Hipar sp. z o.o.

TECHNICAL
AND OPERATIONAL DOCUMENTATION ECOROTE 5000

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PRODUCT **SPECIFICATION**

The design is based on an H-rotor Darrieus vertical axis wind turbine using the same lifting force principle as for horizontal axis turbines.

It incorporates a rotor comprising a shaft to which are attached three/four pairs of struts with a laminar flow section mounted at equal angular intervals around the vertical axis of the turbine and three/four blades mounted at the ends of the arms. The action of the centrifugal force is limited by crossmembers attached near the ends at the upper and lower ends of the blades. The blades, with their aerodynamic and asymmetric profile, specifically designed for circular operation, are entirely made of aircraft grade aluminium by extrusion and their surface is protected by anodizing.

The high height to diameter ratio allows higher rotational speeds (the peripheral speed is 2.5 times higher than the wind speed – which significantly reduces the cost of the generator). The turbine is gearlessly coupled to a permanent magnet generator with the efficiency over 96% and no cogging torque. Double protection against overspeed and emergency stop has been applied.

State-of-the-art technical and technological solutions based on the results of tests conducted in a wind tunnel and our own experience made it possible to design a wind turbine with high parameters rarely achieved even by large horizontal axis turbines.

TURBINE **ADVANTAGES**

1. Uniform operation independent of wind direction – no “upwind” mechanism required, so simplified mechanical design and control.
2. Possibility of easy installation on structures – no need to build high masts (cheaper design than for horizontal axis turbines).
3. Possibility of installation on building roofs, poles, existing mast structures, etc.
4. Aesthetic appearance.
5. Quiet operation – even at the maximum speed (less burdensome operation).
6. Strong wind resistance – the wind turbine is resistant to strong winds of up to 40 m/s. The inverter protects the wind turbine from 15 m/s so that no damage to the turbine occurs. The energy production and status of the turbine is shown in the table of electrical parameters on page 11.
7. Maintenance-free operation of the generating set – no sliding connections (design cheaper than for horizontal axis turbines).
8. Relatively low cost compared with the classic horizontal axis wind turbine.
9. Low start-up speed of about 1 m/s – provided by a low rpm zero-cogging disk generator.
10. High wind energy utilisation efficiency Cp ~ 0.42 as a result of the innovative design and shape of the blades.
11. The horizontal force acting on the mast, in relation to the power generated, is lower than for other turbines.
12. More power from a particular area in the case of installation of a large number of turbines.

1 GENERAL **NOTES**

All notes and recommendations must be followed before starting assembly works and putting the unit into operation.

HIPAR SP. Z O. O. is not responsible for their omission.

- The user is responsible for his/her own and others' safety and must know and observe the following rules on the operational use.
- All specifications are subject to change without prior notice.
- The wind turbine must be installed in accordance with the standards of the country concerned.
- Details and requirements for the installation and connection should be consulted with the energy supplier or local office of spatial planning.
- The drawings in this manual may differ from the actual state.
  First of all, you should familiarise yourself with the contents of the manual.
- Any doubts should be resolved by contacting the Distributor or the Manufacturer.
- For information on installing the inverter or controller, refer to the instructions supplied with the unit.

2 ENERGY DEVELOPMENT METHODS

The Ecorote 5000 power plant is designed for customers who wish to reduce their electricity costs, become independent from traditional electricity suppliers as well as to protect the environment. Please contact your Distributor or the Manufacturer for the best solution.

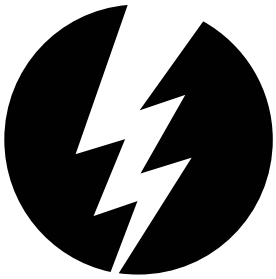
- On-Grid – a solution enabling to sell the excess of generated and unused electricity to the power grid.
- Off-Grid – island operation system for those who do not have a connection to the power grid. Our power plants are ideal for generating electricity that is stored in batteries and consumed upon demand.
- Water heating – the simplest way of using the electricity generated to heat buildings and domestic water.

3 LOCATION **REQUIREMENTS**

The choice of turbine location is a very important point. Small changes in wind speed can be reflected in a decrease in energy production. When selecting the location for a wind turbine, the most important aspects include:

- Safety requirements – a wind turbine must be placed in a safe location that does not endanger life, health and the environment.
- Roughness of the area – the rougher the ground surface around the power plant, the more the wind will be slowed down. Large cities and forests result in significantly reduced wind speeds. Water, on the other hand, is a surface that is smooth enough to cause almost no reduction in speed.
- Tower height – The height of the mast should be between 5 and 15 metres. When selecting the mast, care should be taken to ensure that the turbine is located higher than obstacles (e.g. buildings, trees) present in the turbine's operating area.
  In the case of Poland, 70 % of the wind blows from the west, for which reason it is important to ensure that the direction is clear of any obstacles.
  To verify the direction of wind occurrence, please refer to the historical data available at www.meteoblue.pl under "History and Climate", then "Modeled Climate"
- To calculate the approximate energy gain, please visit our website at www.ecorote.com.pl.
- In the case of installing more than one turbine in one location, spacing should be maintained according to the main wind direction. The principle is to keep the spacing along the direction parallel to the direction of the wind. A spacing of 6 turbine diameters must be maintained, i.e. in the case of a 2.9 m diameter a spacing of 17.4 m must be maintained in the perpendicular direction. Failure to observe this rule results in reduced energy efficiency as the wind speed behind the first turbine will be reduced.

Legal requirements – determining the possibility to build a wind power plant:
IEC 61400.



4 WORK SAFETY RULES

RISKS

MECHANICAL

1 During operation, the turbine rotor can rotate at a speed of up to:

ECOROTE 300/1000 - 550 RPM
ECOROTE 1500/2800 - 250 RPM
ECOROTE 5000 - 200 RPM
ECOROTE 9800 - 150 RPM

Physical injury or even loss of life may result from contact with rotating turbine components. It is prohibited to:

2 stay in close proximity to a running turbine;

3 touch the blades while the turbine is running;

4 stop a turbine by hand.

5 Turbine blades must not rotate during assembly, maintenance and inspection works.

6 The turbine operating area should be inaccessible to unauthorised persons.

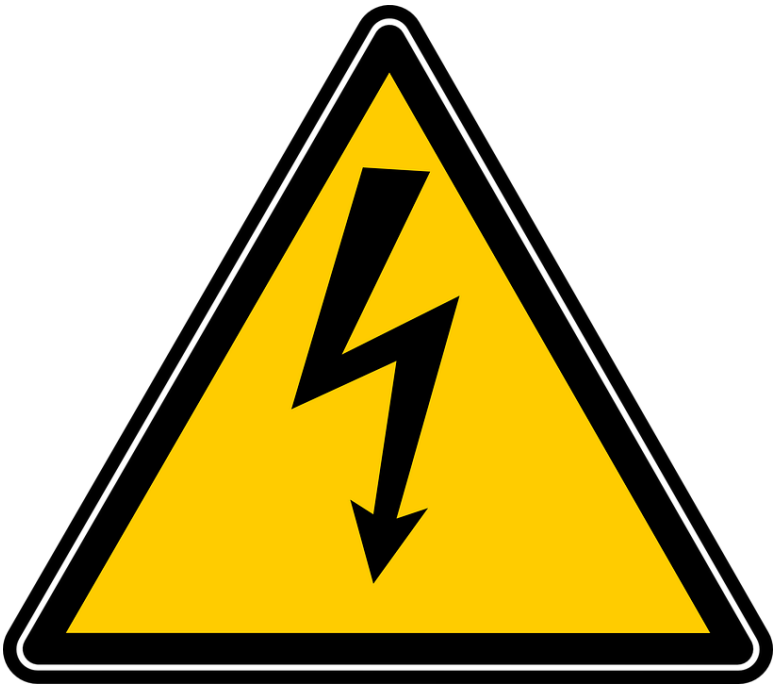
ELECTRICAL

1. A wind turbine generates voltage during operation which can cause electric shock or death. It is forbidden to perform any operation on electrical components when the turbine is running.

2. Electrical components must be arranged and selected so that they are not mechanically damaged, which may lead to a short circuit and fire.

3. Connecting the electrical installations must be performed by appropriate personnel certified in electrical engineering, e.g. for up to 1 kV.

4. Changing the electronic setting values of the inverter or controller may result in damage to the turbine generator.



5 TECHNICAL **SPECIFICATIONS**

TABLE OF TURBINE TECHNICAL PARAMETERS

Parameter	5 kW
Rotor diameter	2.9 m
Rotor height	4,2 m
Start wind speed	2 m/s (turbine rotation without power generation)
Rated wind speed	12 m/s
Total weight	320 kg
Blades and struts	Aluminium structure endurance-tested under extreme conditions
Brake	Electromagnetic
Operation mode	On Grid/ Off Grid/ Hybrid
Controller	Microprocessor
Inverter output voltage	1 x 230V AC or 3 x 230V AC 50Hz
Number of inverter phases	1 or 3
Generator output voltage	AC
Noise level according to PN-EN 61400-11	< 46dB at 8 m/s and a distance of 60 m
Operation temperature	from −40˚C to 70˚C
Corrosion protection	Anodizing, galvanizing, C5+M paint coating
Mast types	Concrete and lattice columns, metal pillars and roof bases Possibility of manufacturing structures according to individual orders
Mast dimensions	from 2 to 25 m
Compliance with standards	CE, IEC 61400-2, 61400-11

TABLE OF TURBINE ELECTRICAL PARAMETERS

Cp	Wind speed	Turbine power 5000W	RPM	Hz	VDC	VAC	IDC
0	0	0	0	0,00	0	1	0,00
0	1	0	15	3,91	28	20	0,00
0	2	0	29	7,83	55	40	0,00
0,15	2,99	26	44	11,70	82	59	0,31
0,225	3,5	62	51	13,70	96	69	0,64
0,3	4	124	59	15,65	110	79	1,12
0,315	4,185	149	61	16,38	115	83	1,29
0,345	5	277	73	19,57	138	99	2,01
0,352	5,38	353	79	21,05	148	106	2,38
0,37	6	514	88	23,48	165	118	3,11
0,378	6,58	693	97	25,75	181	129	3,82
0,382	7,175	908	105	28,08	198	141	4,59
0,388	7,775	1173	114	30,43	214	153	5,48
0,392	8,37	1479	123	32,75	231	164	6,41
0,398	8,97	1848	132	35,10	247	176	7,48
0,41	9,57	2312	140	37,45	264	188	8,77
0,416	9,5	2294	139	37,18	262	186	8,77
0,418	10,165	2824	149	39,78	280	199	10,09
0,419	10,765	3363	158	42,13	297	211	11,34
0,42	11	3596	161	43,05	303	216	11,87
0,422	11,365	3985	167	44,47	313	223	12,73
0,425	11,96	4677	176	46,80	329	234	14,20
0,428	12,562	5458	184	49,16	346	246	15,77

** The turbine power shown in the chart is the maximum power obtained by the PS100 or PS300 grid inverter matched to the wind turbine. In case of using a different controller the power, the voltage of the loaded generator and the current of the loaded generator depend on the controller (inverter). In case of using other solutions please inform your dealer or distributor in order to verify your assumptions. Generators used in ECOROTE wind turbines are AC three-phase ones, the table shows the value of DC voltage after conversion from AC voltage.*

*** Perform real-world measurement of power versus wind speed after wind speed stabilization of about 60s. This is due to the time required for the turbine to achieve the appropriate rotation.*

6 ASSEMBLY INSTRUCTIONS FOR ECOROTE 5000 TURBINE

CONTENTS OF KIT I:

- Shaft x 1
- Blade x 3
- Generator guard x 4
- Upper strut plate x 1
- Upper rod brace x 3
- Middle rod brace x 3
- Lower rod brace x 3
- Lower arm x 3
- Upper arm x3
- Blue and red threadlocker
- Set of screws/bolts:

Quantity	Name
12	Hexagonal head screw M8x30
6	Hexagonal head screw M12x30
12	Hexagonal head screw M12x35
18	Hexagonal head screw M12x45
12	Hexagonal head screw M12x75
36	Washer 13
24	Washer 15
18	Self-locking nut with polyamide insert M12
12	Self-locking nut with polyamide insert M14
18	Self-drilling countersunk head screw 3.9x16
	Spare parts

TOOL KIT FOR ASSEMBLY:

- Torque wrench
- Torque wrench bit 13, 19, 22
- Flat wrench 19, 22
- Hammer, 1 kg

METHOD OF ASSEMBLY:

1. Unpack all components and put them in a place, which ensures their stable positioning.
2. First, place the blades (Fig. 1) on a horizontal, stable surface and secure against uncontrolled movement.
3. Carefully slide the upper (longer) strut onto the blade section (Fig. 2) as shown in Fig. 5. Use M12x30 and M12x35 screws to fasten the strut to the blade. Place M12x35 screws on the side of the leading edge of the blade (the thicker part of the profile section). Apply a small amount of red threadlocker on the threads of the screws and tighten initially with a flat wrench. Then tighten with a torque wrench to 80 Nm. Put white caps on the screws.
4. Carefully slide the lower (shorter) strut onto the blade section (Fig. 2) as shown in Fig. 6. Then proceed in a similar way to point 3.
5. Screw down the lower rod brace bracket to the blade using M6x20 countersunk head screws (Fig. 7). The bracket has an arm with a hole, which is inclined at an angle of 3°. The bracket is to be oriented with its inclination towards the leading edge of the blade. Apply a small amount of red threadlocker to the threads of the screws and tighten initially. Then tighten with a torque wrench to 20 Nm.
6. Fasten the rod braces (Fig. 3) as shown in Fig. 7 using M10x35 hexagon head bolts, fi 13 washers and self-locking nuts. Apply red threadlocker to the bolt thread before tightening the nut. The bolt tightening torque is 80 Nm. Place white plastic caps on all bolt heads and nuts.
7. The winglet is to be fixed using 6 pieces of 3.9x16 self-drilling countersunk head screws, through the holes ending in a cone. Fasten the screws using a screw gun with a clutch and a magnetic cross bit.
8. Place the shaft (Fig. 4) on a stable, non-moving raised horizontal surface.

9. The installation of the blades is shown in Fig.8. Slide the struts between the upper and lower arm discs, screwing them together with M14x75 bolts with washers, and then with a polyamide insert. All screws are tightened by applying blue glue to the threads beforehand. Torque the screws in the range of 85-90 Nm.
10. Repeat points 2-7 for each blade.

NOTES ON ASSEMBLY:

- Carry out all works in accordance with the turbine assembly instructions. The assembly works must be carefully planned.
- Installation of the turbine should take place when there is little or no wind.
- The wind turbine is only to be assembled by a trained assembly team.
- All turbine assembly operations must absolutely take place at ground level. Particular attention should be paid to the assembly of aluminium turbine components, which are most susceptible to mechanical damages.
- Due to the size and weight of the components to be assembled, all operations must be carried out with due caution and in compliance with health and safety regulations.
- A minimum of two persons must be present during assembly so that one of them can give first aid to an injured person in the event of an accident.

  For the safety of the assemblers and the danger of damaging the turbine components, the rotating part of the turbine must be locked when the blades are assembled.

FIGURE 1

Turbine blade

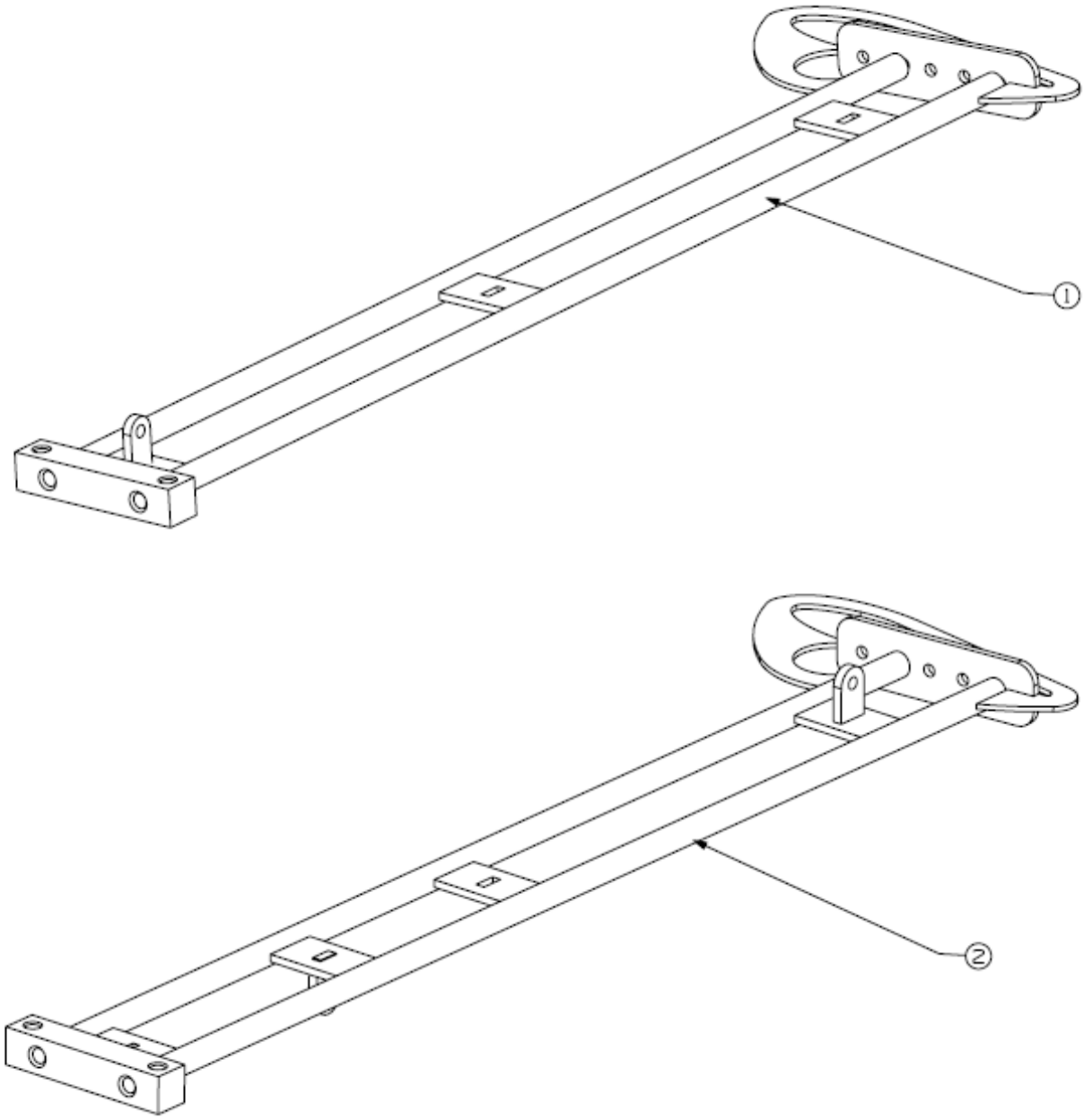


FIGURE 2

Struts

1 — Upper strut

2 — Lower strut

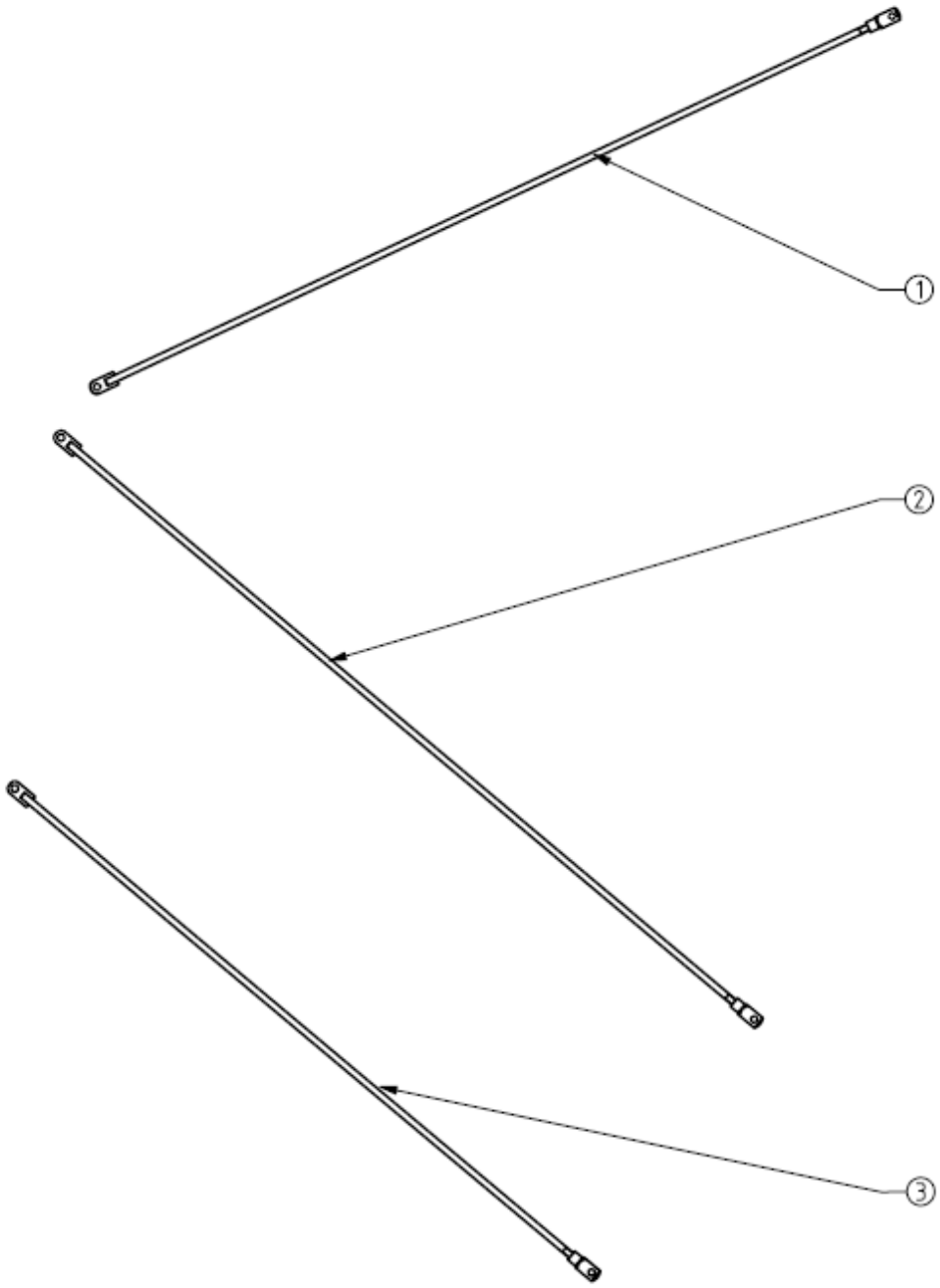


FIGURE 3

Rod braces

1 — Upper rod brace 2 — Middle rod brace 2 — Lower rod brace

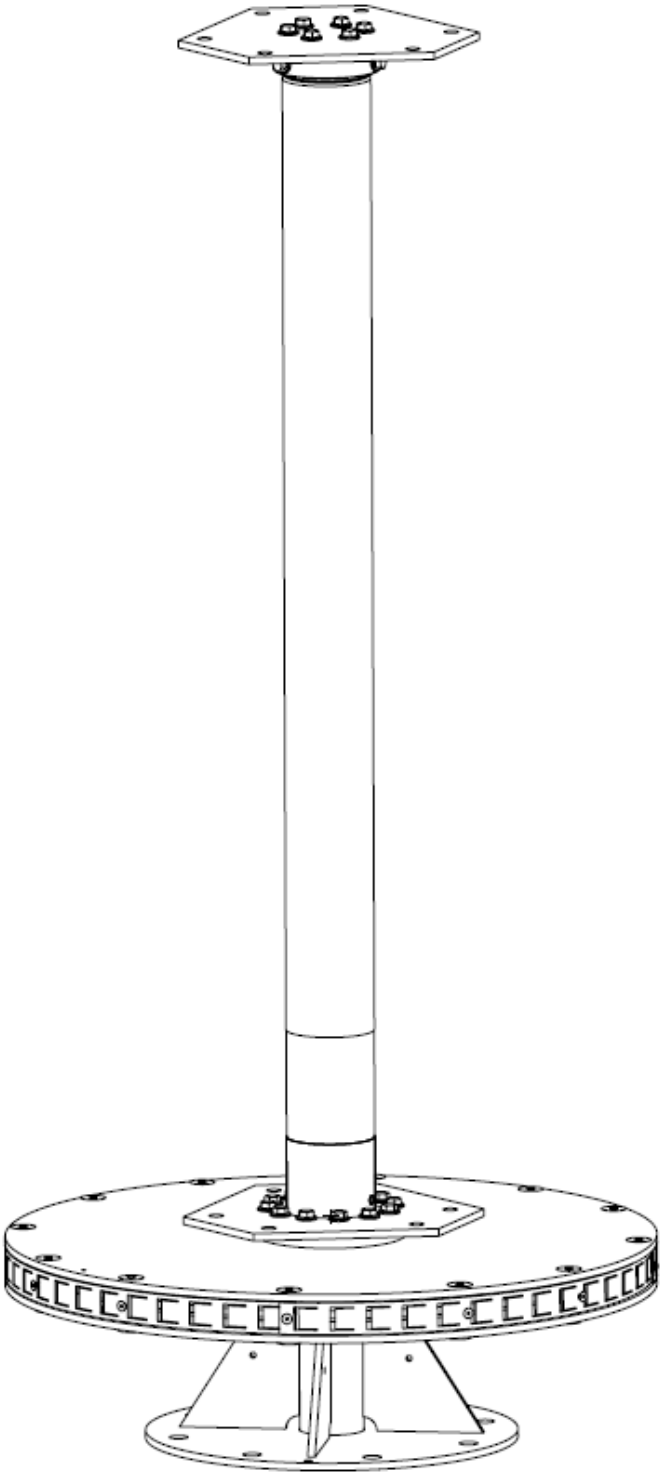


FIGURE 4

Turbine shaft

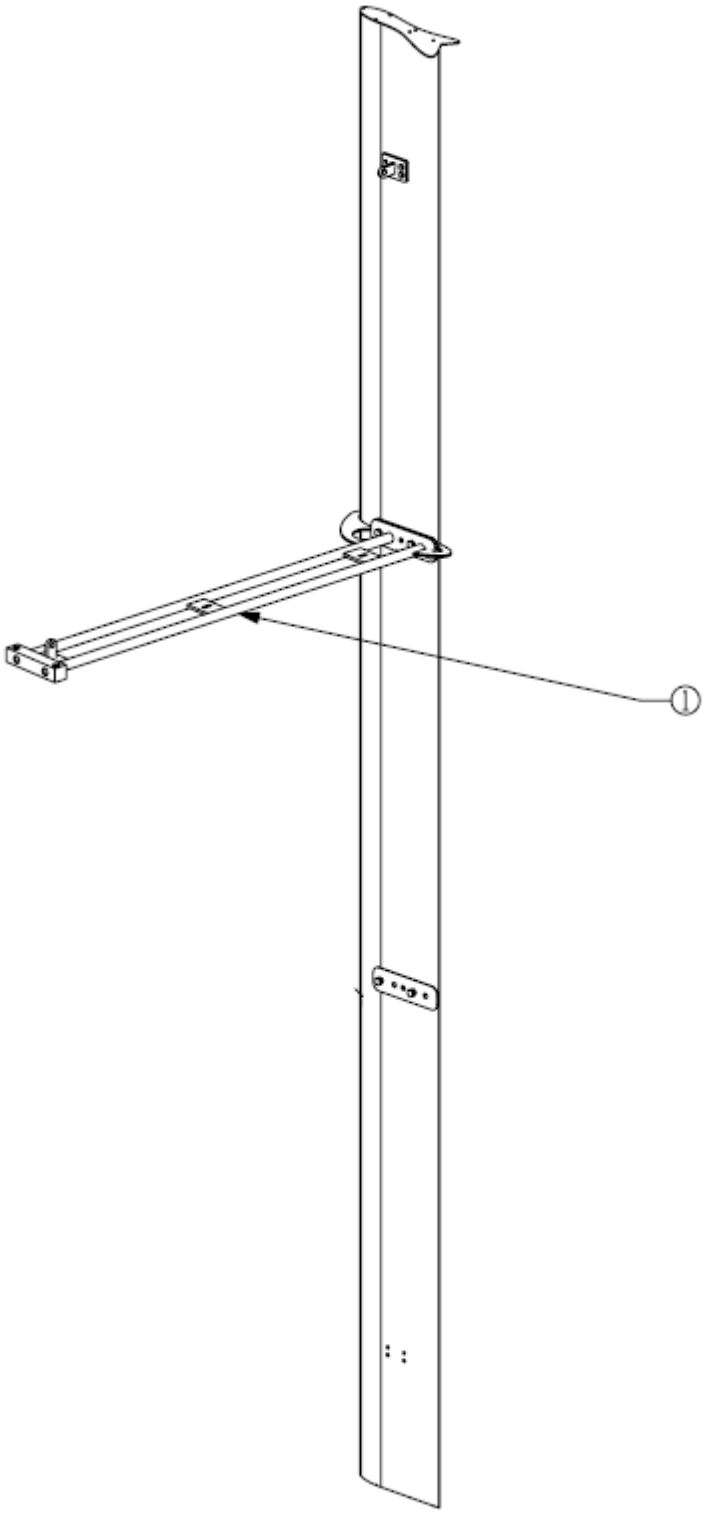


FIGURE 5

Mounting the upper strut

1 — Upper strut

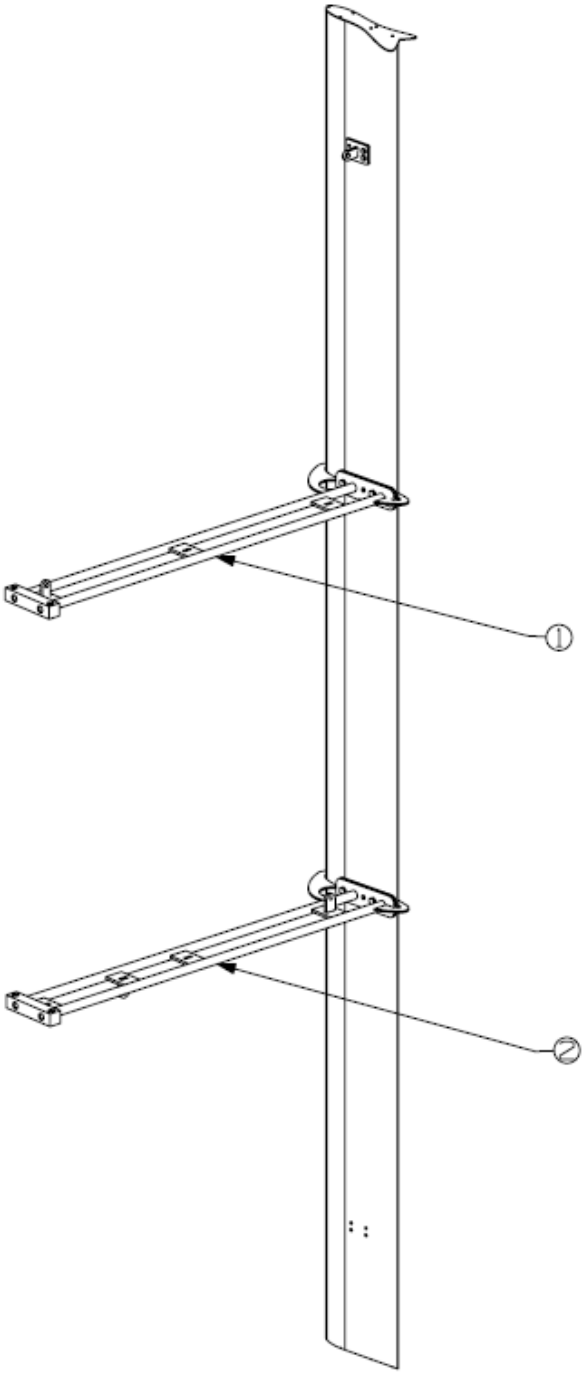


FIGURE 6

Mounting the lower strut

1 — Lower strut

2 — Lower strut

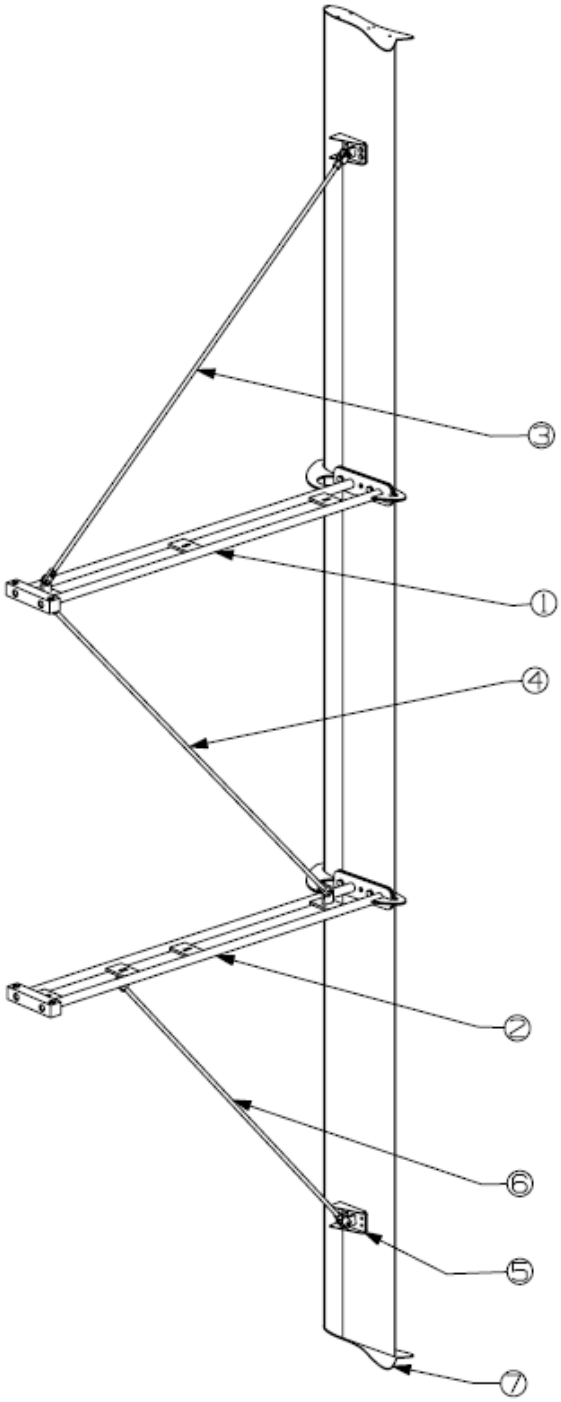


FIGURE 7

Mounting the rod brace bracket, rod braces and winglet

1 —	Upper strut	2 —	Lower strut
3 —	Upper rod brace	4 —	Lower rod brace
5 —	Rod brace bracket	6 —	Middle rod brace
7 —	Winglet		

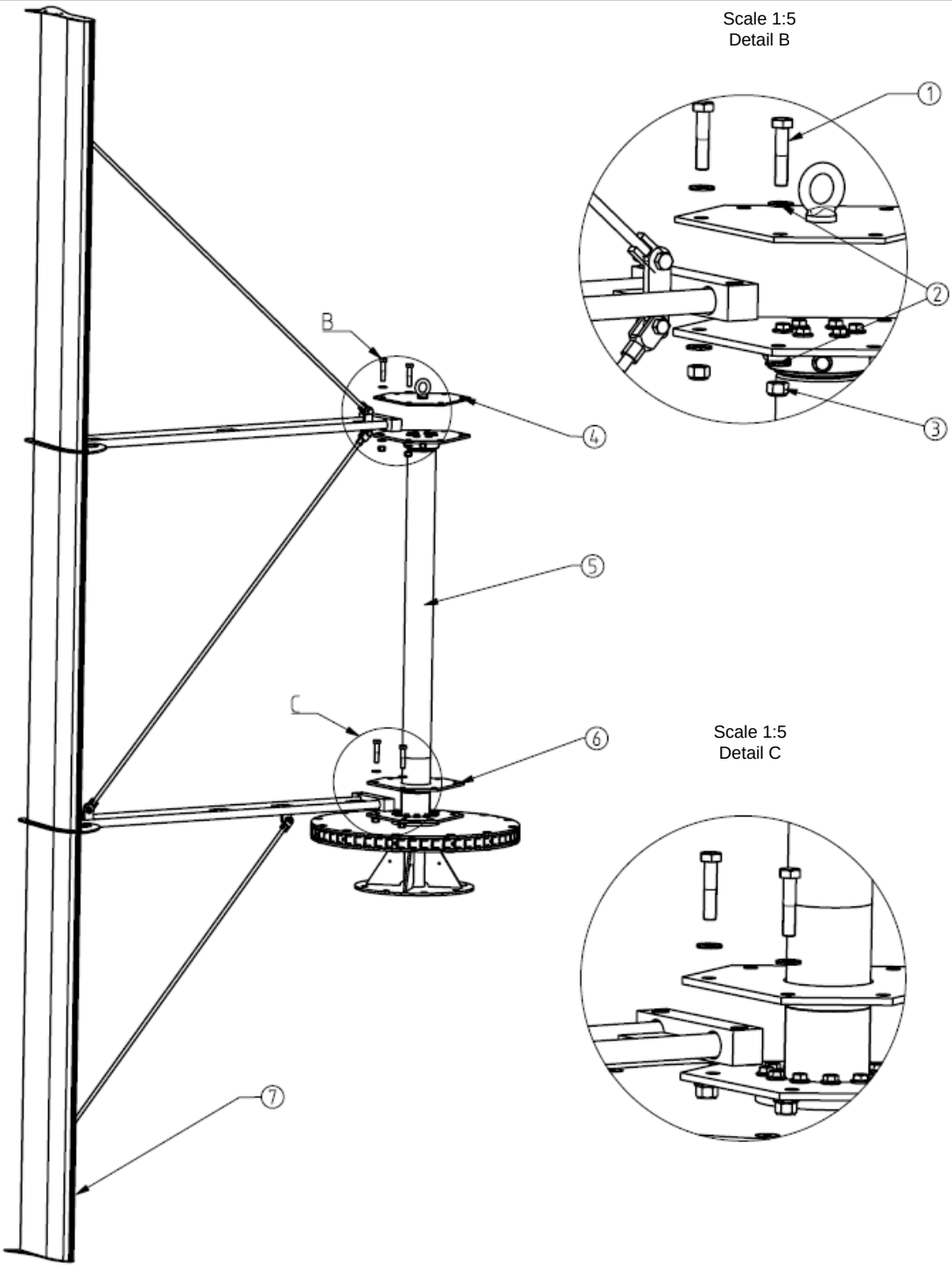


FIGURE 8

Mounting the blade to the shaft

1 —	Countersunk head screw M14x75	2 —	Washer M14
3 —	Polyamide insert nut M14	4 —	Upper strut plate
5 —	Turbine shaft	6 —	Lower strut plate
7 —	Turbine blade		

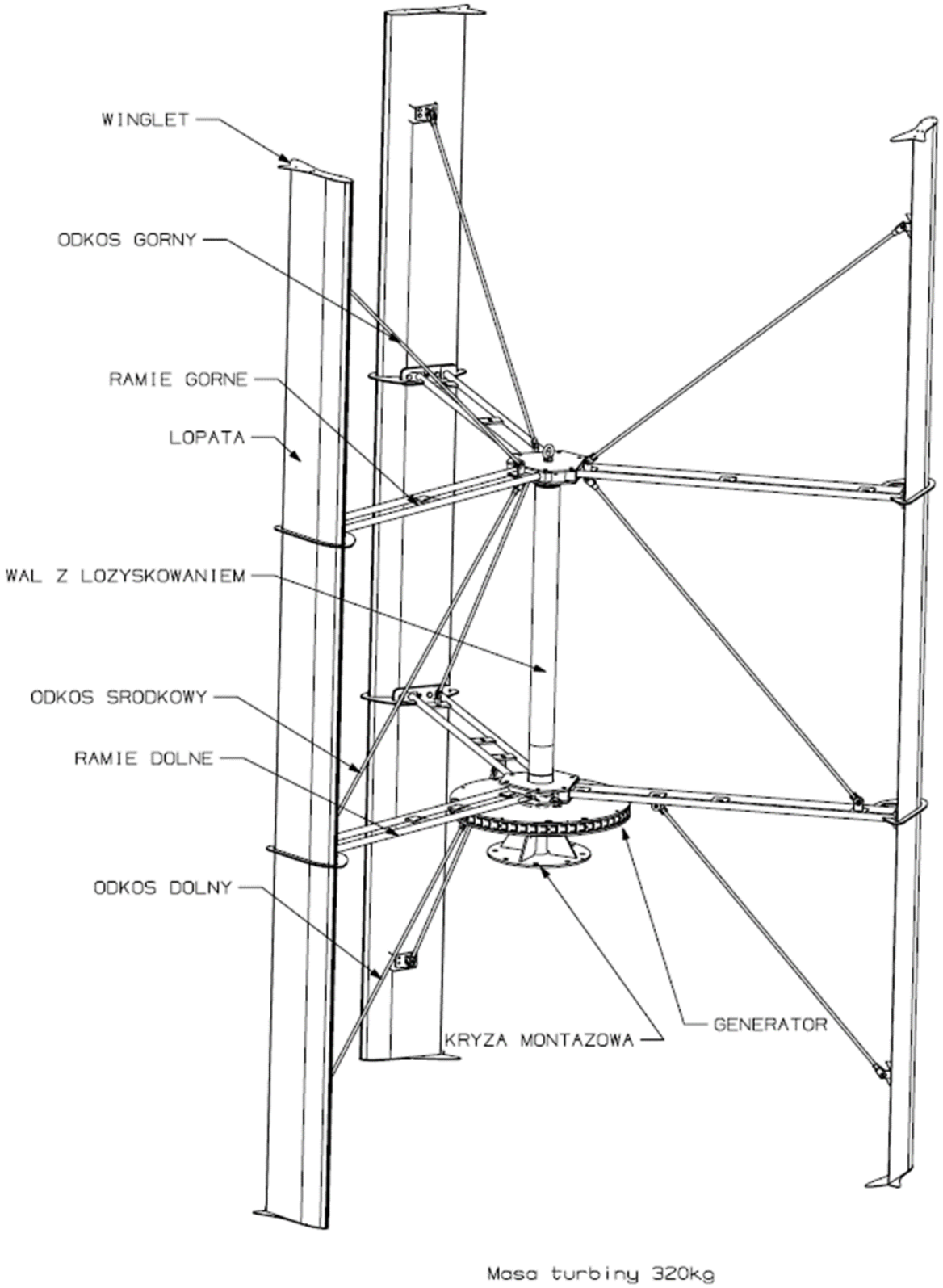


FIGURE 19

View of the turbine

7 ASSEMBLY INSTRUCTIONS FOR TURBINE INSTALLED ON A SUPPORTING STRUCTURE

CONTENTS OF KIT II:

- Anti-vibration isolators x16 (2 types)
- Set of screws/bolts:

Quantity	Name
8	Washer 13
8	Hexagonal head bolt with partially threaded shank M12x70
8	Self-locking nut M12 with Teflon
16	White protective caps 12

TOOL KIT FOR ASSEMBLY:

- Torque wrench 10-110 Nm
- Torque wrench socket 19
- Box wrench 19
- Hammer, 1 kg
- Lifting sling, 1T
- Rope, approx. 20 m

ADDITIONALLY:

- A basket lift or crane with a lifting capacity of approx. 300-500 kg and a lifting height of approx. 3-4 m higher than the height at which the mounting flange is located.
- Ladder

METHOD OF ASSEMBLY:

1 Unpack all components and put them in a place, which ensures their stable positioning.

2 Having the turbine put on a mounting stand, undersling it with a lifting sling by means of an M12 screw with a lifting eye and lift it to a height of approx. 20 cm from the base of the mounting stand. If there is no mounting stand, prepare a stand approx. 1.3 m high so that the blades can be easily inserted. The stand is best made from transport pallets. The mounting stand can be rented, please contact the turbine manufacturer.

3 Place the anti-vibration isolators according to Fig. 10. Use M12x70 bolts.

4 Place the turbine on the supporting structure so that the M12x70 bolts fit into the holes shown in Fig. 11.

5 Fasten the turbine shaft to the supporting structure using M12 self-locking nuts and washers, tighten them with 15 Nm.

6 Protect all hexagonal head bolts and nuts above the mounting flange (in the rotating part) with plastic protective caps. The plastic caps are designed to reduce the resistance force when the rotor is rotating.

7 Check that the turbine components are correctly tightened.

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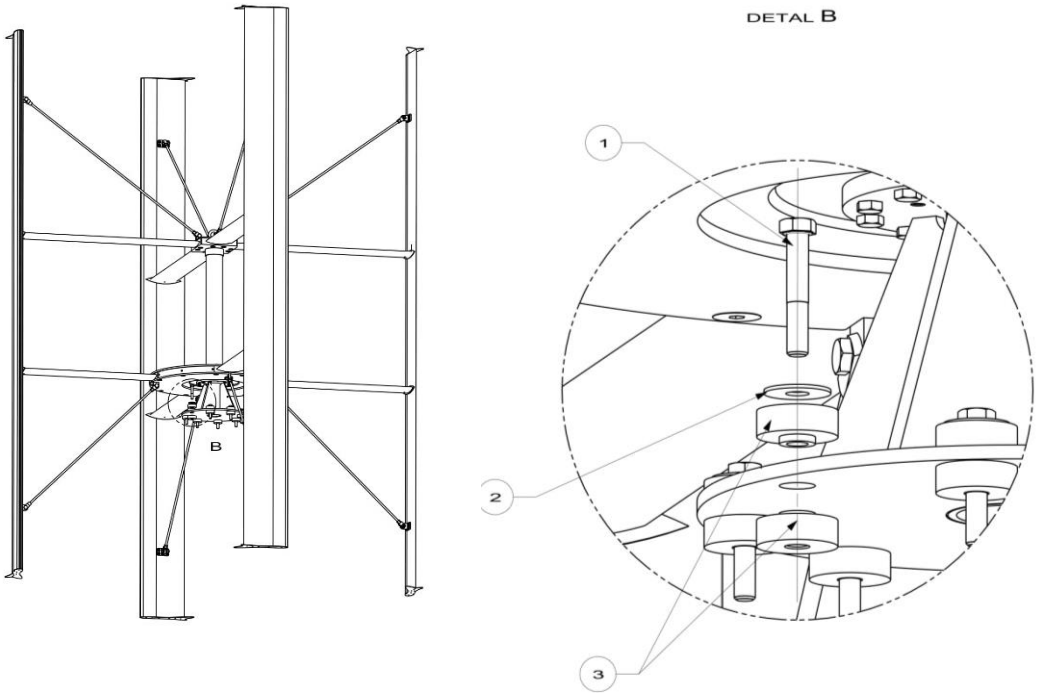


FIGURE 11

1 — Hexagonal head bolt with partially threaded shank M12

2 — Anti-vibration isolator with steel inserts

3 — Anti-vibration isolator

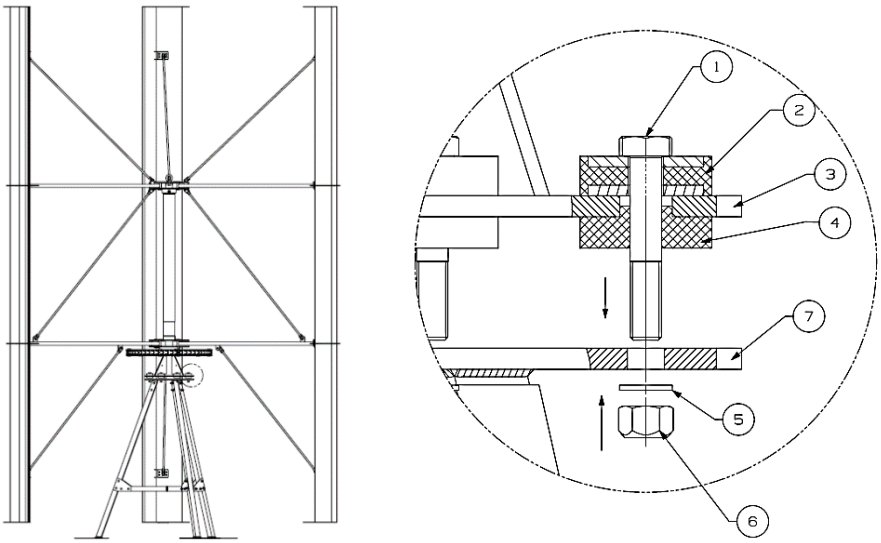


FIGURE 12

1 — Hexagonal head screw with thread on part of shank M12

2 — Anti-vibration isolator with steel inserts

3 — Turbine base

4 — Anti-vibration isolator

5 — Washer 13
6 — Self-locking nut M12 with Teflon
7 — Supporting structure base

NOTES ON ASSEMBLY:

- Assembling is carried out using a crane and basket lift or a basket lift and ladder with the assembler's safety devices.
- It is prohibited to lift the turbine by the strut and blade components.
- Ensure that all tools are removed from the turbine surface before assembling.
- When lifting the turbine, attach a rope to stabilise the turbine and control the lifting from the ground.
- Carry out all works in accordance with the turbine assembly instructions. The assembly works must be carefully planned.
- Installation of the turbine should take place when there is little or no wind.
- The wind turbine is only to be assembled by a trained assembly team.
- The turbine must not be installed upside down or in any position other than that specified in the instructions.
- You may stand on the generator during assembly operations.
- It is prohibited to climb on the turbine blades and struts.
- Crane services are required for turbine assembly.
- When lifting the turbine components, make sure that everything is properly tightened.
- Due to the size and weight of the components to be assembled, all operations must be carried out with due caution and in compliance with health and safety regulations.
- A minimum of two persons must be present during assembly so that one of them can give first aid to an injured person in the event of an accident.
- For the safety of the assemblers and the danger of damaging the turbine components, the rotating part of the turbine must be locked when the blades are assembled.

8 WIRING INSTRUCTIONS FOR ECOROTE 5000

CONTENTS OF KIT III:

- Inverter TWERD 3kW/5,5kW/8kW
- Brake-protection system
- Braking resistor
- Additional resistor (resistors have a common housing from 2022)
- Anemometer
- Anemometer bracket
- Turbine switchgear (prepared by Hipar Sp. z o.o.)
- Optional island inverter (OFF GRID or ON/OFF GRID version)
- Optional inverter for water heating
- Optional SMARTWIND inverter
- Set of screws/bolts:

Quantity	Name
4	Hexagon socket button head screw M5x8
4	Washer 5.3

SET OF TOOLS:

- Flat-blade screwdriver
- Cross-head screwdriver
- Crimping pliers for electrical terminals
- Cable insulation stripper
- Electric cable cutter
- Flat wrench 8

ADDITIONALLY:

- Outdoor cable 3x4 mm^2 YKY UV/ 3 x 4 mm^2 PV cable
- Outdoor cable 2x0.5 mm^2 OWY/ CAT5 outdoor twisted pair
- Indoor cable 3x4 mm^2 YDY/ OMY
- Cable 3x2.5 mm^2 YDY/OMY
- Electrical ring terminals 4 mm^2
- Electrical tube terminals 4 mm^2

- Cable trays
- In the case of cable trenches, use an AROT 40/50 mm protective flexible corrugated conduit.

INSTALLATION METHOD:

1 The installation is shown on the wiring diagram below.

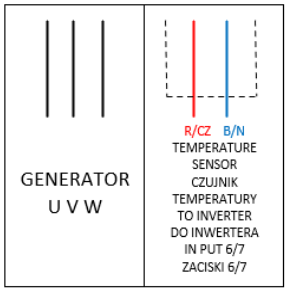
2 Ensure that the supporting structure on which the turbine is placed is properly earthed. For this purpose, it is necessary to make earthing connections in the case of the following structures:

- Roof structures – use LgYżo cable, min. of 6 mm^2;
- Steel poles – for connections between the main components, use LgYżo cable, min. of 6 mm^2 and connect the pole to the lightning protection system.
- Prestressed concrete columns, make earthing connection using 4 x 20 mm galvanised hoop mounted to the column using stainless steel clamps.

3 If rubber pads or other vibration dampers are used, it is important to make a connection bridge between the mounting flange and the turbine base.

4 Before connecting the generator, complete the wiring and then connect the terminals on the generator.

5 Connection is required to follow Schematics at the end of DTR (Connection documentation). In case of other Inverters than PS100 /PS300 please contact distributor or producer for details of connection.
Connecting of inverters is in details in Manuals of Producer of inverters. For an easy connection of turbine there is small box installed under generator in which there are 3 single cables LgY 2.5-4mm2 included in one connector WAGO type from generator and silicone wire 2x0,5 mm2 for a temperature sensor.



6 Make the electrical connections in accordance with the electrical engineering rules.

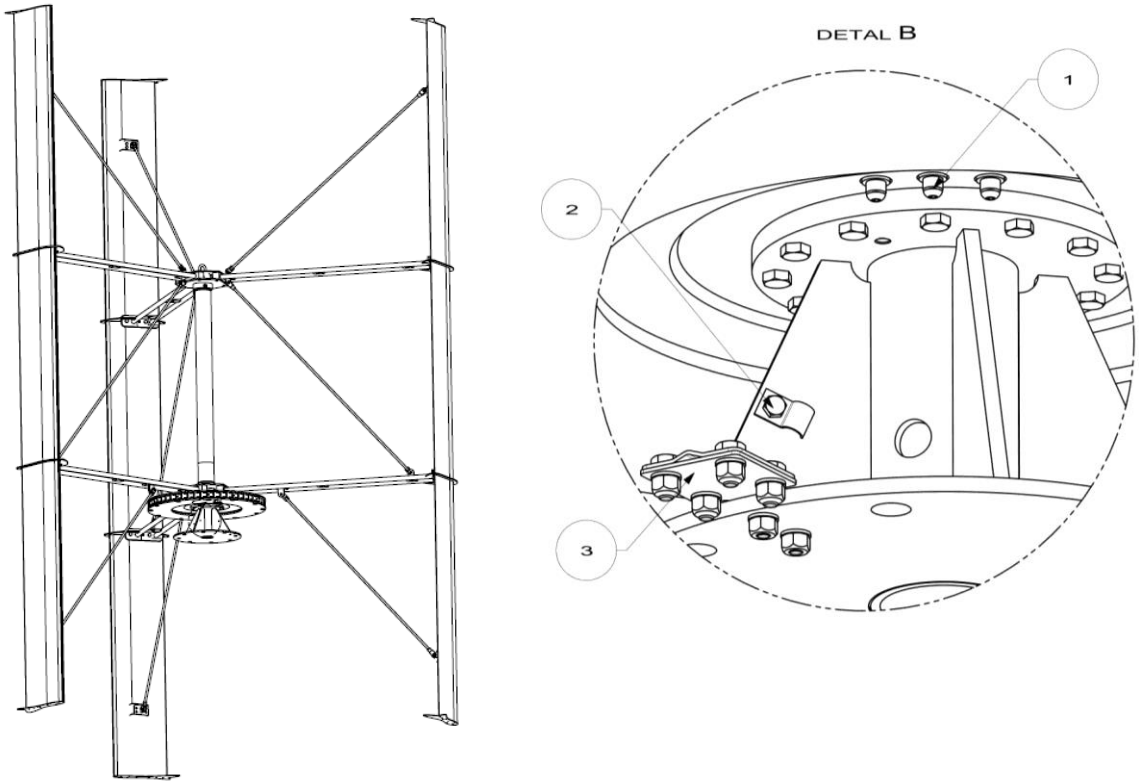


FIGURE 2

1 – Generator terminals

2 – Cable clamping

3 – Lightning conductor / earthing terminal

NOTES ON CONNECTIONS:

- The turbine is delivered to the customer with a short-circuit termination inserted on all three terminals of the generator. The purpose of the jumper is to electrically lock the turbine against the possibility of rotation.
- The resistance to earth of the mast should be at least R < 10 Ω.
- The resistance to earth at the surge protector point should be at least R < 10 Ω.
- The electrical enclosure should have a rating of at least IP65.
- All electrical connections must be made with due care.
- Connection works may be performed only by persons holding a manufacturer's certificate authorising to carry out the wiring.
- Do not forget to carry out electrical measurements: earthing, continuity of equipotential connections, cable insulation.

9 SUPPORTING STRUCTURE PARAMETERS ECOROTE 5000 TURBINE

The supporting structure of the turbine should be designed by a person authorised to design this type of structures. The structure must meet the following strength conditions according to Fig. 2.

The place of installation of the turbine must be selected so that no person can enter the turbine's working area.

The base on which the turbine is mounted should have the dimensions as per Fig. 1.

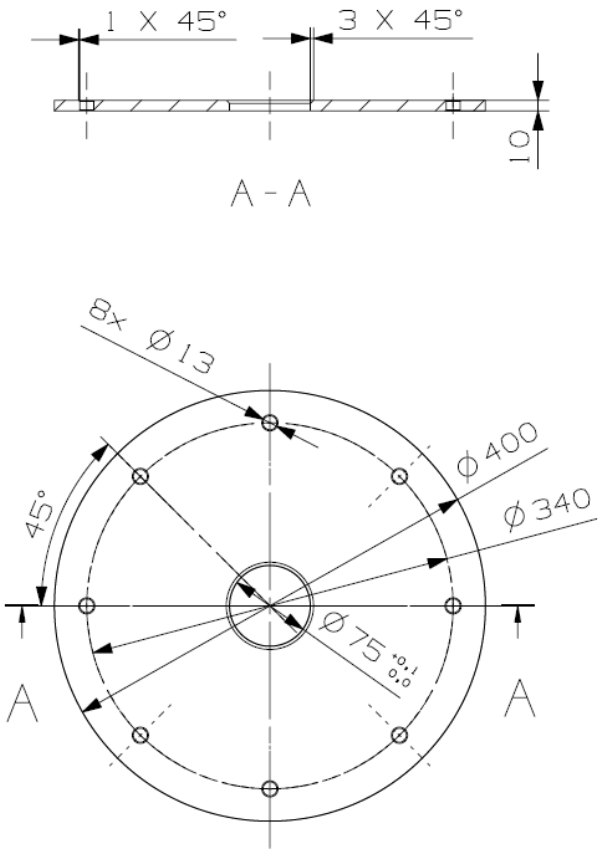


FIGURE 1

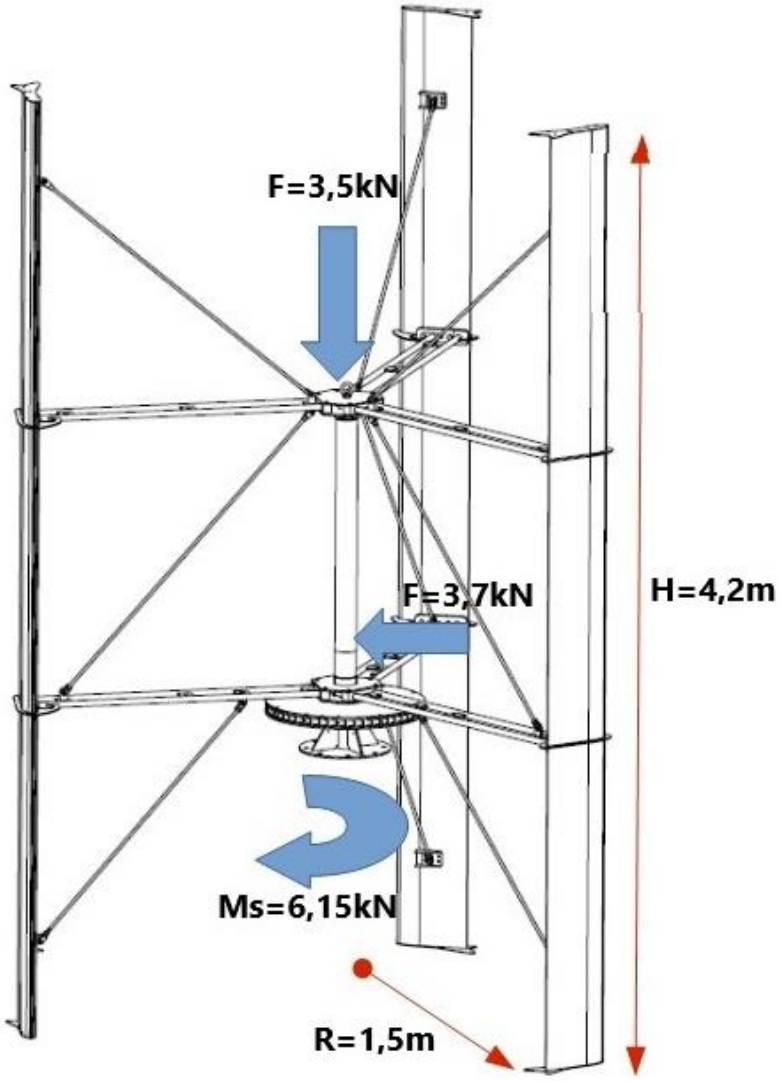


FIGURE 2

Forces

10 OPERATING **RESTRICTIONS**

1 Once the turbine has been installed and connected by authorised persons only, the use of the turbine is maintenance-free and open for a wide range of users, including people with disabilities. Operate the turbine in accordance with the warranty conditions.

2 When operating the wind turbine, do not:

- load the structure contrary to recommendations,
- attach additional components to the turbine structure,
- modify or repair the structure.

3 A technical inspection is required at the end of the warranty for safety reasons.

4 Routine inspections should be carried out by a qualified person. Particular attention should be paid to the technical condition of key structural components and the condition of galvanised and painted coatings.

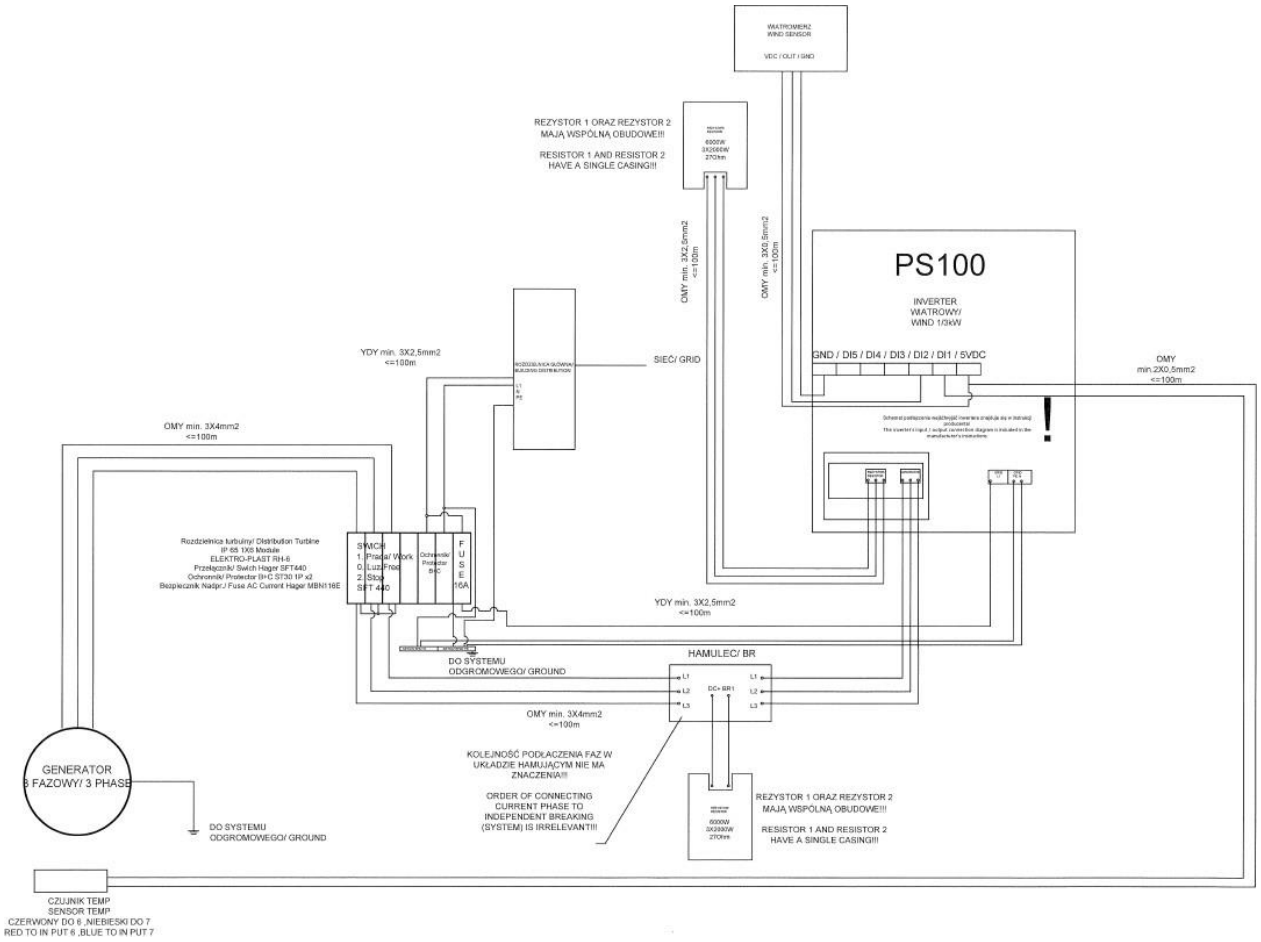
5 An inspection of the turbine is required in the event of weather anomalies such as a hurricane, tornado, etc. In this case, the technical condition of the turbine must be additionally checked or, if this poses a safety risk, the turbine must be stopped.

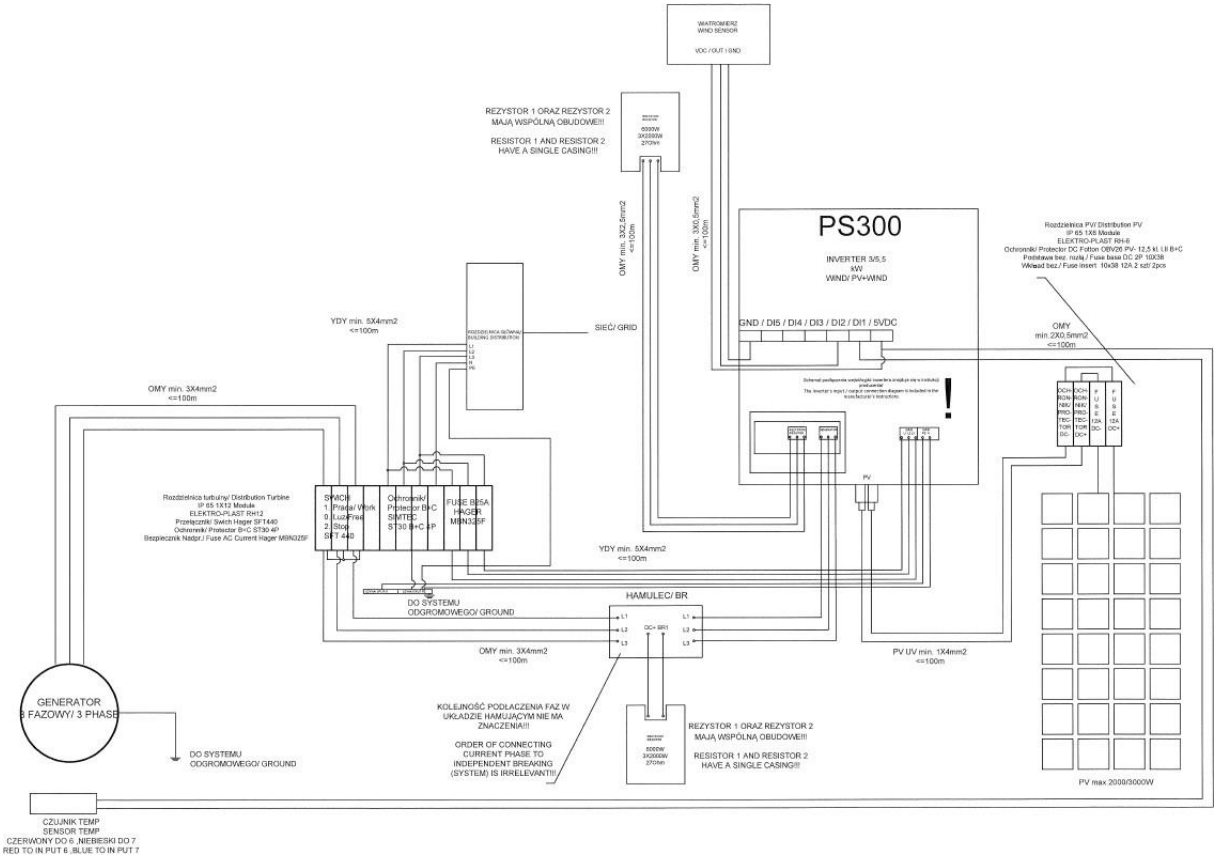
6 Shut down or stop the turbine before carrying out any maintenance or inspection works.

7 In case of problems, contact the Manufacturer or Distributor.

8 Disassembly of the system:

- When disconnecting, first switch off the inverter. Then disconnect the cable between the generator and inverter terminals, short-circuit all 3 generator terminals to brake the turbine.
  Operation must only be carried out by authorised persons.


WATROWIERZ
WIND SENSOR
VDC / OUT / GND
REZYSTOR 1 ORAZ REZYSTOR 2
MAJĄ WSPÓLNĄ OBUDOWE!!!
RESISTOR 1 AND RESISTOR 2
HAVE A SINGLE CASING!!!
6000W
3X2000W
27Ohm
OMY min. 3X2,5mm2
<=100m
OMY min. 3X2,5mm2
<=100m
PS100
INVERTER
WATROWY/
WIND 10kW
GND / DI5 / DI4 / DI3 / DI2 / DI1 / 5VDC
OMY
min.2X0,5mm2
<=100m
YDY min. 3X2,5mm2
<=100m
SIEC/ GRID
OMY min. 3X4mm2
<=100m
Rozdzielnica turbiny/ Distribution Turbine
IP 65 1X6 Module
ELEKTRO-PLAST RH-6
Przełącznik/ Switch Hager SFT440
Ochronnik/ Protector SH-C ST30 1P +2
Bezpiecznik Nadpr./ Fuse AC Current Hager MBN116E
SYMCH
1. Praca/ Work
0. Luz/ Free
2. Stop
SFT 440
Ochronnik/
Protector
SH-C
FUSE
16A
YDY min. 3X2,5mm2
<=100m
DO SYSTEMU
ODGROMOWEGO/ GROUND
HAMULEC/ BR
L1
L2
L3
DC+ BR1
OMY min. 3X4mm2
<=100m
KOLEJNOŚĆ PODŁĄCZENIA FAZ W
UKŁADZIE HAMUJĄCYM NIE MA
ZNACZENIA!!!
ORDER OF CONNECTING
CURRENT PHASE TO
INDEPENDENT BREAKING
(SYSTEM) IS IRRELEVANT!!!
REZYSTOR 1 ORAZ REZYSTOR 2
MAJĄ WSPÓLNĄ OBUDOWE!!!
RESISTOR 1 AND RESISTOR 2
HAVE A SINGLE CASING!!!
6000W
3X2000W
27Ohm
GENERATOR
3 FAZOWY/ 3 PHASE
DO SYSTEMU
ODGROMOWEGO/ GROUND
CZUJNIK TEMP
SENSOR TEMP
CZERWONY DO 6 ,NIEBIESKI DO 7
RED TO IN PUT 6 ,BLUE TO IN PUT 7


WIATROMIERZ
WIND SENSOR
VCC / OUT / GND
REZYSTOR 1 ORAZ REZYSTOR 2
MAJĄ WSPÓLNĄ OBUDOWĘ!!!
RESISTOR 1 AND RESISTOR 2
HAVE A SINGLE CASING!!!
PS300
INVERTER 3/5,5
kW
WIND/ PV+WIND
GND / DI5 / DI4 / DI3 / DI2 / DI1 / 5VDC
SIEĆ/ GRID
YDY min. 5X4mm2
<=100m
OMY min. 3X4mm2
<=100m
OMY min. 3X2,5mm2
<=100m
OMY min. 3X0,5mm2
<=100m
OMY
min.2X0,5mm2
<=100m
Rozdzielnica turbiny/ Distribution Turbine
IP 65 1X12 Module
ELEKTRO-PLAST RH12
Przełącznik/ Switch Hager SFT440
Ochronnik/ Protector B+C ST30 4P
Bezpiecznik Nadpr./ Fuse AC Current Hager MBN325F
SWICH
1. Praca/ Work
0. Luz/Free
2. Stop
SFT 440
Ochronnik/
Protector B+C
SIMTEC
ST30 B+C 4P
FUSE 80SA
HAGER
MBN325F
DO SYSTEMU
ODGROMOWEGO/ GROUND
HAMULEC/ BR
YDY min. 5X4mm2
<=100m
OMY min. 3X4mm2
<=100m
PV UV min. 1X4mm2
<=100m
PV
GENERATOR
3 FAZOWY/ 3 PHASE
DO SYSTEMU
ODGROMOWEGO/ GROUND
KOLEJNOŚĆ PODŁĄCZENIA FAZ W
UKŁADZIE HAMUJĄCYM NIE MA
ZNACZENIA!!!
ORDER OF CONNECTING
CURRENT PHASE TO
INDEPENDENT BREAKING
(SYSTEM) IS IRRELEVANT!!!
REZYSTOR 1 ORAZ REZYSTOR 2
MAJĄ WSPÓLNĄ OBUDOWĘ!!!
RESISTOR 1 AND RESISTOR 2
HAVE A SINGLE CASING!!!
PV max 2000/3000W
CZUJNIK TEMP
SENSOR TEMP
CZERWONY DO 6 ,NIEBIESKI DO 7
RED TO IN PUT 6 ,BLUE TO IN PUT 7

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