament
- lamp power outside specified tolerances
- ballast overheating
- mains voltage too low (undervoltage)

#### **Note:**

- The yellow LEDs are blinking if temperature is too high or if undervoltage is detected.
- The ballast will never automatically restart any lamp after safety shutdown.
- For restart temporarily disconnect ballast from mains.
- The ballast should not be started until the reasons for safety shutdown are removed.

The ballast might be damaged by:

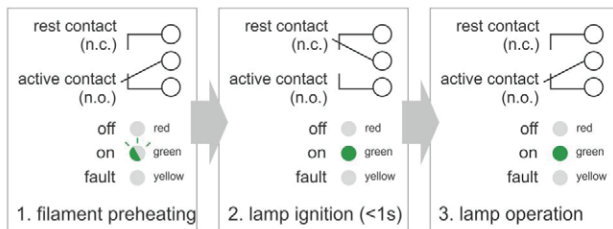
- overvoltage at mains terminals, even if the overvoltage occurs just for short time
- short circuits,
- incorrect wiring,
- loose contacts.

**Note:** The use of CE conform components in systems does not automatically implicate CE conformity for the complete system. For example the design of the cabinet, the type and routing of cables, the number of ballasts and the combination of devices influence the measurement results and should be evaluated for every different application.

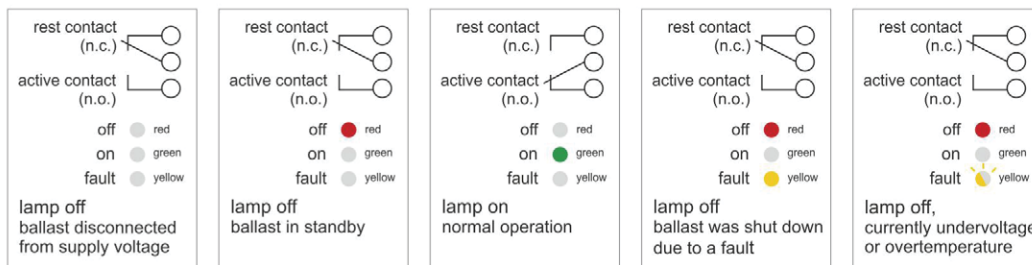
## 7 Status indication

- The ballast operation status is indicated by status LED and potential free relay contacts.

### lamp starting sequence



### lamp operation states



## 8 Lamp operation

- The ballast shall be operated with the UV lamp specified in this data sheet.
- The ballast operation parameter are adjusted and optimized to the specified lamp.
- This ballast might be used with lamps other than specified if current and power values are similar to the specified ballast ratings. In this case please verify the preheat settings since these values may differ significantly.
- Preheat time and preheat current settings are shown on the ballast label. Please ensure that these parameters match the lamp manufacturers specifications.