Signal heads for road traffic
Siemens signal heads ... safe, reliable, environmentally compatible, energy-saving, attractively priced

LED signal heads

These days, LEDs are the predominant form of illumination for signal heads, having largely superseded conventional signal lamps.

This technology consumes little power, yet today’s LEDs achieve top traffic signal performance.

LED signal heads with their bright evenly illuminated lights are reliably seen by road users, even in unfavorable lighting conditions, and using LEDs practically eliminates the disorienting phantom reflections that occur when the sun is very low.

The electrical interface to the controller is provided by a connection enabling LED signal heads to be operated on Siemens controllers compliant with HD 638 / DIN VDE 0832 100.

LED lights have a considerably longer lifetime than conventional signal lamps and ensure a high level of reliability of the system. Failures caused by defective signal lamps are a thing of the past.

The higher efficiency of LEDs means that their electrical power consumption is vastly reduced, so running costs for power supply are correspondingly low. LED signal heads with their low energy consumption thus represent a valuable contribution to environmental protection: saving up to 90% of the energy consumed by signal lamps.

Conventional signal heads

Signal heads with conventional signal lamps are used throughout the world and can be expanded with a wide selection of individual parts and accessories.

The product portfolio includes conventional high-voltage signal heads with 230 V signal lamps. Low-voltage technology (10 V) enables your energy consumption to be significantly reduced, right down to around 20 or 30 W.

PLUS signal heads

The lamp circuits in signal heads with PLUS technology are switched decentrally in the signal heads themselves. This provides for marked reductions in the cabling outlay and in the work needed to take the units into operation. PLUS technology is available for 40 V LED and 10 V lamp designs.

- Millions of Siemens signal heads have proven their value in everyday use.
- They have demonstrated their capabilities in many different countries in the most adverse weather conditions.
- They blend very well into any urban situation and have been awarded with the seal of “Good Industrial Design”.

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Optical aspects and light sources ... suppression of phantom effects crucial for good recognition

Visibility

The visibility of traffic signals depends on the following criteria:

- Luminous intensity distribution
- Phantom class
- Evenness of the luminous field
- Contrast between the signal light and its surroundings
- Size of the luminous field
- Light source

Luminous intensity distribution

The luminous intensity distribution is determined by the optical system – i.e., by the components that direct the light (reflector, diffusing lens) and the light source.

The luminous intensity must be sufficient to enable the signal to be easily seen in daylight but not high enough to dazzle road users at night. And its spatial distribution must ensure that the signal is recognizable from all relevant positions.

The luminous intensity distribution is specified by DIN EN 12368/ DIN 67527-1. The distribution for Siemens signal heads with signal light sizes of 200 mm is based on the class B2/2, and on class B3/2 for signal light sizes of 300 mm.

The lights can be dimmed at night for appropriate markets.

Phantom class

The phantom class describes how well the equipment suppresses reflections of sunlight.

The basic design of Siemens signal heads – i.e., the formation of the light source and the shape of the optical components – eliminates most phantom effects.

In the case of conventional signal lamps, the reflectivity of the optical system can be further reduced by means of an anti-phantom insert.

Phantom effects in LED signal heads are suppressed almost entirely by inserting colorless diffusing lenses. Sunlight reflections appear white and are clearly distinguishable from the colored signal light.

LED signal heads achieve the highest phantom classes, making phantom effects a thing of the past.

Contrast with the surroundings

With Siemens signal heads, contrast with the surroundings is ensured by the dark, square front surface. This contrast can be further improved by attaching background screens, which also serve to make the signal head more conspicuous to road users.

Light sources

The predominant light source used today is LEDs, but various designs of conventional signal lamps are still used in some cases. The chosen lamps must always be matched to the optical system in order to obtain specific luminous intensity values for specified angles with the lowest possible energy consumption.

Signal light size

Siemens offers signal light sizes of 200 mm and 300 mm, plus a low level signal head with a diameter of 100 mm.
Siemens signal heads ... your choice

Signal heads are classified either as LED signal heads or conventional signal heads.

Siemens offers the following LED signal heads:

- Units with 230 V technology
- Units with 40 V technology

Siemens also offers the following conventional signal heads:

- Units with high voltage 230 V technology
- Units with low voltage 0 V technology

LED signal heads using 40 V technology and conventional signal heads with low voltage 10 V technology are also available as PLUS signal heads.

LED signal heads

LED signal heads have considerable advantages over conventional signal heads and are used today in practically all new systems. Thanks to their modular design, existing systems can be refitted with LED signal head technology with a minimum of effort.

The benefits of Siemens LED signal heads at a glance:

- Brilliant optical properties
- Colorless lenses eliminate phantom color effects
- Phantom class 5 (for almost all colors and sizes)
- Energy savings of up to 90% as compared to conventional signal lamps
- High level of EMC immunity
- Optimized electrical interface for SIEMENS controllers
- Significantly longer life than conventional signal lamps
- Increased availability of your traffic signal systems

All LED signal heads from Siemens are equipped with a central light source comprising one or more high-performance LEDs. The light is refracted by a Fresnel and diffusing lens to obtain optimum emission characteristics. The signals can be easily seen from all angles and always show an homogeneous illumination.

The luminous intensity has been optimized to achieve a high level of recognition of both signals and symbols regardless of the environmental conditions. The luminous intensity is more than adequate, even on bright days, while at night the symbols are not so brightly illuminated as to be difficult to recognize.

Safety technology

To ensure the safety of the traffic light system, each LED light source is equipped with an electronic monitoring circuit that has been certified by the TÜV (the German safety standards authority). The current and voltage of the LEDs are continually monitored. If the forced deactivation circuit registers values indicating that illumination performance conformant to standards can no longer be assured the current at the input is interrupted, thus enabling the controller to detect the fault in the LED unit.
Conventional signal heads

In addition to signal heads with LED light sources there is a whole range of conventional signal lamps still in use:

- **High-voltage lamps**
  - operating at 230 V that are powered directly from the public mains supply

- **Low-voltage lamps**
  - operating at 10.5 V that are powered via a 230 V / 10.5 V transformer

Low-voltage lamps not only have a longer service life but also offer better light gain than high-voltage lamps (more lumens per watt). These smaller light sources also produce a narrower bundling of the light distribution. Both effects maximize the luminous efficacy, leading to a corresponding reduction in energy consumption.

Complete signal heads are available, as well as upgrade kits for Siemens signal heads with optical unit diameters of 200 mm and 300 mm.

PLUS signal heads

PLUS signal heads are available as LED models with either 40 V technology or conventional 10 V technology.

PLUS signal heads with LED technology use the same signal heads as for controllers with centralized lamp switches. A lamp switch module must be installed in at least one signal head chamber for each signal pole. The associated transformer can be housed in a pole distributor or in another signal head chamber. 10 V signal lamps are powered by at least one transformer on each pole, which means that there is no need for individual transformers in each signal head chamber as for conventional 10 V technology.

PLUS signal heads with conventional technology have the same optical system as 10 V signal heads. “Master” signal heads are responsible for power supply, lamp control and lamp monitoring, and these may have additional signal heads attached.

Low voltage signal heads with 10 V technology

These signal heads are equipped with specially designed reflectors and transformers that have two pluggable connectors on the secondary side, enabling them to power either a 20 W or a 30 W lamp as required. Failure-monitored lamps in red light units are equipped with R type ring core transformers complaint with safety regulations; other lights have standard (EI type) transformers. Both types of transformer are fitted with interference suppression elements.

Small signal heads

Small signal heads have a light diameter of 100 mm and are available either with LED technology or conventional lamp technology.

Siemens offers the following versions of these units:

- LEDs as a 230 V version
- LED as a 40 V version
- High-voltage lamps as a 230 V version
- Low-voltage lamps as a 10 V version

The voltage for low-voltage lamps is generated by transformers in the signal head. The modular design enables signal heads to be combined for almost all applications and all signal colors (red, green, amber, white and blue) are available.

There has been no compromise with the functionality of these units – the safety technology complies with VDE 0832.
Material and design ... decisive for service life, installation and maintenance

Siemens signal heads are available for signal light diameters of 200 mm and 300 mm, and these can be combined. Small signal heads with a signal light diameter of 100 mm are also available.

These signal heads are made of exceptionally tough, solid-colored polycarbonate with a maintenance-free surface. Tried and tested high-quality materials are also used for the other parts.

The design of Siemens signal heads is appropriate to the materials used and include many details that add useful benefits. Examples include:

- Quick-release latch for fast relamping or replacement of the LED insert. Opening the signal head requires tools.
- User-selectable hinge position of the cover (hinged on the left or right-hand side); this is important where signal heads are installed side by side.
- Terminal block with spring elements for fast installation plus vibration-resistant contacts.
- Quick attachment using clamp mounts without the need to drill holes in the mast.
- Visor made of flexible material with snap-in fastening for easy installation and replacement.

Terminal block with spring terminals for rapid, reliable connection

Signal head quick-release latch

Quick attachment with no need to drill holes in mast by using clamp mount (above), protected by the mast cover
Installing Siemens signal heads is easy and saves time.

- Individual signal heads (light chambers) can be assembled to multi-unit signal heads without tools, using special lamping rings or collar screws and nuts. The uniform design of the joints makes it possible to combine signal heads of different sizes without any difficulty. Continuous toothed rings on the mating surfaces allow adjustment at any angle and reliably protect against twisting.
- The following fixing components are used:
  - Clamp mounts
  - Support mounts
  - Fastening part 1

All mounting elements are made of corrosion-resistant material and are essential for secure fastening with protected wiring. Two different lengths of clamp mounts and support mounts make it possible to achieve an extremely wide variety of signal head configurations. All tube joints have uniform threads. Signal heads can be attached to masts without drilling by means of stainless steel straps. Corrosion-resistant, rugged and adjustable special attachments are available for cantilevers.
- The entire unit consisting of signal head, support mount and background screen is tested in a wind tunnel and can withstand wind velocities up to 200 km/h.
Accessories for signal head installation

Installation on straight masts
Universal fastening elements are available that simultaneously accommodate and protect the cables. These elements consist of fastening part 1, which can be screwed to the signal head, plus tubular clamps and support mounts. The clamp mount is used for fast installation of the signal head on the mast head; installation on continuous masts and flat surfaces uses the support mount. The aluminum tubes have a widely used $R\ 1\ 4''$ thread size.

The plastic-coated clamp and support mounts are available in two different lengths. Their tubes are closed with plastic sealing plugs during installation.

Installation at mast heads
For mast head installation the signal head is attached at the upper end of the mast with a clamp mount; at the bottom it is supported against the mast by the support mount. The support mount is fastened to the mast with a strap. Drilling is unnecessary with this type of attachment as the cables are routed through the upper mast opening and the clamp mount, and threaded holes for fixing screws are not needed. This ensures efficient installation. The mast opening is closed by a mast cover that permits adequate ventilation.

Installation on continuous masts
For installation on continuous masts the signal head is attached to the mast by means of two support mounts.

In this case, leadthroughs for cables and threaded holes for fixing screws will need to be drilled in the mast. For this type of installation one of the two support mounts can also be fastened using straps, thus eliminating the need to drill the corresponding threaded holes.

Installation on cantilevers
The cantilever attachment enables signal heads (with up to 3 units) to be securely fastened on cantilevers, as well as on bridges, portals or walls. Special features of this fastening method are as follows:

- Straightforward installation on the structure
- When mounted, the ball head and height-adjustment facility enables them to be tilted and turned to any desired angle
- Secure bolted joints
- Corrosion resistance

When a 300 mm signal head with 3 units and a type A background screen is installed, the cantilever attachment can withstand wind loads of up to 1500 N/m² (equivalent to a wind speed of approximately 150 km/h).

Key to figures
1) Threaded bolt
2) Support mount
3) Fastening part 1
4) Strap
5) Signal head
6) Mast cover
7) Clamp support

Installation on continuous mast

Installation at mast head
A comprehensive product range ... Vital for universal application

Combining the individual features and components listed below produces a broad range of different versions. Further variants are also available on request.

LED signal heads are protected against both dust and water jets (from any direction) in accordance with protection class IP 65.

Conventional high-voltage, low-voltage and PLUS signal heads are splashproof in accordance with protection class IP 54. Models with extra seals and IP 55 protection are also available. This makes the signal heads suitable for cleaning with high-pressure water jet equipment (as frequently used in tunnels, for example).

Housing

All housing components can be used for both conventional signal heads and for LED technology. Complete signal head and retrofit kits are available.

Housing colors, main models

Tray/cover combination with visor

Housing colors:
• Pebble gray/black
• Pine green/pine green
• Black/black

Signal light sizes:
• 200 mm and 300 mm diameters
• 100 mm diameter for small signal heads

Reflectors

For conventional signal heads only:
• Single reflector
• Double reflector for installing two lamps

Lamp bases

For conventional signal heads only:
• E 27 for high-voltage lamps (110 V – 240 V)
• BA 20s for low-voltage lamps (10 V) and for BÜSTRA 24 V
• Special bases for special applications are available on request

Diffusing lens colors
• Red, amber, green, white
Symbols

When symbols are required, masks are inserted in the relevant signal fields or diffusing lenses with burned-in symbols are used.

In the case of signal heads using LEDs, all symbols are implemented as masks that are inserted in the removable front lens in the LED.

Symbol lenses are supplied in place of symbol masks for small signal heads with LEDs with a light diameter of 100 mm.

To minimize servicing, the LED inserts are designed in such a way that the symbols can be changed or rotated on site.

The diffusing lenses for LED signal heads are made of system-specific colorless or colored plastic.

Diffuser masks are used to reduce the luminous intensity of white signals in LED signal heads (as used in local public traffic systems, for example) to prevent dazzling and increase the recognizability of the symbols.
Background screens are optical aids. By enlarging the contrast surface and increasing the visibility, background screens make signal heads much more conspicuous during the day and against bright backgrounds. Siemens background screens are manufactured from polycarbonate or aluminum. Their surface is maintenance-free, and they are strong enough to withstand even high wind speeds.

Background screens are easily attached to signal heads without the need for drilling.

<table>
<thead>
<tr>
<th>Background screens in accordance with DIN EN 12368</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mm signal light diameter</td>
</tr>
<tr>
<td>Type C</td>
</tr>
<tr>
<td>Type P</td>
</tr>
<tr>
<td>Type Q</td>
</tr>
<tr>
<td>300 mm signal light diameter</td>
</tr>
<tr>
<td>Type A</td>
</tr>
<tr>
<td>Type B</td>
</tr>
<tr>
<td>Special shapes</td>
</tr>
<tr>
<td>Type C1</td>
</tr>
<tr>
<td>Type E</td>
</tr>
<tr>
<td>Type D</td>
</tr>
<tr>
<td>300 mm signal light diameter</td>
</tr>
<tr>
<td>Type B1</td>
</tr>
</tbody>
</table>

Other versions available on request
Signal head construction with conventional lamp technology

1. Mast cover
2. Clamp mount
3. Tray
4. Spring terminal
5a Reflector for 230 V
5b Reflector for 10 V
6. Lamp
7. Anti-phantom insert
8. Seal (cover)
9. Cover
10. Seal (diffusing lens)
11. Diffusing lens
12. Visor
13. Socket for E 27 base
14. Fastening part 1 (also used for mast head installation)
15. Collar screw and nut
16. Clamping ring
17. Support mount
18. Plug
19. Strap
20. R type transformer (10 V)
21. EI type transformer (10 V)
22. Socket for BA 20s or 20d base
23. Tray base (for single-unit signal heads)
24. Clamping ring with screw (for fastening the E 27 base)
Signal heads – Dimensions and fastening elements

Dimensions of 200 mm and 300 mm signal heads

Key:
Dimensions in brackets: Signal head with
300 mm signal light diameter
* with short clamp or support mount
** with long clamp or support mount

1) Mast cover
2) Clamp mount
3) Fastening part 1
4) Strapt
5) Support mount
Cantilever attachment

Key:
1) Cable
2) Signal head attachment
3) Strap
4) Cantilever
5) Adjustable

* for 300 mm signal head with 3 signal fields

Strap; dimension α: 35 - 200 mm, type-dependent

Support mount
* Short version ** Long version
Technical data

### Optical properties of the LED signal heads
in accordance with DIN EN 12368 / DIN 67527-1

<table>
<thead>
<tr>
<th></th>
<th>200 mm diameter</th>
<th>300 mm diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous intensity distribution class</td>
<td>B2/2</td>
<td>B3/2</td>
</tr>
<tr>
<td>Axial light intensity– typical value - red</td>
<td>&gt; 200 cd</td>
<td>&gt; 400 cd</td>
</tr>
<tr>
<td>- amber</td>
<td>&gt; 200 cd</td>
<td>&gt; 400 cd</td>
</tr>
<tr>
<td>- green</td>
<td>&gt; 200 cd</td>
<td>&gt; 400 cd</td>
</tr>
<tr>
<td>Radiation characteristics W (wide-angle signals)</td>
<td>N (narrow-angle signals)</td>
<td></td>
</tr>
<tr>
<td>Evenness of the luminous density</td>
<td>1:10</td>
<td>1:15</td>
</tr>
<tr>
<td>Chrominance in accordance with DIN EN 12368 - red</td>
<td>613 - 631 nm</td>
<td></td>
</tr>
<tr>
<td>- amber</td>
<td>585 - 597 nm</td>
<td></td>
</tr>
<tr>
<td>- green</td>
<td>489 - 508 nm</td>
<td></td>
</tr>
<tr>
<td>Symbol class</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>Phantom class</td>
<td>4 bis 5</td>
<td></td>
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</tbody>
</table>

### Electrical and mechanical properties of LED signal heads

<table>
<thead>
<tr>
<th></th>
<th>40 V LED signal head</th>
<th>230 V LED signal head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>40V / 50 Hz</td>
<td>230V / 50 Hz</td>
</tr>
<tr>
<td>Power consumption (average values; other models are available for 230 V LED signal heads)</td>
<td>7 W for all colors</td>
<td>red: 17 W amber: 12 W green: 12 W white: 12 W</td>
</tr>
<tr>
<td>Power factor</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>EMC in accordance with DIN EN 50293</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection type</td>
<td>IP 65</td>
<td></td>
</tr>
<tr>
<td>Diffusing lens</td>
<td>System-specific colorless plastic lenses</td>
<td>System-specific colored or colorless plastic lenses</td>
</tr>
<tr>
<td>Symbol masks</td>
<td>Standard version (symbol lenses for small signal heads)</td>
<td>Standard version (symbol lenses for small signal heads)</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>IR 3</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40° C to +65° C, class A, B, C</td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td>20% to 95%</td>
<td></td>
</tr>
</tbody>
</table>
### Siemens signal head housings

**Material**
- Tray and cover made of UV-stabilized polycarbonate

**Housing colors**
- Black, RAL 9005
- Pine green, RAL 6009
- Pebble gray, RAL 7032

<table>
<thead>
<tr>
<th>Protection type</th>
<th></th>
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<tbody>
<tr>
<td>Standard version</td>
<td>IP 54</td>
</tr>
<tr>
<td>Special version available on request</td>
<td>IP 55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bases</th>
<th></th>
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<tbody>
<tr>
<td>E27 base for lamps (110 V to 240 V)</td>
<td></td>
</tr>
<tr>
<td>BA 20s base for low-voltage high pressure lamps (10 V)</td>
<td></td>
</tr>
<tr>
<td>BA 20s base for low-voltage halogen lamps (10 V)</td>
<td></td>
</tr>
<tr>
<td>BA 20d base for 40 V lamps – available on request</td>
<td></td>
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<tr>
<td>Bases for special applications – available on request</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Optical system</th>
<th></th>
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<tbody>
<tr>
<td>Reflector: Surface made of high-gloss aluminum</td>
<td></td>
</tr>
<tr>
<td>Diffusing lenses made of polycarbonate with web structure for high-voltage and low-voltage technology; red, amber, green, white</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbols</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Standard symbol masks available on request – symbol lenses</td>
<td></td>
</tr>
<tr>
<td>Symbol classes in accordance with DIN EN 12368: classes S1 and S2</td>
<td></td>
</tr>
</tbody>
</table>

**Luminous intensity – dependent on the number of lamps**

| Signal size 200 mm:       | B1/2 (min. = 100 cd) or B2/2 (min. = 200 cd) |
| Signal size 300 mm:       | B2/2 (min. = 200 cd) or B3/2 (min. = 400 cd) |
| Phantom light class:      | At least class 3 for high-voltage technology |
|                           | At least class 4 for low-voltage technology |
| Background screens:       | Sizes 200 and 300 in accordance with DIN EN 12368 |

| Type:                     | RiLSA |

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**Signal heads for low-voltage and high-voltage lamps**

**Mechanical requirements according to DIN EN 12368**
Further information can be obtained from:

Siemens AG
Industry Sector
Mobility Division
Traffic Solutions
Hofmannstr. 51
D-81359 Munich

The information in this brochure contains merely general descriptions and service characteristics which in a specific case may not always apply in the form described, which may change as a result of further development of the products. The desired service characteristics shall be binding only if expressly agreed at the time of entering into the contract.

Order no.: A24705-X-A532-*-7604