

Philips NatureDynamics White

- Installation instructions -

Contents

Getting started	2
Scope of this guide	2
Needed items before installation.....	2
Planning the installation.....	3
Mechanical	3
Tubes	3
Clips	4
Pentamount clip	6
Dimming power supply.....	7
Connection cable.....	7
Optical	8
Electrical	10
Tubes	10
Dimming power supply.....	11
Connection cable.....	13
Thermal	13
Tubes	13
Dimming power supply.....	13
Steps to a successful installation.....	14
Schematic overview of installation	15

Getting started

Scope of this guide

This guide will help you in designing and preparing the full installation of a NatureDynamics White system. This to ensure correct calculation of the needed materials and a clear preparation of the installation work itself.

Preparation is the main part of this guide; the physical installation is mainly normal workmanship which should be carried out by a certified installer.

Needed items before installation

Make sure all material is available. This consists of following Philips materials (numbers according installation):

- Tube White luminaires
- Mechanical clips
- Power supplies
- Connection kit (connection cable including end cap)

Besides these materials, make sure also auxiliary materials are available in the right numbers, these are standard materials and not directly supplied by Philips. Think of following materials:

- Mounting means (wires, screws, etc.)
- Connecting junction boxes (~1-2 / power supply)
- Mains cables/wires for connection of mains to power supply
- 0-10V connection wire to connect control signal to power supply
- Connectors to connect cable to each other inside the junction boxes
- Etc.

The number needed of each component is totally depending on the installation and should be studied and prepared on forehand.

Planning the installation

The installation should be planned with the boundary conditions in consideration. These boundaries are explained in the following chapters.

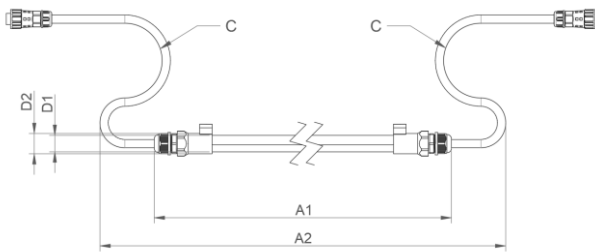
The NatureDynamics White Poultry luminaire (also referred to as “tube”) is considered as a luminaire which has LED’s over its full length distributed on one side. It has an in- and output connector which makes it possible to create long strings of luminaires connected to each other.

Mechanical

Tubes

Tubes consist of a two-color tube (diameter 20mm), front (light emitting side) is diffuse and the backside is white. At both ends the tubes are sealed by end-caps. These end-caps ensure water tightness, have a cable exit and a location feature which makes it possible to orient and fix the tubes in the right lighting direction.

Typical dimensions of a NatureDynamics White (20 shown as example)



Product	A1	A2	D1	D2	C
Nature Dynamics	1940	2000	20	24	300
White 20	mm	mm	mm	mm	mm

Tubes can come in several lengths as can be seen in below table:

Product	Minimal installation Length (A2)		Maximum pitch	
	[mm]	[ft]	[mm]	[ft]
NatureDynamics White 14	1400	4.5	1900	6
NatureDynamics White 17	1700	5.5	2200	7
NatureDynamics White 20	2000	6.5	2500	8
NatureDynamics White 23	2300	7.5	2800	9
NatureDynamics White 26	2600	8.5	3100	10

The cables on each end have a length of ~300mm (1ft). This makes a flexible installation length (pitch) possible as can be seen from the above-mentioned table.

The input side has a male IP67 connector while the output has a female IP67 connector.

Clips

The tubes can be mounted with the special designed clips which allow for various number of mounting / orientation options. The clips fit around the optical tube and have special features which align to the orientation features of the endcaps.

A tube would normally be supported with 3 clips. The longest tubes could have some sagging. In some installation this is not allowed. For these situations a fourth clip is advised.

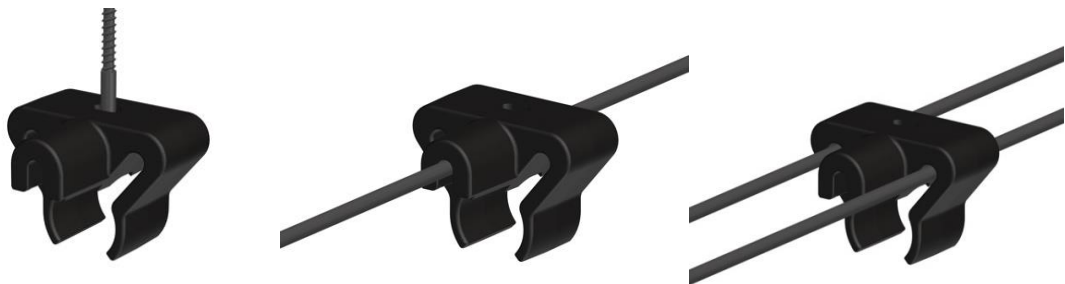
Product	Minimal clips / minimal sagging with rotation fixed
NatureDynamics White 14	3 (2 in some cases sufficient, but needs to be checked in application)
NatureDynamics White 17	3
NatureDynamics White 20	3
NatureDynamics White 23	3
NatureDynamics White 26	3 (4 best in class)

Clips allow for several options to be connected to a frame.

- Screw fixation (with included reference to frame for orientation)
- One wire support, maximal 4mm diameter round (with separate, to be designed in application, reference for orientation)
- Two wire support, maximal 4mm diameter round

Bear in mind that a one wire support when guided through one of the outer holes could lead to a ~45 degrees slanted tube if required.

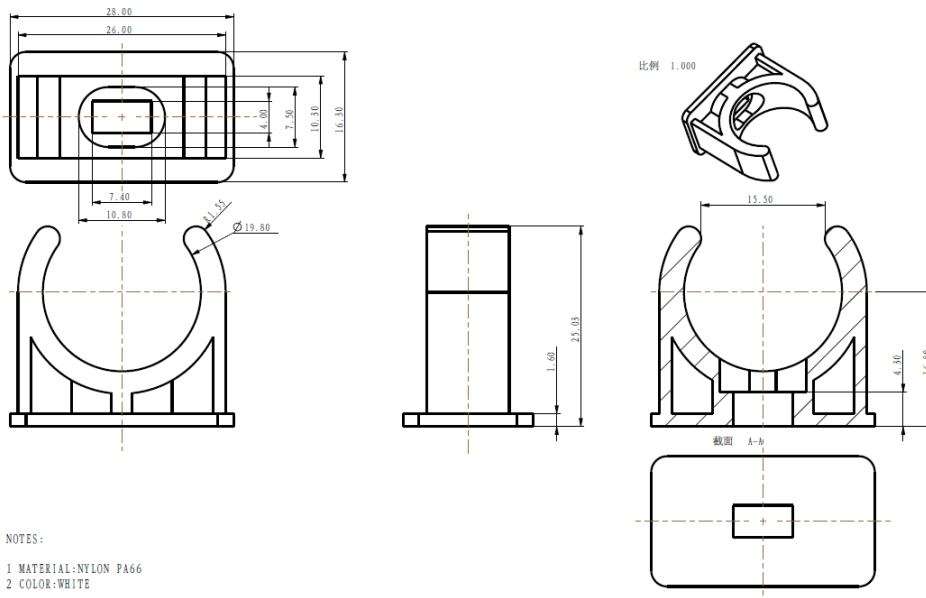
Some pictures of possible fixation below:



Below picture shows how the clip is attached to the end of the tube to ensure correct orientation.



Besides these special designed clips, the 20mm tube also will allow for industry standard mounting clips for 20mm tubes. Similar to below shown clip:



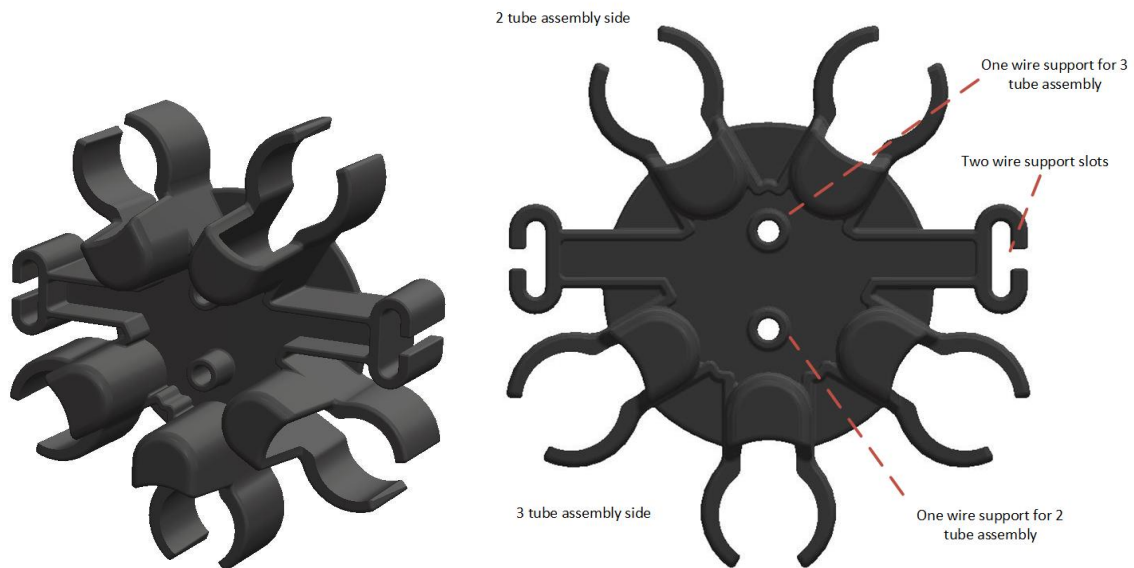
Number of clips needed for these standard clips and the way of mounting needs to be studied case by case. Orientation is not always fixed by these clips and should be solved in a different way (i.e. special bracket).

Pentamount clip

In locations where much more light output is needed, a special design mounting clip is available which can have either 3 tubes or 2 tubes in an assembly. Where the rotation of the tube is fixed and aimed to have best light distribution.

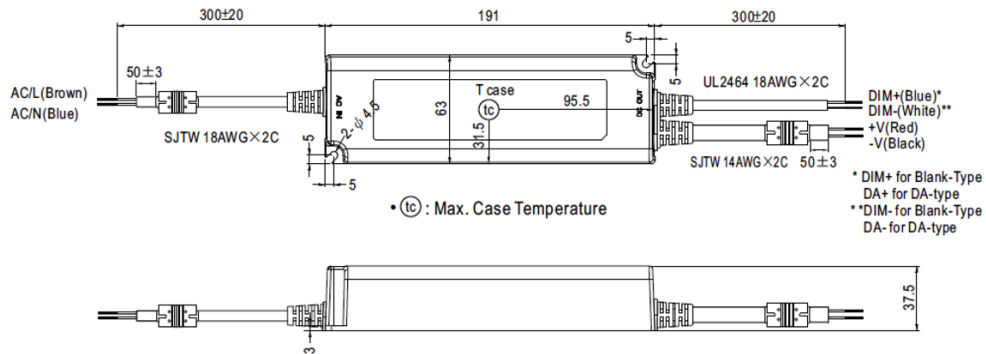
It is advised to suspend the pentamount clips on two wires at 90mm distance. However, it is also possible to hang the pentamount on one wire. Two holes are present for either 3 tubes or 2 tubes option. These single holes could also be used to screw the pentamount to any other supporting structure.

Below a picture of the pentamount clip and an explanation of the different suspension options.



Dimming power supply

The power supply can be mounted with two screws according to the below shown schematic.



The power supply is IP67 certified in a plastic enclosure and can be mounted inside the chicken barn. Wires at the end are ~300mm long and need to be connected inside suitable junction boxes (standard catalog items).

Each power supply needs a junction box with mains connection and a junction box with 24V and dimming-control connection. In some cases, two power supplies could join one junction box on each side.

These junction boxes should be according the local electrical regulations. These regulations should be adhered to and only done by a certified installer.

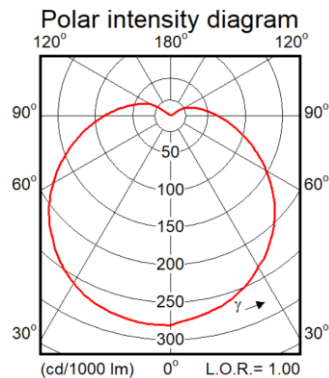
Connection cable

The connection cable kit consists of a 5m connection cable which has a female connector to connect to the first tube of a string and on the other end free stripped ends, to connect to the power supply output. Make sure the first tube connected to the connection cable has the right orientation to fit to the female connector. The kit also comes with an endcap to seal the last tube in a string, or the connection cable if the cable would be installed considerable time before the tubes are installed. This endcap will protect the last female connector on a string.

Optical

The tubes have white LED's inside. The pitch of the LEDs and the special diffusing material on the light emitting side allow to have a nice distribution of light on a surface.

If looking to the x-section of a tube, the opening angle of the light is ~130 degrees and is distributed according to below graph.

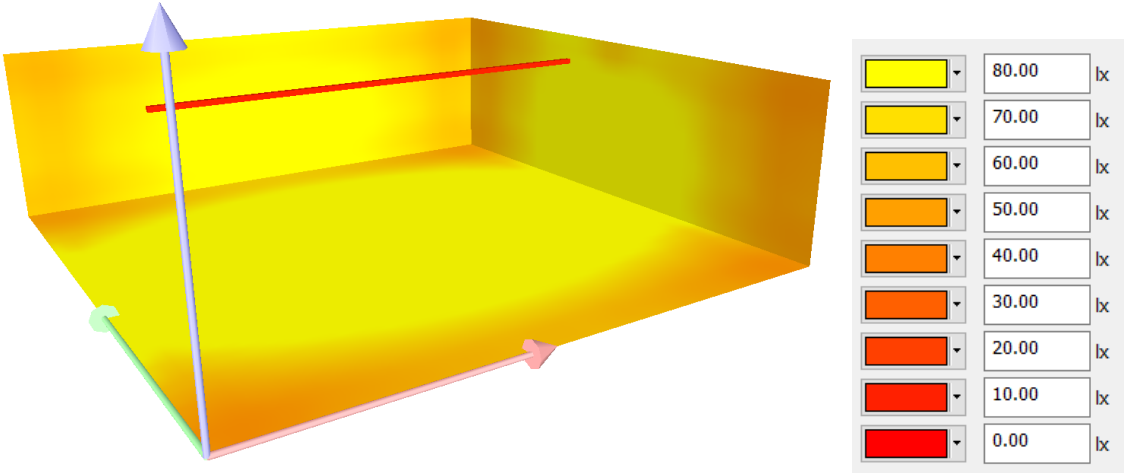


The total luminous flux is depending on the length of the tube. As can be seen in below mentioned table.

Product	Minimal Luminous Flux [lm]
NatureDynamics White 14	330
NatureDynamics White 17	410
NatureDynamics White 20	500
NatureDynamics White 23	580
NatureDynamics White 26	660

It is possible to have very homogeneous lite surfaces with these tubes. Depending on the real requirement this would need simulation which can be done (appropriate files for this available on request).

Although lighting simulation results are fully depending on the final total situation;the example below shows a unit of 2.3x2.3x0.7m and one NatureDynamics White 20 mounted centrally in the top. Even in the far corners the illumination reaches minimal 50Lux.



More simulations, optical considerations and advise available on request.

Electrical

Tubes

The tubes operate at a safe voltage of 24V. Depending on the length they have different power rating, as can be seen in below table.

Product	Input current [A]	Power [W]
NatureDynamics White 14	0.16	3.8
NatureDynamics White 17	0.20	4.8
NatureDynamics White 20	0.24	5.8
NatureDynamics White 23	0.28	6.7
NatureDynamics White 26	0.32	7.7

The tubes are connected to each other (in- and output) thus forming a long string of tubes, electrically they are parallel connected with longer wires for longer strings.

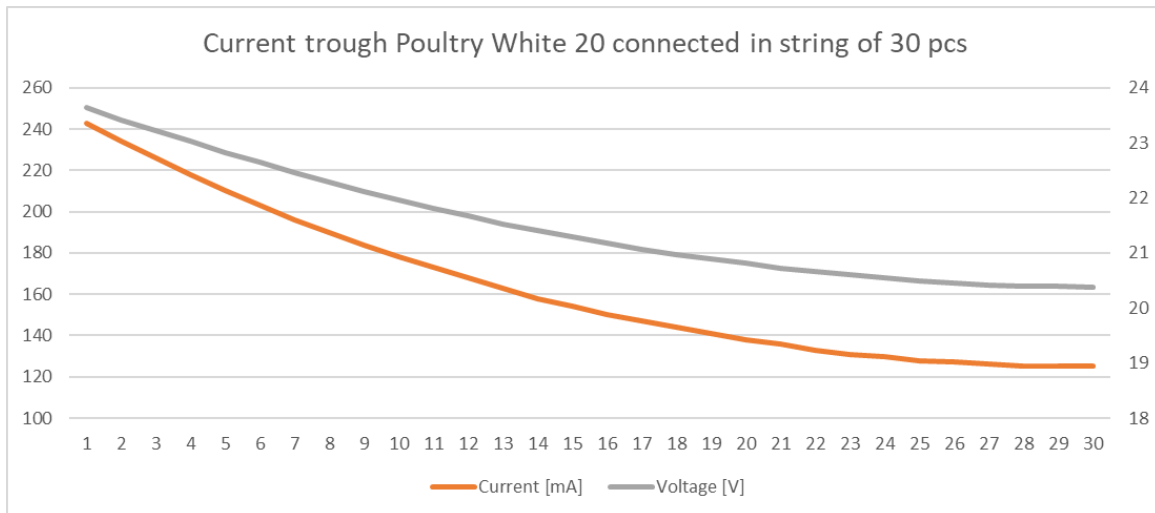
By the nature of Ohms-law there will be power losses in the long wires connecting long tubes to each other. This results to current (thus brightness) and supply voltage for tubes getting lower along the daisy chain of tubes.

The number of tubes connected to each other should be tuned to the maximum power of the driver. However, strings should never exceed 30 pcs of tubes (for White 20) or a total length of 75 meter (for maximum pitch calculated length), whichever comes first.

For different tube lengths as per below shown table:

Product	Max number of tubes connected to each other
NatureDynamics White 14	42
NatureDynamics White 17	35
NatureDynamics White 20	30
NatureDynamics White 23	25
NatureDynamics White 26	21

To get an idea of the power losses, below a graph of the current and voltage values inside a string of 30 pcs White 20 connected with a connection cable of 5m.



Dimming power supply

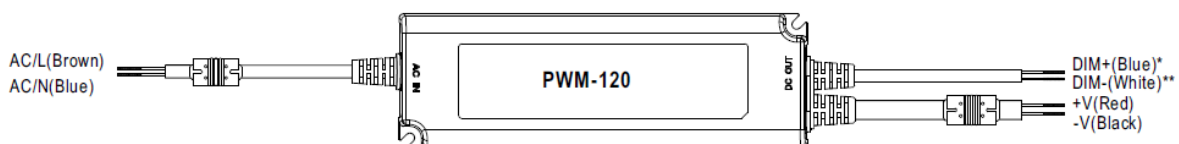
The dimming power supply is a AC/DC Led driver which can generate an output which is PWM controlled based on a control input signal (0-10V).

Power supply is available in 120W and 90W. The latter being especially available for US-installation as these installations are only allowed with a Class II power supply.

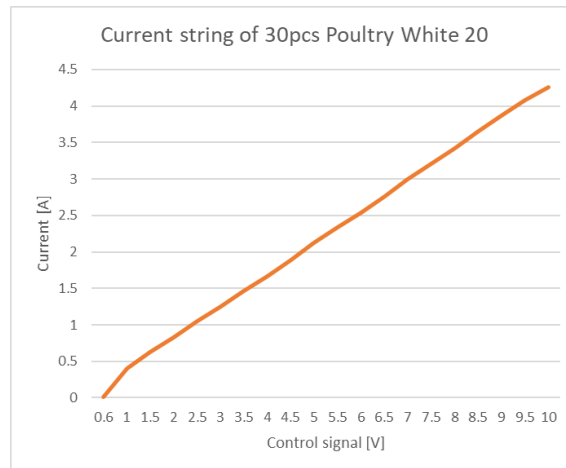
Below table shows the maximum number of tubes connected in one string for each driver solution:

Product	Max number of tubes connected to each other	
	120W driver	90W driver
NatureDynamics White 14	42	30
NatureDynamics White 17	35	26
NatureDynamics White 20	30	21
NatureDynamics White 23	25	17
NatureDynamics White 26	21	14

Power supply should be connected according below shown schematic



Based on the input control signal, the power supply generates a PWM output signal of 24V at a frequency of 1.47kHz.



In the region of 1-10V the dimming behavior is linear, full off is achieved at a level of below ~0,6V.

The graph shows the current at the first tube where a string of 30 tubes are connected.

Due to inrush current peaks as can be expected from this driver, special attention needs to be paid to the connection on the mains side!

For US only use a circuit breaker which is certified as NEMA 410.

For Europe one may connect maximal 6 power supplies to a 16A C-type circuit breaker!

This number of power supplies per circuit breaker can be increase with some options:

- Place an in-rush current limiter in the mains line, preferable close to the power supplies. I.e.: CAMTEC ESD101.LED.230VAC
- Use a zero-crossing circuit breaker which prevents in rush current to happen.

The best solution is application and installation depended and should be studied and selected by certified installer on beforehand.

Connection cable

The connection cable has a length of 5m. Shortening the cable is allowed and will reduce the power losses inside the cable.

Extending the cable is not advised as the power loss will become higher and current, voltage and brightness drop will be higher.

Thermal

Tubes

The LED's are evenly distributed over the full length of the tube and total power is only ~3W/m. No special cooling is required for these luminaires

Dimming power supply

The power supply is best mounted in an open environment for natural convection to take place. Mounting the power supply on a metal frame will improve the cooling and if build inside a box, it's best done in metal, although plastic is possible.

In case of doubt on the thermal behavior of the driver for a specific installation, it's best checked by a thermal measurement to ensure the power supply is not heating up too much.

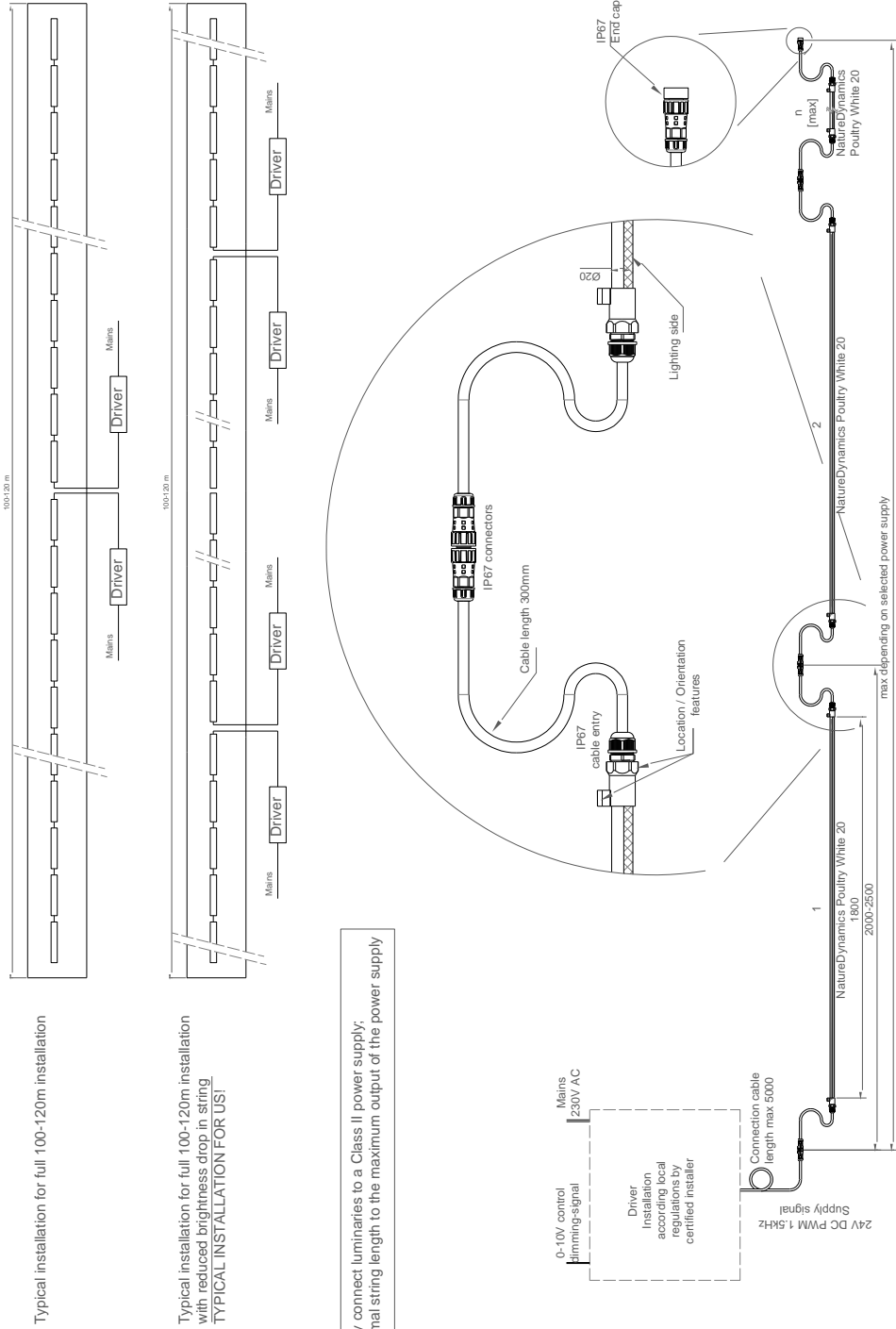
Steps to a successful installation

With following step by step approach a successful installation can be achieved:

- Study datasheets of components carefully
- Decide on best length of tube to be used (depending on pitch of installation)
- Check whether the connection cables (between tube and at input side) can be routed safely
- Decide on length of strings to be used (depending on total size)
- Check whether string lengths are in line with the available power supplies
- Decide on place of power supply taking connection length and ease of installing in consideration
- Make a complete list of materials (both NatureDynamics and auxiliary materials)
- Order components

When products arrive, the installation is quite straight forward, but must be done by a certified installer. Some guidelines for correct installation can be found in the schematic on the last page.

Schematic overview of installation



For US: Only connect luminaries to a Class II power supply. Adjust maximal string length to the maximum output of the power supply