

SON Schmidts Original Nabendynamo

Installation Instructions

SON XS100

The **SON XS100** hub dynamo is designed for wheels measuring 394 to 528 mm overall. It brings the famous high efficiency of the SON concept to recumbents and folding bikes. The low weight of only 400 g ensures the bike won't be heavier than with a conventional front hub and sidewall dynamo. The lightweight axle construction of the **SON XS100** is designed only for bicycles with less than 100 kg total weight (incl. cyclist and luggage). For cargo bikes, tandems and mountain bikes you should use the classic SON20 or SON28, however.

Concerning function, reliability and design the Schmidt switched headlights E6 match ideally with SON28. Other high quality headlights with integrated switch or control sensor, e.g. the halogen- and LED headlights made by Busch + Müller are also usable. All these headlights are provided with an integrated overvoltage protection. Since year of manufacture 2007 you can recognize it by this test symbol:



Using the **SON XS100** in wheels larger than 20" means even less driving force. However, that way you produce less voltage than is regulated in German StVZO when riding at low speed. In a 20" wheel we achieve 6V3W at a speed of 16 km/h, in a 28" wheel only at about 22 km/h. The clearance between flanges is narrower. So wheels with **SON XS100** hubs have less lateral stiffness than those built with hubs of common geometry.

Building the hub into a wheel is best left to an expert – who should nevertheless note the information below.

Wheelbuilding

The SON28 is designed for the usual crossed form of spoking. Flange thickness and spoke holes are optimised for high quality 2 mm (14 g) spokes. The correct length of spokes is determined with reference to the rim radius r_2 . This radius is half the distance measured between two opposite nipple-head lay-ons. The ideal spoke length l is calculated as:

$$l = \sqrt{r_1^2 + r_2^2 + a^2 - 2 \cdot r_1 \cdot r_2 \cdot \cos \frac{k \cdot 720^\circ}{n}}$$

r_1 = radius of spoke holes = 35 mm
 r_2 = radius of nipple-head lay-ons in rim
 a = half of flange distance = 20 mm
 k = number of crossings
 n = total number of spoke holes

For 16"-20" rims this can be simplified to:

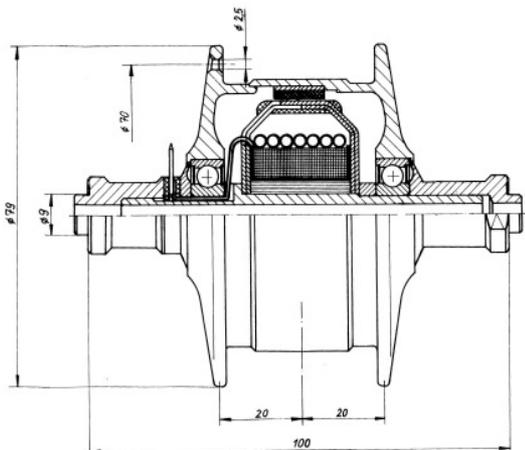
$$32 \text{ hole, 2 cross: } l \approx r_2 - 21,5 \text{ mm}$$

$$28 \text{ hole, 2 cross: } l \approx r_2 - 18,0 \text{ mm}$$

$$24 \text{ hole, 2 cross: } l \approx r_2 - 13,5 \text{ mm}$$

Spokes 1 mm shorter may also be used.

For a Rigida X-Plorer 19-406 with 32 spokes 2 cross we recommend spoke length 163 mm. For Birdy rim Alex DV15 15-355 with 24 spokes 2 cross we recommend spoke length 155 mm.



Fitting the front wheel

Schmidts Original hub dynamo SON28 fits a fork designed to accept an axle of 9 mm diameter and a width of 100 mm between dropouts. The electrical connections may be on the right or on left handside.

The hub is secured using the included skewer set. It fits the same way as a quick-release, but fastens with a 5 mm allen key (**recommended torque moment 8-10 Nm**).

Apply a little grease on thread and screw-head but not on the shank (to prevent clogging up the pressure compensation system leading into the hollow axle). If the skewer tension is too low, the axle may move inside the fork end causing a rattling noise.

Alternatively a lever-type quick-release may be substituted, or a proprietary security fastener such as Pitlock.

Fitting the headlamp

We suggest that you fasten the cable of the headlamp to the fork blade etc. with nylon zip-ties, leaving enough slack by the axle to facilitate disconnection from and re-connection to the hub. Either plug may be connected to either spade terminal (they simply push together), it makes no difference which way round. It is possible to order an E6 or Lumotec headlamp equipped with a long cable and separate plugs etc. This can be trimmed to the required length, after which you attach the plugs yourself according to the process illustrated below.

1	<ul style="list-style-type: none"> Remove about 4 cm of outer insulation Twist the underlying wires together and slide a piece of thin shrink-sleeve over them 	
2	<ul style="list-style-type: none"> Heat with a hot air gun or flame (carefully) to shrink this sleeve, then do the same with a piece of fatter shrink-sleeve overlapping the junction. Trim the sleeve and inner insulation to expose about 5 mm of each cable 	
3	<ul style="list-style-type: none"> Fit the plugs, using a crimp tool or pliers to secure both the insulation and the cables. The first pair of claws must grip the insulation. 	
4	<ul style="list-style-type: none"> Slide and shrink a piece of sleeve over each plug 	

Headlamps with integrated switch by other manufacturers (e.g. Lumotec oval senso plus) are usually equipped with twin cables instead of coaxial cable. Instead of step 1 and 2 the cable only has to be cut to length, the two wires separated for about 3 cm and the insulation removed at about 5 mm.

Connection of a rear lamp

The SON XS100 should always be connected to a 6V3W load. The usual way is the combination of the 2.4W halogen headlight and a 0.6W rear light or a special 6V3W halogen bulb. The permanent use of a 6V2.4W bulb alone will shorten the bulb lifetime radically (not valid for the E6 headlamp)!

We recommend a high-quality LED rear lamp with capacitor standlight (e.g. Toplight D plus or Seculite D plus by B+M).

The switch in the headlamp will also control the operation of the rear lamp. A single wire connection from the innermost spade terminal (on some models marked with a flash) of the headlamp to the rear lamp will usually be sufficient (the system is earthed at the mounting hole of the lamp). A 2.8x0.5 mm plug should be connected according to pictures 3 and 4 of the table above.

A definite neutral/earth connection can be made (i.e. double wiring) by using the spade terminal marked with the earth symbol (only Lumotec and Lumotec Oval Plus) or by adding a 6 mm crimp eyelet between the lamp and its bracket.

Most reliable and elegant cables are the Schmidt coaxial cables for rear lamps.

The cable for rear lamp with overvoltage protection (item no. 72095) must be used in case the headlight itself is not provided with an integrated overvoltage protection.

Maintenance

The generator is fully enclosed and maintenance free: there are no gears or other moving parts inside. The wiring and lamps should be checked regularly, and any defects repaired in order to avoid dangers caused by high voltage.

The ball-bearing cartridges are pre-lubricated and similarly maintenance free in normal everyday use. A slight amount of play is normal with this type of bearing - do not attempt to adjust or regrease them.

The aluminium axle and the parts that are pushed on are threadless. They cannot and must not be twisted.

To avoid water ingress do not immerse the hub and take care when washing it never to spray water (from a hose etc.) directly at the axle.

In case of any problems (e.g. worn bearings, damaged electrical contacts) let your bike shop contact the manufacturer or importer. For warranty claims (5 years from date of purchase) please add a copy of the purchase receipt.

Important advice

With lights switched off, the fast spinning generator induces a high and possibly dangerous voltage. For this reason the switch and generator must be connected by a fully insulated cable like the one provided, i.e. with no bare parts.

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