



INDUPERM^{AS}

**PAPI System
Hella Induperm type 801**

**USER MANUAL
GB**





LIST OF CONTENT

1. General information 3

 1.1 The layout of this manual 3

 1.2 The use of the manual 3

 1.3 Manufacturer information 3

 1.4 Document information 3

2. General overview of PAPI functions 4

3. Mode of Operation 5

4. Description of the PAPI unit 6

5. Features 7

6. Hella Induperm PAPI specification 7

7. Installation 10

8. Adjustments 11

9. Maintenance 11

10. List of Spares 12

 10.1 Assembly drawing 12

 10.2 List of components 13

11. Certificates 14

1. General information

1.1 The layout of this manual

This manual includes technical information about the Hella Induperm range of PAPI Light fixtures. All PAPI types are constructed and manufactured with the same mechanical and optical parts. However, the PAPI units can be supplied with one, two or three optical systems and with different height of light output center.

1.2 The use of the manual

The manual is intended to be used for installation, operation, maintenance of the PAPI unit in a PAPI system with four or eight units or in an APAPI system with only two PAPI units. The manual is also necessary for purchase of spare parts.

1.3 Manufacturer information

The PAPI 801 are developed and manufactured by:

HELLA INDUPERM A/S
Københavnsvej 1
DK-4800 Nykøbing Falster
DENMARK

Tel.: +45 5486 0200

Fax.: +45 5486 0389

E-Mail: induperm@induperm.dk

Homepage: www.induperm.dk or www.hella.com/airportlighting

1.4 Document information

Version	Date	Author	Approved
A –First release	2014.4.25	Ole Lund-Hermansen	OLH

Version	Date	Author	Approved	Comments
Aa	2014.6.25	OLH	OLH	Foundation bolt drwg. added



This manual includes a number of safety instructions, but national instructions as well as IEC 61820, Annex C, must be observed.



Hella Induperm A/S reserves the right to changes without notice. It is not allowed to copy this manual without permission.

2. General overview of PAPI functions

The PAPI system is a simple and reliable visual aid which enables the pilot to establish and maintain an exact glide path. The system secures the safe and accurate guidance for the pilot throughout the final approach phase to touch-down, both day and night.

A standard PAPI system comprises a wing bar of 4 light units located alongside the runway on its left, at the glide path origin and facing the approach. If further horizontal guidance is required, a second wing bar on the opposite side of the runway can be established.

The optical system divides the light beam of the unit in an upper half showing white and a lower half showing red. The transition at the centre of the vertical range is of so short a duration that the light gives an eye-catching click within a range of less than 3 minutes of arc.

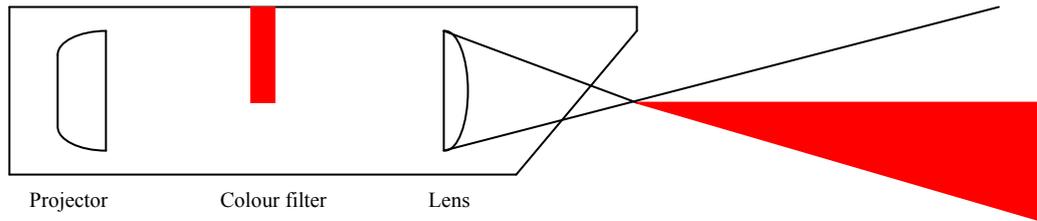
The four units forming a wing bar are set up at the glide path origin (TDZ point). The light unit next to the runway edge (light unit D) is adjusted to an angle 30' higher than the nominal glide path angle. The next light unit (light unit C) is adjusted 20' higher than D and so on. This is shown on Fig. 1.

The TDZ point must be co-ordinated with the ILS system (if available), or the distance between TDZ-point and Threshold can be calculated to secure a minimum Threshold clearance of 15m for all relevant types of aircraft.

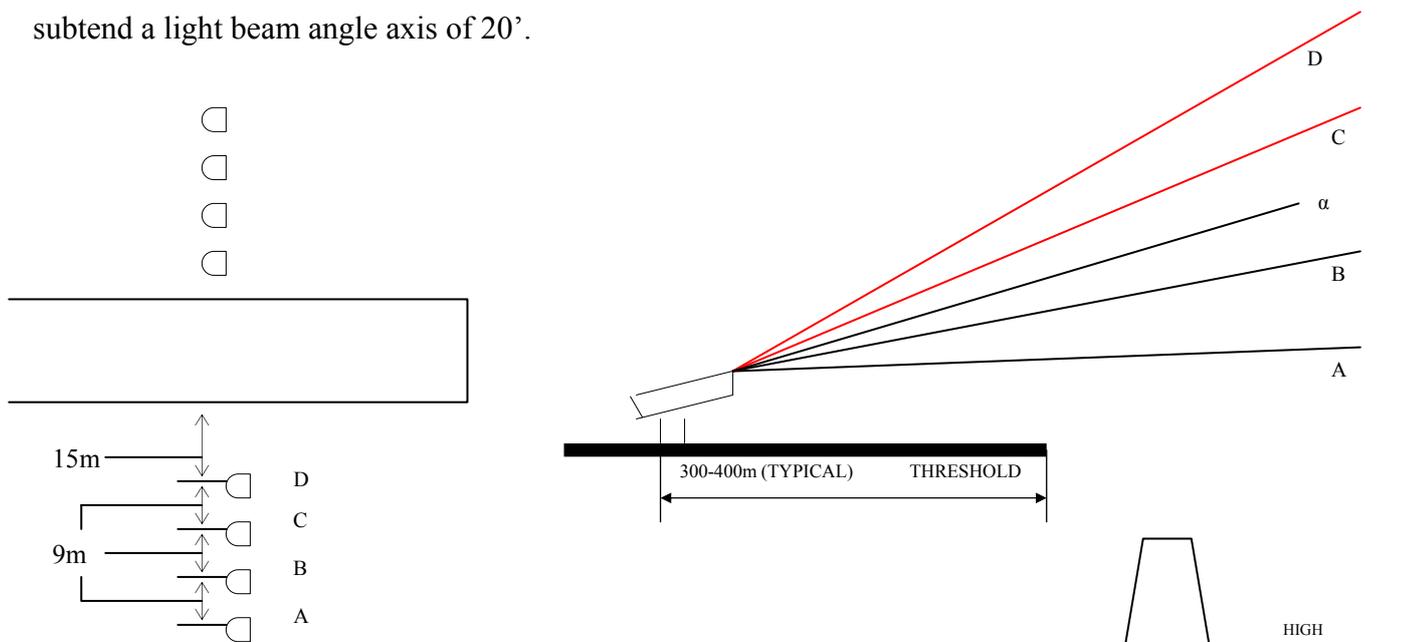
Hella Induperm PAPI can be supplied as 2-light units (2 x 200W Pk30d) or as 3-light units (3 x 200W Pk30d). As an option, the units can be supplied with heating elements on the lenses to prevent ice and / or mist.

3. Mode of Operation

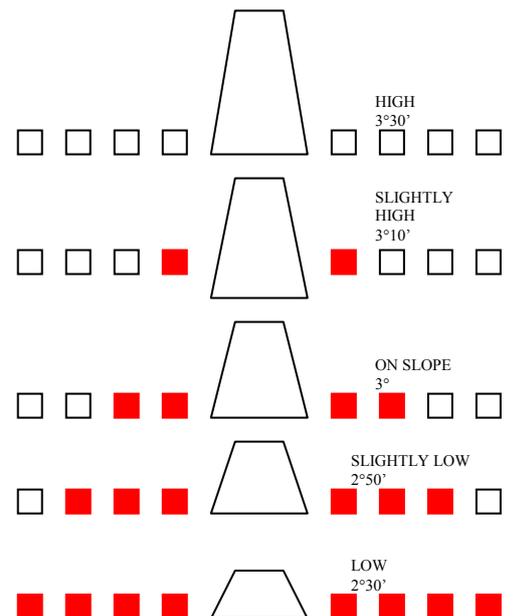
The optical system divides the light beam of the units in an upper half showing white and a lower half showing red. The transition at the centre of the vertical range is of so short a duration that the lights give an eye-catching click within a range of less than 3 minutes of arc.



The four units forming a wing bar are set up at the glide path origin so that any two adjacent units subtend a light beam angle axis of 20°.



On approach, the pilot is presented with a red/white light pattern that informs him instantly of his vertical position relative to the designated glide path, enabling him to adjust the rate of descent to acquire the correct glide slope or, if necessary, fly a low or high approach in complete safety.



4. Description of the PAPI unit

The PAPI units can be seen on the drawings 801.813/1 (3 lamp unit) and 801.823/1 (2 lamp type).

The main parts in PAPI units are as follows:

- Stainless steel housing
- Stainless steel cover
- 3-legged bottom frame, with adjustable legs.
- Lenses
- Red filters with eccentrics for adjustments
- Aluminium reflectors
- Control plane for angel adjustment

The PAPI unit is constructed and adjusted to have centre of lamp, edge of red filter and centre of lens on one line to secure the sharp transition.

In the factory the PAPI unit is adjusted to 0° in both light direction and perpendicular to the light direction (measured on the control plane), and in this position is the following controlled / adjusted:

- Light output is also 0°
- Transition sector is completely identical for all (2 or 3) light systems in the PAPI unit
- The transition sector is horizontal

The PAPI unit is now adjusted to a sharp transition between red and white, and the angel on the control plane will be the same as the angel of the light output.

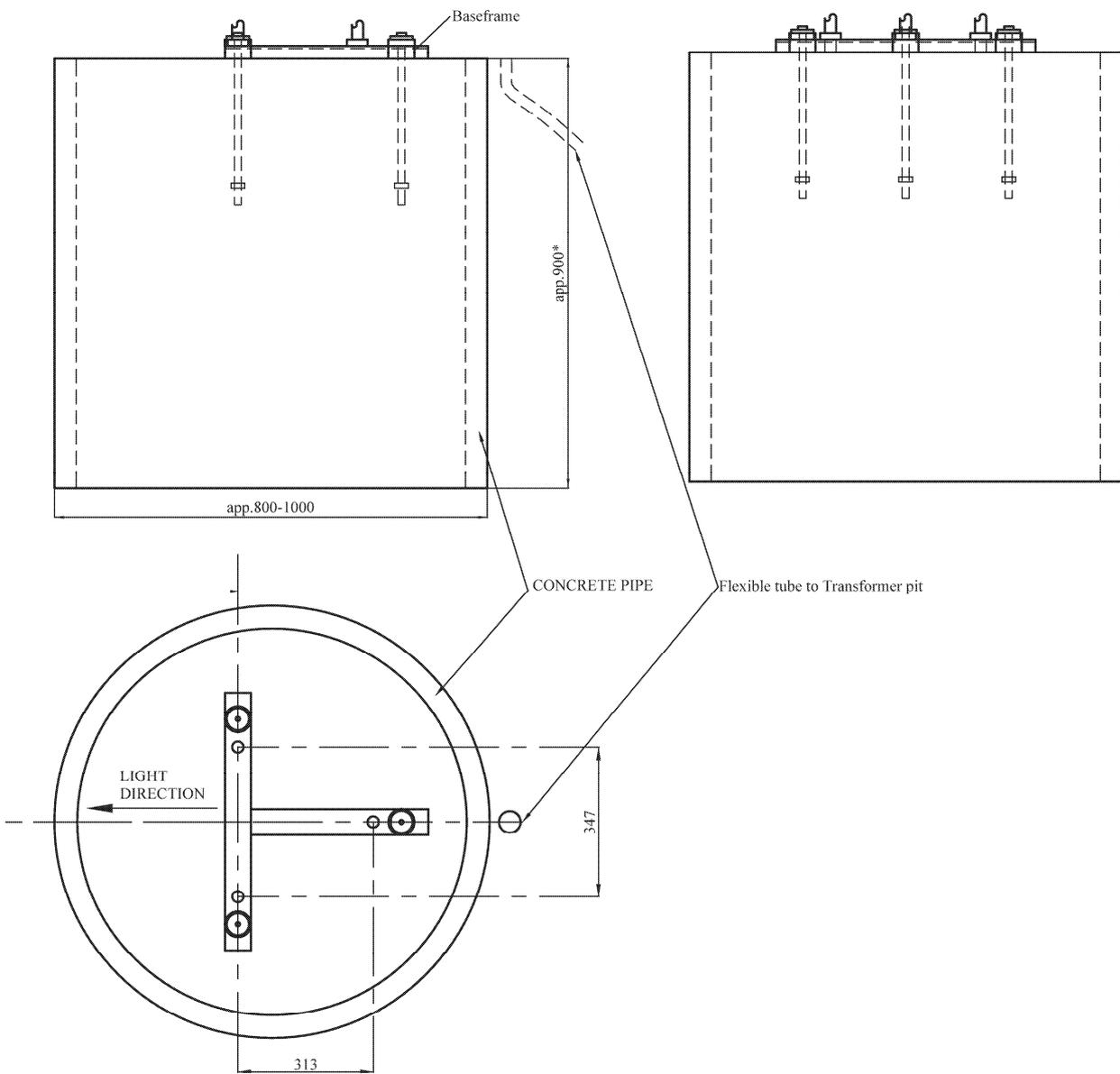
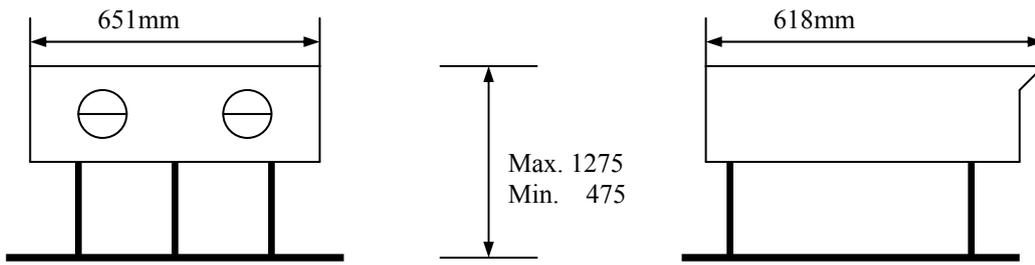
The angel of the light output can now be adjusted by adjusting the ball joint on the back leg.

5. Features

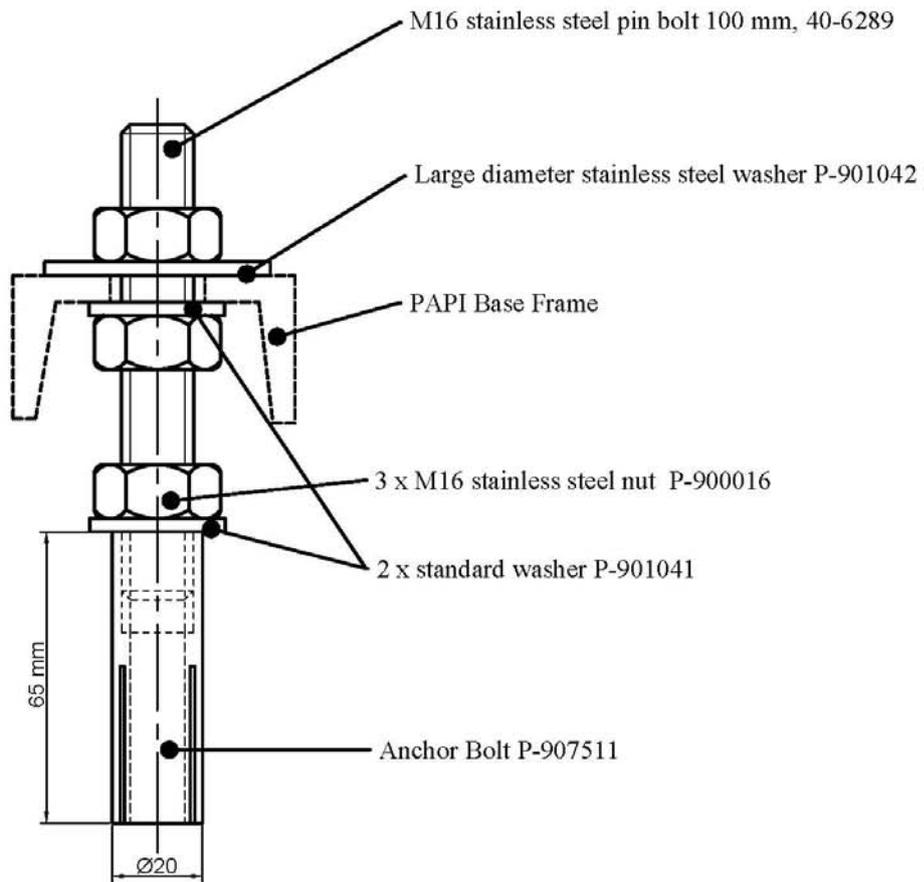
- Easy installed and adjusted
- No tool needed for re-lamping, and no additional adjustments required
- Non-corrosive cabinet of a reliable mechanical construction
- Standard 200W-6,6A Pk30d lamps used
- Standard base frame includes breakable couplings

6. Hella Induperm PAPI specification

- The PAPI units can be supplied with light plane height above ground between 350mm and 700mm. The standard value is 550mm. The height can typically be adjusted ± 20 mm.
- Light output app. 35.000cd (white) / 10.000cd (red) for one 200W light system. To be multiplied with 2, respectively 3 dependant on the number of lamps in the PAPI unit.
- Lamps: 200W-6,6A- Pk30d-1000Hour
- Weight app. 40 KG
- Cover in aviation yellow, the rest is black.
- Breakable coupling included
- Foundation bolts are not included as standard. Standard 16mm hot dip galvanized bolts with accessories can be used or we can offer a stainless foundation kit type 801.530
- Cable entry for each lamp through PG 13,5 gland. Connection directly to male connector on Pk30 bulb as standard.
- Optional FAA cable can be supplied in length according to customer request
- The PAPI light fixture can as an option be equipped with a heater system including a heater for each lens and a thermostat. Total power is 75W with an input voltage of 48VAC. The heater kit is to order as type 801.845.



PAPI UNIT FOUNDATION.



SCALE:	Standard foundation bolt Assembly	
DATE: 23.08.2013		
DRAWN: DLW		
APPROV AND		
RELEASED: OLH		
REPLACES:	PAPI	801.530
REPLACED BY:		

Z:\Srv2\data\Arkiv\Armatu\801\801530

7. Installation

If the runway has ILS, the TDZ point for the PAPI system must be the same as the theoretical TDZ point for the ILS.

If not, the airport authorities can determine the TDZ point or the minimum distance from the Threshold can be calculated as follows:

The minimum Threshold clearance is 15m.

1. Runway is horizontal:

Distance from Threshold = L (in m) =>

$L = 15 / \tan(\alpha)$, where α = glide slope angel

2. TDZ is D (in m) lower than Threshold:

Distance from Threshold = L (in m) =>

$L = (15+D) / \tan(\alpha)$, where α = glide slope angel

3. TDZ is D (in m) higher than Threshold:

Distance from Threshold = L (in m) =>

$L = (15-D) / \tan(\alpha)$, where α = glide slope angel

Placed in the TDZ point, the PAPI units have to have their light output centre, the light plane, in level with the centre of the runway. It means that the top of the foundation must be 550mm (for a standard height of PAPI units) lower than the centre of the runway. If that's not possible, either the TDZ point or the PAPI units must be displaced.

Each PAPI unit is mounted on a stable concrete foundation by means of 3 anchor bolts. The light output must be parallel to the runway or have a very small toe-in.

The PAPI units are mounted on the anchor bolts, and the bottom frame levelled.

By means of the ball joints on each leg, the PAPI unit is adjusted to the correct light output plane with the housing app. Levelled.

8. Adjustments

The ball joints on the 3 legs are adjusted until the PAPI light unit has the correct light output level, and at the same time the factory adjusted control plane in the PAPI unit is 0° in both light direction and perpendicular to the light direction. This is measured by means of the high accuracy digital clinometers, see the following figure.



Then the digital clinometer is placed on the control plane in the light direction, and the ball joint on the back leg is adjusted to the desired angle for each individual PAPI light unit. Be careful not to touch the housing during the adjustment as angle adjustment is very sensitive.

Please read the manual for the digital clinometers carefully before use to know how to handle this very sensitive, high-tech device. Please note, that the battery must be changed regularly to maintain the factory calibration of the digital clinometers.

9. Maintenance

Once a month the PAPI light fixtures should be maintained and controlled as follows:

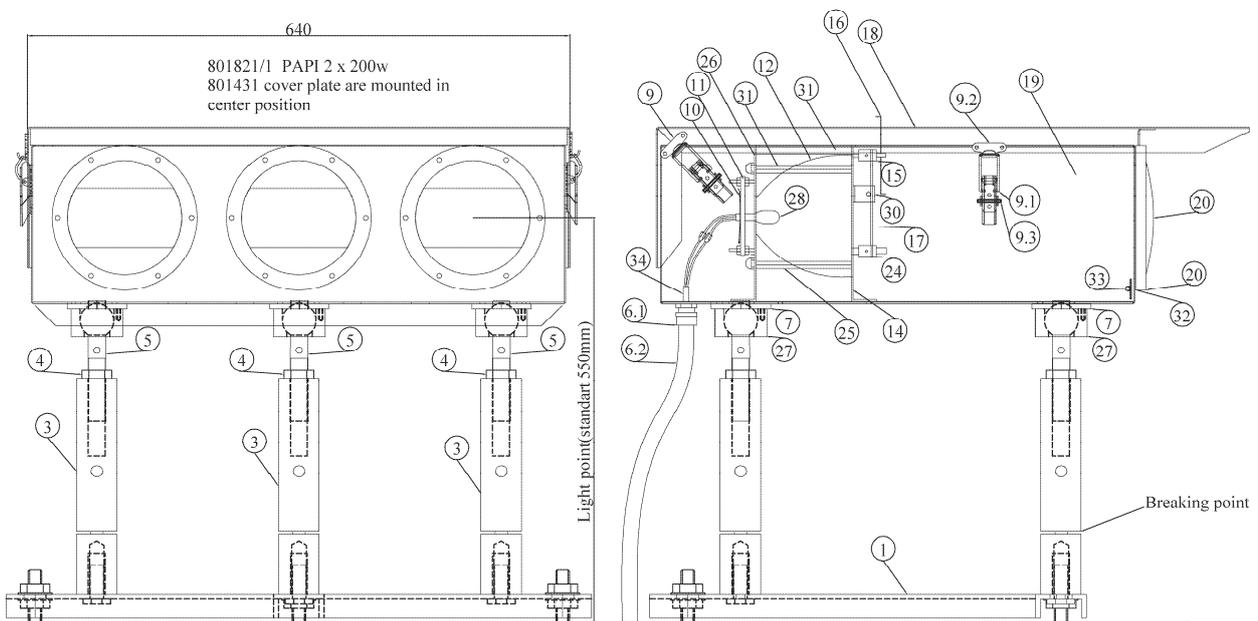
1. The lenses are cleaned.
2. Reflectors and filters are carefully cleaned with a dry, soft cloth.

Make sure, that the filters are in the correct position in groove in the eccentrics

3. Control that the lamps are working, and that the filament in the lamps is in the correct position (if the filament in the lamp starts “hanging” the transition sector for the actual light output will have moved).
4. Use the digital clinometers to control the setting of each PAPI unit, both in the light direction and perpendicular to the light direction.
5. Switch-on the PAPI light in the highest intensity step, and look at the light output from the longest distance, where the transition from white to red can be seen. The transition must be sharp and simultaneous for all light system in the PAPI unit.
 - a. If not, control the position of the filters or
 - b. Change the lamps (be careful to place the lamp correct)

10. List of Spares

10.1 Assembly drawing



10.2 List of components

Pos.	Beskrivelse / Description	Nr. / No.	Antal / Psc.
1	Bundramme / Bottom frame complete	952.208	1
2	Mellemrør / Pipe coupling	952.207	3
3	Møtrik ½" RG / Nut	P-900515	3
4	Kuglebolt / Ball bolt	801.203	3
6.1	PG13,5	P-242032	4
6.2	Protection tube	P242031	0.7m
7	Aflastningsplade / Nylon relief	801.221	4
9.1	Lock A2	P-355503	4
9.2	Lock A2	P-355504	4
9.3	Pin for lock	P855505	4
10	Fjeder f. lampeholder / Spring for lampholder	801.419	3
11	Lampeholder / Lampholder	801.418	3
12	Parabol / Parabol	801.416	3
13	Parabolstag	801.406	8
14	Parabolskod	801.815/2	1
15	Filterholder / Filterholder	801.412	4
16	Fjeder / Spring	801.410	2
17	Filter rød/ Filter red	801.401/18	3
18	Låg / Cover	801814/3	1
19	Svøb / Housing	801.810/1	1
20	Linse / Lens	801.401/5	3
24	Filterjusterexcentrik	801.413	6
25	Excentrikaksel	801.414	6
26	Bagplade f. parabol / Rear plate for parabol	801.817/2	1
27	Kugleskål / Ball bearing	801.202	3
28	Lyskilde 200W / Source of light 200W	P-383007	3
30	Vinkel	40-5769	2
31	Justerstang/Adjustment bar	40-5778	1
32	Rubber gasket	801.433	3
33	Pre-heat assembly kit *	801.845	1
34	FAA-cable 2 pol 0,9m *	P-242010	4

* optional parts

11. Certificates

Certificate

about Conformity of the product
PAPI Light (White/Red)
 with the mentioned specifications of International Civil Aviation Organization (ICAO)

Manufacturer: Hella Induperm A/S
 Københavnsvej 1
 4800 Nykøbing Falster
 Denmark

Model description: Hella Induperm PAPI Type 801

Version / Variant: 2x 200 W / 6,6 A

Brand name: Hella Induperm PAPI

Light source(s): 2 incandecent lamps 200W

Test standard/specification: International Civil Aviation Organization (ICAO), Aerodromes, Annex 14, Volume 1, Fifth Edition, dated July 2009
 Photometry – ICAO Figure A2-23 and §5.3.5.29
 Chromaticity – ICAO Figure A1-1 (white, red) and §5.3.5.30

Test laboratory: TÜV Rheinland Lichttechnik GmbH
 Rhinstrasse 46
 12681 Berlin

Date of Test(s): 20 February 2014 - 21 February 2014

Test report number: 5356543

This is to certify that the mentioned product is in accordance with the mentioned test standard/ specification at the time the tests were carried out in our laboratory.

Berlin, 26 February 2014


 Kurt Anders
 Deputy head of Laboratory


 Dipl.-Ing. Heiko Herzberg
 Laboratory engineer

TÜV Rheinland Lichttechnik GmbH
 Rhinstrasse 46, 12681 Berlin, Germany

Note: This certificate is part of the full test report and should be read in conjunction with it. This certification is valid until the first quarter 2017. The test laboratory having carried out testing services which are object of the certificate in conjunction with technical report is accredited by the DAkkS Deutsche Akkreditierungsstelle GmbH for performing these testing services according to DIN EN ISO/IEC 17025. The accreditation is valid for the testing procedures listed in the certificate. The certificate in conjunction with technical report shall be reproduced and published in full by the client only. It shall however be reproduced partially with the written permission of the Testing Laboratory only.