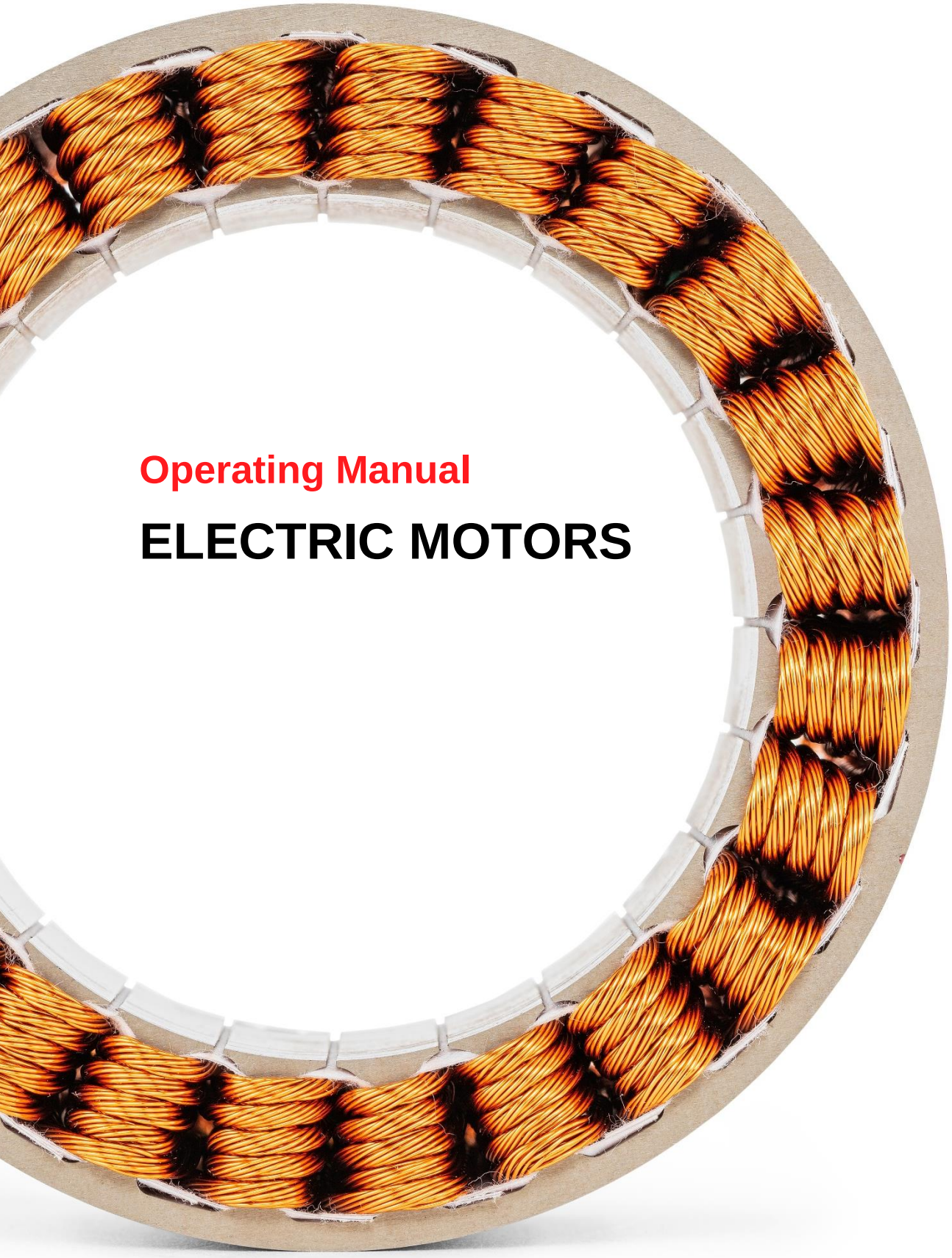
PLETTENBERG
HIGH-END ELECTRIC DRIVE SOLUTIONS



Operating Manual

ELECTRIC MOTORS

OM_Plettenberg_Electric_Motors | Version 1 | 2023.07.14

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1. About this document

Legal provisions

The information contained in this document is the sole property of Plettenberg Elektromotoren GmbH & Co. KG ("Plettenberg"). Publication, in whole or in part, requires the express written consent of Plettenberg. An internal company duplication, which is intended for the evaluation of the product or for the appropriate assignment, is permitted and not subject to approval.

Liability

We shall not be liable for the slightly negligent breach of non-essential contractual obligations. In the case of slightly negligent breaches of essential contractual obligations, also if they have been committed by our legal representatives or our vicarious agents, our liability is limited to the foreseeable damage typical for the contract. Unlimited liability on our part exists for damages to body and health of the customer culpably caused by us, our legal representatives or our vicarious agents, as well as in the case of intent and gross negligence and for the absence of the guaranteed quality.

If damage caused by slight negligence on the part of the customer attributable to us is covered by an existing insurance policy of the customer, our liability in the event of damage to property and/or financial loss shall be limited to the disadvantages for the customer associated with the claim against the insurance company.

We shall not be liable for damage caused by improper handling of our products as well as improper influence of third parties on our products, improper assembly and/or installation, overstressing or overvoltage, unless these are due to our fault or a fault of our representatives or vicarious agents. The same applies in the event of unauthorised and improper repairs or interventions in the delivery item by the purchaser or third parties.

We shall not be liable for damage caused by incorrect information and communications from the customer, unless these are due to our fault or a fault of our representatives or vicarious agents.

We expressly point out that our standard motors, motor controllers and other products have not been subjected to the safety and endurance tests prescribed for aircraft and aircraft equipment. Therefore, we are not liable for damage of any kind which occurs during and/or through the operation of our motors, motor controllers and other products in manned aircraft or related airborne systems, such aeroplanes, microlight aircraft, rockets, hang-gliders and gliders, parachutes, air traffic control systems, etc. We are also expressly not liable for damages due to aircraft being grounded. The use of our products in aircrafts or other airborne systems needs to be specifically agreed with us and relevant safety and endurance tests will have to be performed.

We expressly point out that our motors, motor controllers and other products are not designed and approved for use in control systems of nuclear reactors.

We are not liable for any kind of damage caused during and/or by the operation of our motors, motor controllers and other products in control systems of nuclear reactors or in/at nuclear reactors.

We are not liable for damages of any kind that arise from applications and use of our products that are subject to the German war weapons act.

Our liability under the product liability act remains unaffected.

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sales@plettenbergmotors.com

Scope of validity

This document applies for the following motor series:

Motor Type			
BLDC Inrunner		BLDC Outrunner	Brushed DC
NOVA 1	ADVANCE 1	ORBIT 1	ALPHA 1
NOVA 3	ADVANCE 3	ORBIT 5	ALPHA 2
NOVA 4 (*)	ADVANCE 5	ORBIT 15	
NOVA 5			
NOVA 10			
NOVA 15 (*)			
NOVA 30 (*)			
NOVA 50			

(*) also available as light-weight version (“LW”)

Across the above stated motor series, Plettenberg offers various lengths and configurations. Please note that this operating manual covers all relevant configurations and subvariants.

Target group

The activities described in this document may only be executed by qualified, skilled workers. The qualified, skilled workers must possess the following qualifications:

- Knowledge regarding the functional methods and operation for the product
- Knowledge and observation of these instructions with all safety notes
- Technical standards must be observed

Updated additional information

Links regarding updated additional information can be found under: www.plettenbergmotors.com

Symbols

Symbol	Clarification
	Warning, the non-observance of which leads directly to death or serious injury
	Warning, the non-observance of which may result in serious injury
	Warning, the non-observance of which may result in minor or moderate injury
	Warning, non-observance of which may result in damage to property
	Information, which is important for a specific subject or goal, but not relevant to safety.

Nomenclature

Full name	Name used in this document
Light weight	LW
Clockwise	CW
Counter clockwise	CCW
Electronic speed controller	ESC
Brushless direct current	BLDC
Direct current	DC

2. Product overview

Introduction

Plettenberg is a global leader in high-performance rugged BLDC motors. The product range includes inrunner and outrunner BLDC as well as brushed DC motors. Our motors range in power from 20W to 50kW, with up to 95% efficiency levels and up to 26kW/kg power-to-weight ratio. All our motors are made-to-order and tailored to the specific requirements of its customers. The customization process involves adjusting the number of windings, number of poles, stator length, ingress protection, etc. The result is a motor design, which leads to the highest possible efficiency over the entire load profile and covers all critical load points with safety buffer, while minimizing size and weight. Plettenberg aims to maximize the weight-to-performance-to-robustness ratio and minimize the total-cost-of-ownership of its customers.

Customization

All our drive solutions are made-to-order and tailored to the specific requirements of our customers. This can include adjustments to housing, shaft, number of poles, winding, cooling, potting, IP rating, etc. These adjustments allow us to build the most efficient, lightest and robust drive solutions for our customers.

Total Efficiency

We take a holistic perspective and always look at total efficiency over the entire load profile. We tailor our products such that endurance and performance is maximized, and weight is minimized. Often, a tailored drive solution can increase efficiency by 15-30%, mitigate the need for gearboxes and reduce overall system cost.

Life Cycle

We support our customers throughout the entire product life cycle. Our engineers provide extensive development and system integration advise and support with prototyping. Following development, we manufacture the final series inhouse for as many years as required by our customers. We also offer an extensive spare parts program.

Robustness

All our drive solutions are rugged in design and built for application in harsh environments. Our NOVA series of BLDC inrunners is available with ingress protection of up to 67. This makes them ideally suited for missions in the harshest environments, such as snow, desert or sea water operation.

Quality

All our drive solutions are developed and manufactured at our HQ in Germany. We employ highly experienced professionals with many years of experience. We believe in products built by hand, as it provides for the highest quality and a great degree of flexibility. We have a strict quality system which is ISO 9001 certified.

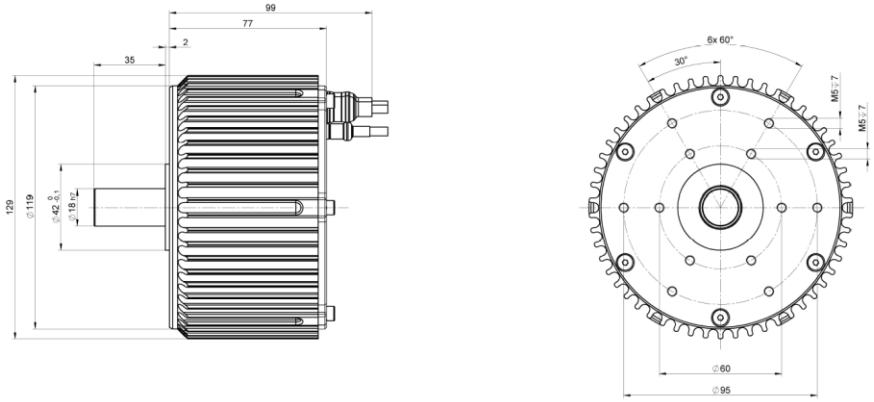
Solution Focus

We provide customers with tailored system solutions, comprising motor, ESC as well as related accessories. Next to the hardware, we provide extensive engineering and system integration support. In the case of starter-generators, we provide the generator as well as starter-generator electronic boxes.

BLDC Inrunner

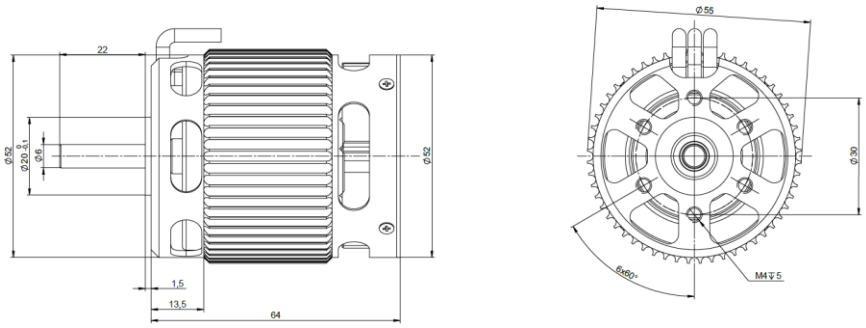
Our inrunner motors consist of the **NOVA** and the **ADVANCE** families.

The **NOVA** series of inrunners feature an extra rugged closed housing design with ingress protection of up to IP67. The motors can be applied in the harshest environments, such as desert, snow and sea water operations. At the same time, the NOVA motors are designed to be extremely efficient and have market leading power-to-weight ratios. The NOVA series is available in the power range from below 1kW to 50kW.



NOVA 15-30. Note: additional measurement sheets included in the Appendix.

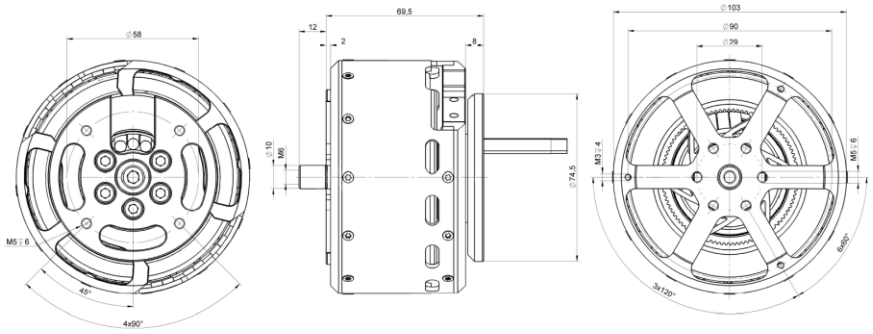
The **ADVANCE** series of inrunners feature a weight-optimized open housing design. This allows for best-in-class power-to-weight ratios and makes the motors very suitable for applications with constraints in space, weight and power supply. The ADVANCE series is available in the power range from 1kW to 5kW.



Advance 1-30. Note: additional measurement sheets included in the Appendix.

BLDC Outrunner

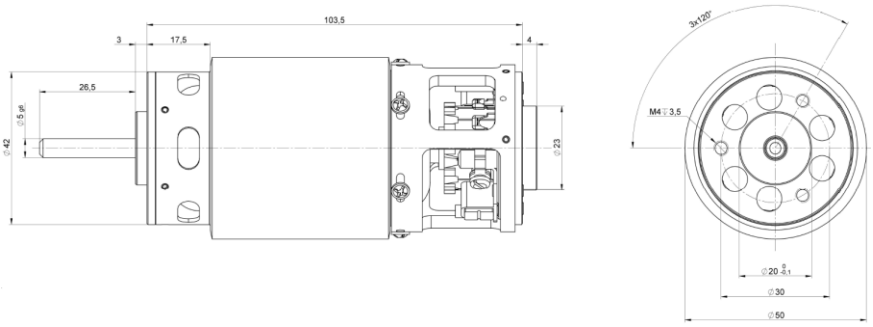
The **ORBIT** series of outrunners have been developed for applications with constraints in space, weight and power supply. Compared to other outrunners in the market, the ORBIT series is built much more robust and features a reinforced rotor casing. The ORBIT Series is available in the power range from below 1kW to 15kW.



Orbit 15-25. Note: additional measurement sheets included in the Appendix.

Brushed DC

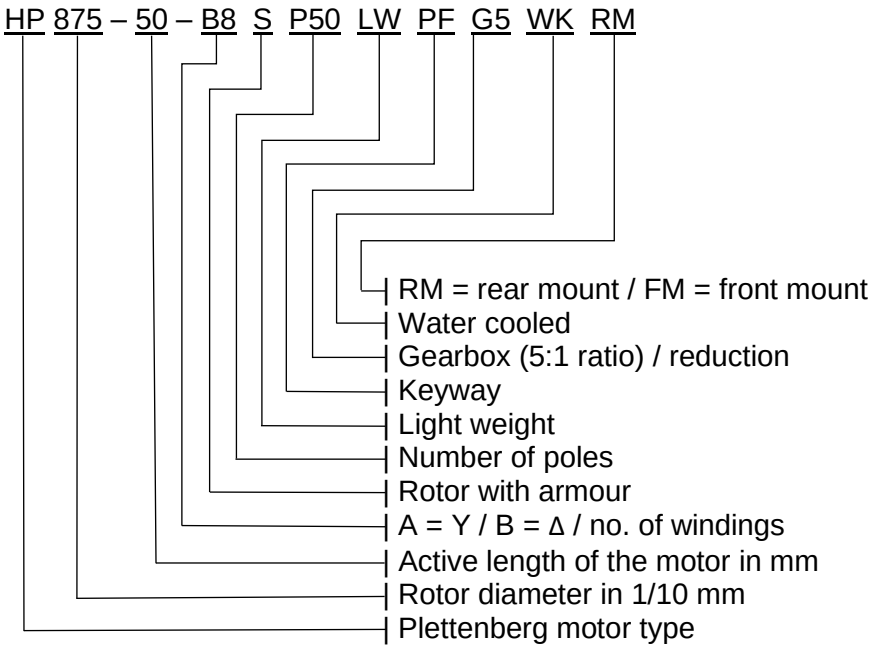
The **ALPHA** series of brushed DC motors are ideally suited for industrial and other applications, with highest requirements regarding power-to-weight ratio, durability, efficiency and cost. The ALPHA series is available in the power range from below 500W to 1.5kW.



Alpha 2-50. Note: additional measurement sheets included in the Appendix.

Type designation

Plettenberg motors are designed based a modular system and are available in +5,000 configurations. Customers are advised to provide all their relevant details and specifications in the form of the Plettenberg Specification Sheet (Please reach out to sales@plettenbergmotors.com for more information). Based on the received information, the engineering team of Plettenberg will determine the electrical design of the relevant drive system. The format of the resulting motor design designation is based on a code system. The below figure provides an illustrative (non-comprehensive) type designation for a Plettenberg motor.



Motor rotation designation

All sensor guided motors of Plettenberg have a specified direction of rotation (CW or CCW), which needs to be specified when ordering the motor. Please use the definitions as illustrated in the below chart.

Clockwise rotation (**CW**)	Counter-clockwise rotation (**CCW**)

Motor force direction designation

Plettenberg motors may be specified for pull or push application (or both for some series). The force direction needs to be specified when ordering the motor.

Side view: Force (Tractor/Pull)	Side view: Force (Pusher)

3. Safety

Intended use

The area of validity is defined as:

- Drive unit

The following are considered improper use in the sense of a foreseeable misuse:

- Using the motor in manned aircrafts and other manned airborne systems
- Using the motor in public vehicles and transport
- Using the motor as a toy
- Using the motor in potentially explosive atmospheres
- Any use other than those provided for

The use of our products outside the area of validity needs to be specifically agreed with us and relevant safety and endurance tests will have to be performed.

Safety Information

This chapter contains safety instructions which must always be observed when working on and with the product. In order to prevent personal injury and property damage and to ensure continuous operation of the product, always read this chapter carefully and follow all safety instructions at all times.

Danger

Slight, moderate or severe injuries

Malfunctions can be caused by electromagnetic interference. Communication equipment and other devices in the surroundings must not be exposed to impermissible electromagnetic interference.

- Modifications to the product are not permitted.
- Before the first operation, the product must be checked against damages and the correct connection of all connections must be checked again.
- The phase cables must not touch any metal surfaces. (capacitive and inductive coupling)
- Power cables and control cables must be minimum 3 cm distance from each other.
- The phase cables must not be laid as a coil.
- The phase cables must be laid twisted (one turn every 20 cm).

Warning

Cut injures, loss of eyesight!

- The product must never be contaminated with foreign bodies / adhesives / paint during assembly.
- Modifications to the product are forbidden.
- Always ensure that the motor is properly fastened.
- Always ensure that the motor controller settings are correct.
- The product must be sufficiently cooled.
- Operation of the motor at idling speed without load is prohibited.

Warning

Electric shock, burns, fire
Caused by energised parts.

- The product must always be protected against overheating, dirt and moisture, otherwise the components will be damaged. This can cause short circuits.
- The product as well as the contacts must be inspected for overheating, soiling, deformation, fire and moisture before commissioning.
- Assembly and disassembly must be carried out only when in de-energised condition.
- Always ensure proper handling.
- Modifications to the product are not permitted.
- Always ensure that the motor is properly fastened.
- The bending radius of the connecting cables must be greater than 6x outer diameter.
- The product must be sufficiently cooled.
- Operation of the motor at idling speed without load is prohibited.

Warning

Injuries due to crushing, being caught up
Malfunction due to electromagnetic interference.

- The control and phase cables must not be extended. The product must be inspected and the fastening must be controlled again before commissioning.
- Modifications to the product are not permitted.

Danger

Danger from magnetic radiation
Malfunction / destruction of magnetically sensitive parts.

- The motor must never come into contact with magnetically sensitive parts such as pacemakers or data carriers. The strong magnets can lead to damage and / or malfunction or extinction of these.

Danger

Crushing, pulling in / being caught up
Caused by careless touching and too small a distance from rotating parts.

- There must be sufficient distance retained to the motor so that no people or objects can be caught up or drawn in.

Caution

Burns
Caused by carelessly touching hot surfaces.

- The surfaces could be hot after operating the product. Always let the product cool down.

Notice

Thermal overload / destruction

- Always ensure sufficient cooling for the motor (air or water cooling)
- A high load on the motor is only permissible in short operation. Under no circumstances must the motor exceed the temperature of 100°C.
- Only motor controllers and regulators approved by Plettenberg must be used.

4. Commissioning

Safety during commissioning

Danger

Severe, moderate or minor injuries.
Destruction or damage to the product

- Safety instructions from Chapter 2 must be complied with!
- Test runs with prop should only be executed outdoors or with special safety equipment, such as caged test stand.
- The side and front of the rotating plane needs to be kept clear.

Assembly & mounting

Notice

Destruction / damage of the motor

- Always use suitable screws or bolts.
- Sawed or ground screws or bolts can destroy the thread in the motor's bearing shield.
- After each use, the motor must cool down again to ambient temperature.
- Only motor controllers and regulators approved by Plettenberg must be used.
- Never exceed the maximum screw-in depth. Screws or bolts which are screwed too far will damage or destroy the motor.
- Only use original screws or bolts.
- Do not use a sensor-guided motor against its specified direction of rotation.

- The motor phases must not be shortened without prior consultation. Crimping of connections must also not be executed without previous consultation.

Mounting of the motor shall be performed on a firm base with an appropriate number of bolts. Please refer to the Appendix for recommended bolt sizes and torque. Depending on the model, the motor may be specified for front mounting, back mounting or both. Please contact us for any questions on mounting and installation.

Cable connections

Only motor controllers and regulators approved by Plettenberg must be used. If other motor controllers or regulators are used, Plettenberg cannot assume any guarantee or liability in the event of destruction of the motor, regulator or the motor controller.

Motor connection cables must never be shortened or extended.

The three motor phases must be connected to the motor controller according the manufacturer´s instructions.

The sensor cable must be connected to the motor controller in accordance with the manufacturer´s specifications.

Soldered connections

Notice

Destruction of / damage to the motor due to poor-quality or high-resistance connections.

⚠ Caution

Burns
Caused by carelessly touching hot surfaces.

Additionally required tools/materials
(not included)

- No-clean lead-free solder
- Heat shrink tubing
- Cable
- Soldering iron rated at least 100 W
- Hot air gun

A wide portfolio of flexible high temperature cables of different cross-sections, colors and requirements is available from Plettenberg. For more information, please reach out to sales@plettenbergmotors.com.

Sensors

Notice

Do not use a sensor-guided motor against its specified direction of rotation.

Plettenberg motors are available with various positioning and temperature sensors, which are used for commutation and monitoring. The below table provides an overview on the availability of sensor types. Motor series not included below are only available for sensorless operation.

Sensor Types				
Motor Type	Positioning Sensor			Temperature Sensor
	Stator	Rotor	Shaft	
NOVA 1	☑	☑	☑	☑
NOVA 3	☑	☑	☑	☑
NOVA 4	☒	☑	☑	☑
NOVA 5	☑	☑	(☑)	☑
NOVA 10	☑	☑	(☑)	☑
NOVA 15	☑	☑	☑	☑
NOVA 30	☑	☒	☒	☑
NOVA 50	☒	☑	☒	☑
ORBIT 15	☑	☒	☒	☑

Note: (☑) is defined as not available in standard.

Plettenberg's standard positioning sensor is the "stator-sensor", whereby three hall sensors with 120-degree electrical spacing are installed in the stator. Depending on the application, a "rotor-sensor" or a "shaft-sensor" can be viable alternatives. Plettenberg can also integrate custom encoder and positioning sensors.

All sensor guided motors of Plettenberg have a specified direction of rotation (CW or CCW), which needs to be defined when ordering the motor. Our sensors have an operating voltage of 5V.

Commutation sequences

Notice

Destruction of / damage to the motor controller due to short-circuits or incorrect wiring.

Block commutation with sensors

The feedback of the rotor position is implemented through a positioning sensor integrated into the motor. The sensors are electrically offset by 120-degree and deliver six different switch positions per revolution. The three partial windings are driven by the motor controller in accordance with the sensor information.

Forwards switch positions:

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Fault 1	Fault 2
Phase A (U)	+	Z	-	-	Z	+	Z	Z
Phase B (V)	Z	+	+	Z	-	-	Z	Z
Phase C (W)	-	-	Z	+	+	Z	Z	Z
Sensor A	1	1	0	0	0	1	0	1
Sensor B	0	1	1	1	0	0	0	1
Sensor C	0	0	0	1	1	1	0	1

Reverse switch positions:

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Fault 1	Fault 2
Phase A (U)	-	-	Z	+	+	Z	Z	Z
Phase B (V)	Z	+	+	Z	-	-	Z	Z
Phase C (W)	+	Z	-	-	Z	+	Z	Z
Sensor A	1	1	0	0	0	1	0	1
Sensor B	0	0	0	1	1	1	0	1
Sensor C	0	1	1	1	0	0	0	1

Index	Description
Z	High-resistance
+	Plus
-	Minus
1	> 3V
0	< 2V

Thermal management

Plettenberg motors are optimized for the highest possible heat dissipation from the stator windings to the surface of the housing and the cooling fins. Depending on the type of motor, Plettenberg offers air- as well as water-cooled versions. When commissioning and/or integrating the motor, it needs to be ensured that sufficient cooling is available to ensure highest performance and prevent permanent damage.

The general guideline for air-cooled motor is that the air needs to flow through the entire cooling fins in axial direction. The specific required air flow/speed required depends on the type of motor, load profile and customer application. Therefore, Plettenberg recommends consulting its engineering team to receive a detailed

thermal simulation. For applications with insufficient or non-ideal airflow, Plettenberg has a wide range to active and passive cooling solutions available.

For water-cooled motors, Plettenberg recommends minimum flow of 7 litres-per-minute at max. 40 degrees Celsius inlet temperature. Coolant pressure shall not exceed 2 bar/ 29 PSI. For specific pressure drops by motor type please reach out to us.

Plettenberg motors of the NOVA series are equipped with a temperature sensor. The sensor measures the temperature in the stator, which shall never exceed 100 degrees Celsius.

Visual inspection and mechanical inspection

All fastening screws or bolts for the motor must be checked for tightness before commissioning.

It needs to be ensures that all energized cables, plugs and sockets are insulated so that unintentional switching on of the motor by cable contact is prevented.

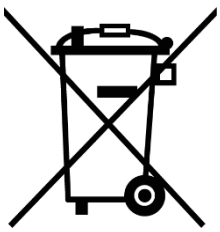
5. Maintenance

General

The housing surfaces can be cleaned with compressed air and a dry, lint-free cloth.

The maintenance requirements can vary by the type of motor. Please consult sales@plettenbergmotors.com for detailed information on requirements.

6. Disposal



A motor that has reached the end of its service life is electrical scrap.

Electrical scrap consists of valuable materials, which can be recovered as secondary raw materials, but also of environmentally hazardous substances.

Information regarding optimum material recycling is available from commercial waste disposal companies.

7. Service / Contact

Please contact us for any questions and/or information on service.

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8. EU Declaration of Conformity

In the sense of the EU Directives

- **EMC Directive 2014/30/EU Appendix IV**
- **Low Voltage Directive 2014/35/EU Appendix IV**
- **RoHS Directive 2011/65/EU Appendix I**

CE

Plettenberg Elektromotoren GmbH & Co. KG

Rostocker Straße 30
34225 Baunatal, Germany

hereby declares, as the manufacturer, that the articles and objects described below comply with the provisions of the relevant community harmonisation legislation referred to above.

Motor type			
NOVA 1	ADVANCE 1	ORBIT 1	ALPHA 1
NOVA 3	ADVANCE 3	ORBIT 5	ALPHA 2
NOVA 4	ADVANCE 5	ORBIT 15	
NOVA 5			
NOVA 10			
NOVA 15			
NOVA 30			
NOVA 50			

Emitted interference	**EMC Directive Article 6 Appendix I.1.a**
DIN EN 61000-6-3:2011-09	Electromagnetic Compatibility (EMC)- Part 6-3: Generic standards - Interference emission for residential areas, business and commercial areas as well as small businesses (IEC 61000-6-3:2006 + A1:2010); German Edition EN 61000-6-3:2007 + A1:2011
Immunity to interference	**EMC Directive Article 6 Appendix I.1.b**
DIN EN 61000-6-1:2007-10	Electromagnetic Compatibility (EMC)- Part 6-1: Generic standards - Immunity for residential environments, business and commercial areas as well as small businesses (IEC 61000-6-1:2005);
Safety of machinery	
DIN EN 60335-1:2012-10	Safety Household and similar electrical appliances - Part 1: General requirements (IEC 603351:2010, modified);
DIN EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk mitigation ISO 12100:2010: German Edition EN ISO 12100

DIN EN 60204-11:2014-10	Safety for Machinery – Electrical Equipment for Machinery – Part 1: General requirements (IEC 44/709/CDV:2014); German Edition FprEN 60204-1:2014

Maximum permissible concentrations in homogeneous materials in % by weight	**RoHS Directive Appendix II**
Lead	0.1%
Cadmium	0.01%
Polybrominated biphenyl (PBB)	0.1%
Polybrominated diphenyl ether (PBDE)	0.1%
Mercury	0.1%
Hexavalent chromium	0.1%

Note:

The sole responsibility for drawing up this declaration of conformity lies with the manufacturer. This declaration of conformity will lose its validity when the product is converted, extended or altered in any other manner without the express consent of Plettenberg Elektromotoren GmbH & Co. KG and when components, not belonging to Plettenberg Elektromotoren GmbH & Co. KG, or accessories are installed in the product as well as in the event of improper connection or improper use of the product.

Baunatal, 14.07.2023.

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(Bastian Greiner, Managing Director)

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(Boris Imhoff, Managing Director)

9. Appendix

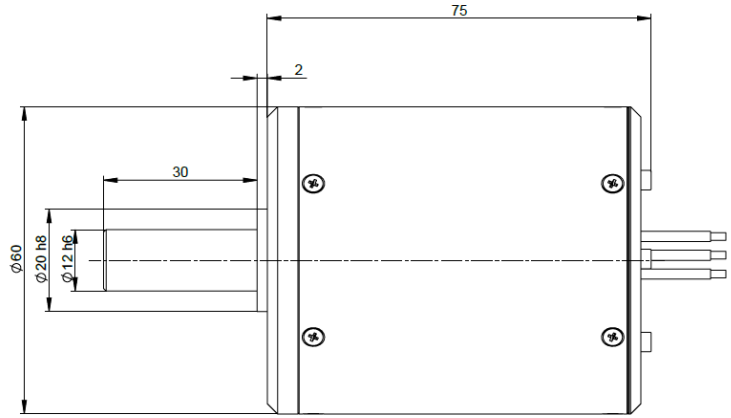
NOVA Series

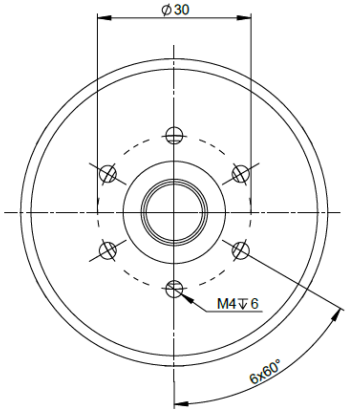
The NOVA series of inrunners feature an extra rugged closed housing design with ingress protection of up to IP67. The motors can be applied in the harshest environments, such as desert, snow and sea water operations. At the same time, the NOVA motors are designed to be extremely efficient and have market leading power-to-weight ratios. The NOVA series is available in the power range from below 1kW to 50kW.

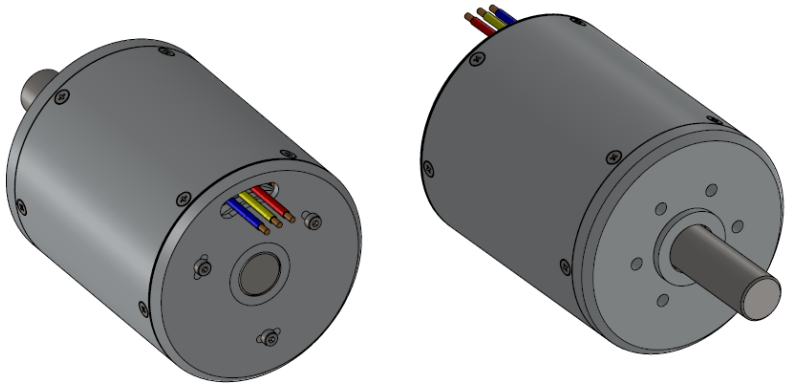
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

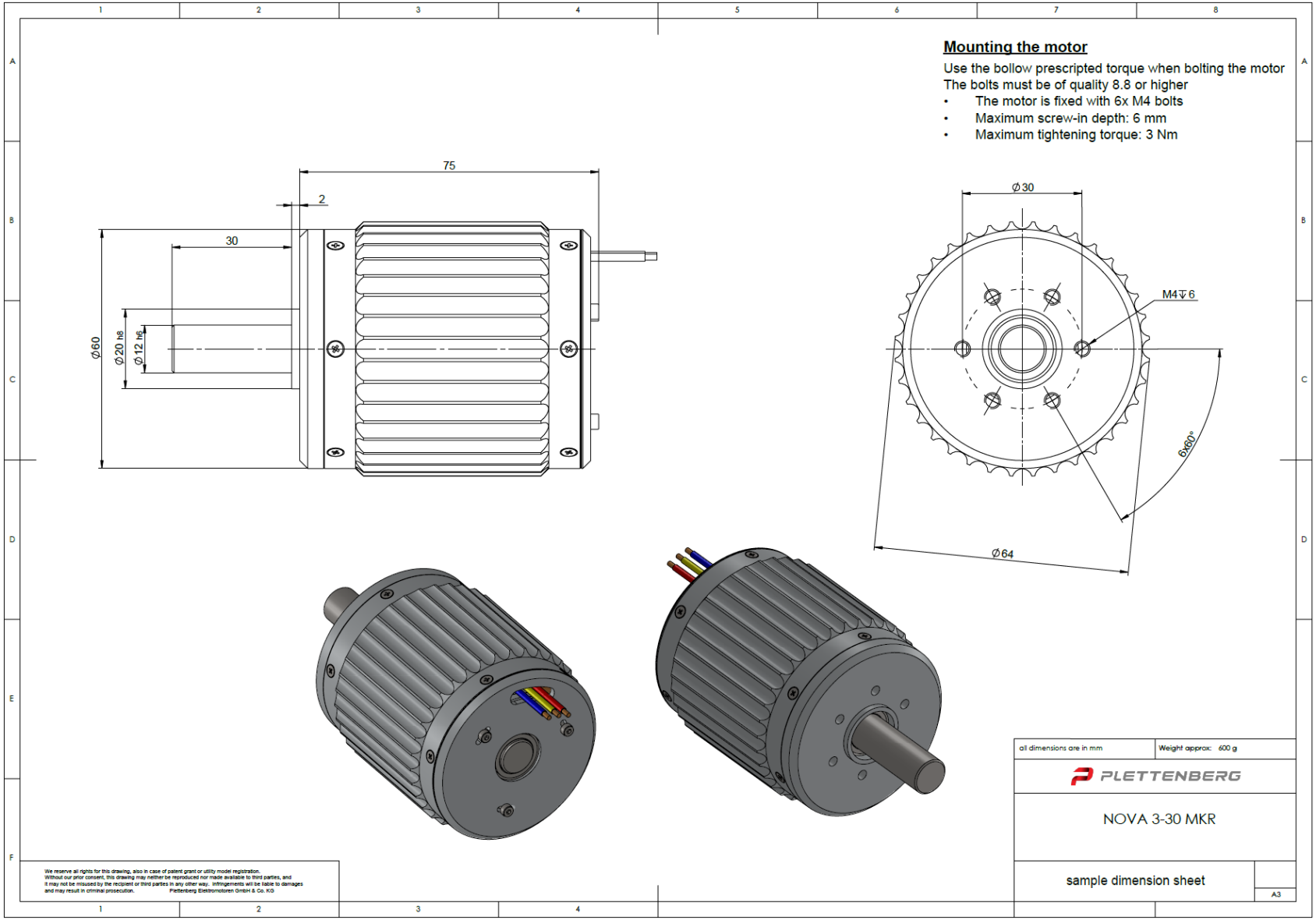
- The motor is fixed with 6x M4 bolts
- Maximum screw-in depth: 6 mm
- Maximum tightening torque: 3 Nm







all dimensions are in mm	Weight approx: 580 g
PLETTENBERG	
NOVA 3-30	
sample dimension sheet	A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
75
2
30
Ø60
Ø20 h8
Ø12 h6
Ø30
M4↧6
6x60°
Ø64
all dimensions are in mm
Weight approx: 600 g
PLETTENBERG
NOVA 3-30 MKR
sample dimension sheet
A3
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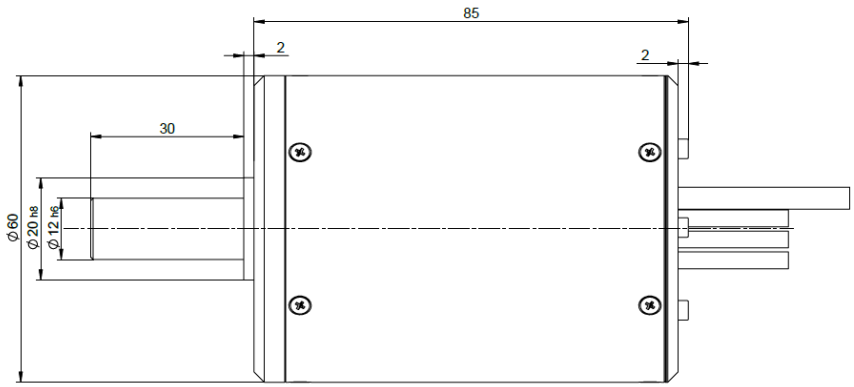
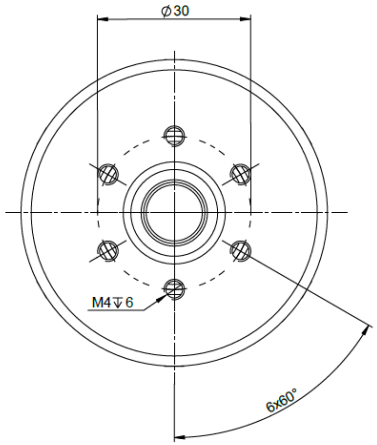
it may not be misused by the recipient or third parties in any other way. Infringements will be liable to damages
and may result in criminal prosecution. Plettenberg Elektromotoren GmbH & Co. KG

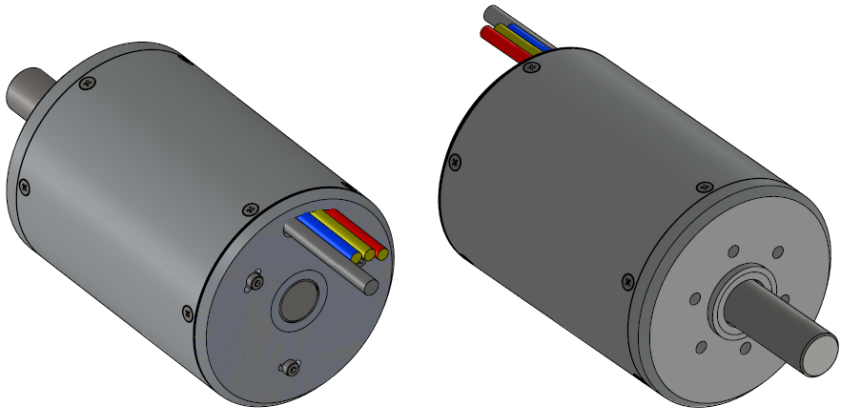
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 6x M4 bolts
- Maximum screw-in depth: 6 mm
- Maximum tightening torque: 3 Nm







all dimensions are in mm	Weight approx: 780 g

PLETTENBERG

NOVA 3-40

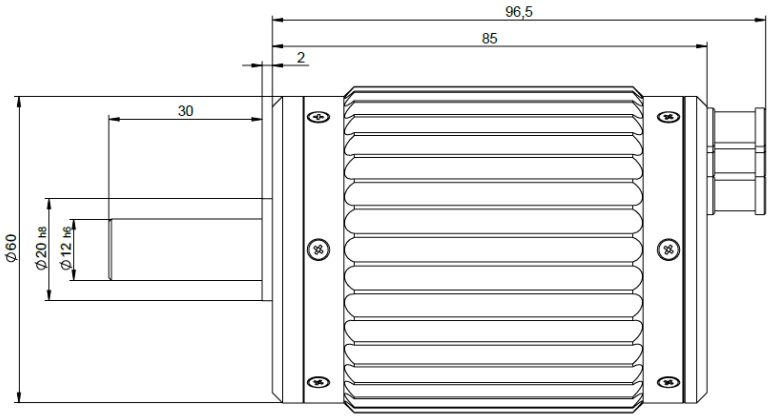
sample dimension sheet

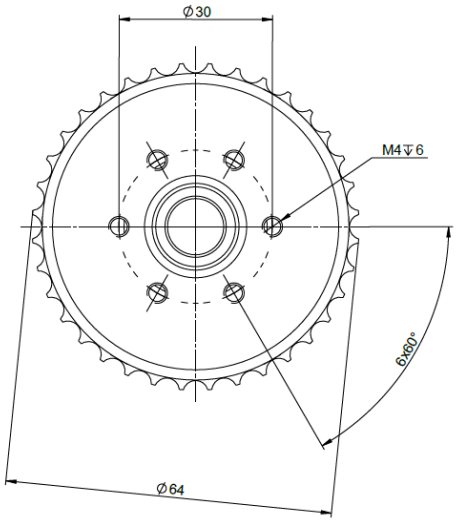
A3

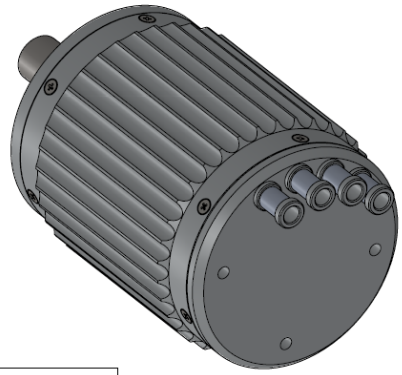
Mounting the motor

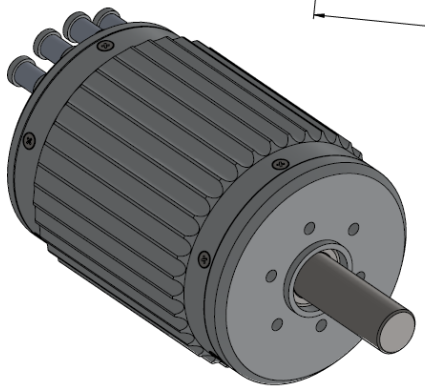
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 6x M4 bolts
- Maximum screw-in depth: 6 mm
- Maximum tightening torque: 3 Nm









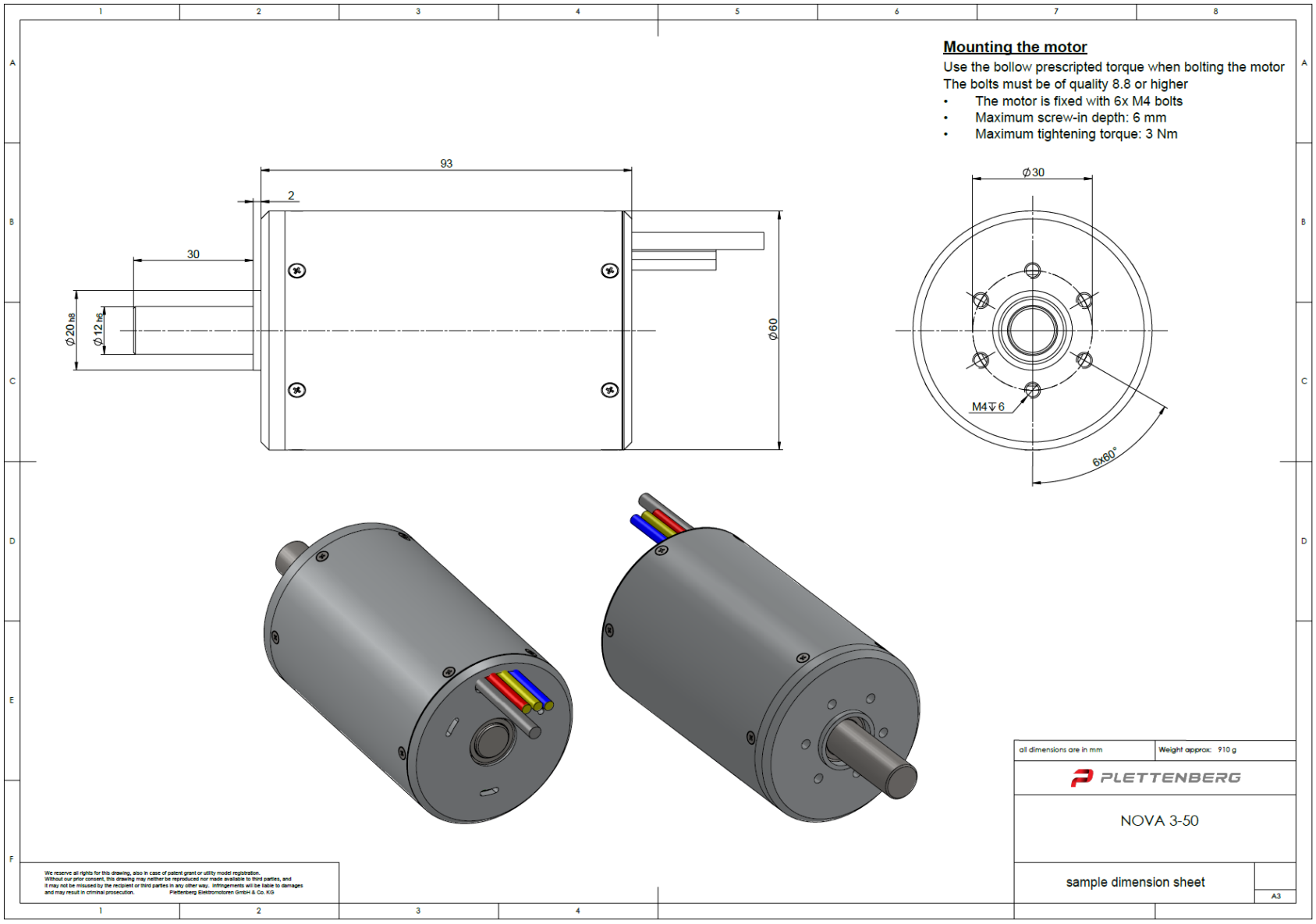
all dimensions are in mm	Weight approx: 800 g

PLETTENBERG

NOVA 3-40 MKR

sample dimension sheet

A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
93
2
30
Ø20 h8
Ø12 h6
Ø60
Ø30
M4↧6
6x60°
all dimensions are in mm
Weight approx: 910 g
PLETTENBERG
NOVA 3-50
sample dimension sheet
A3
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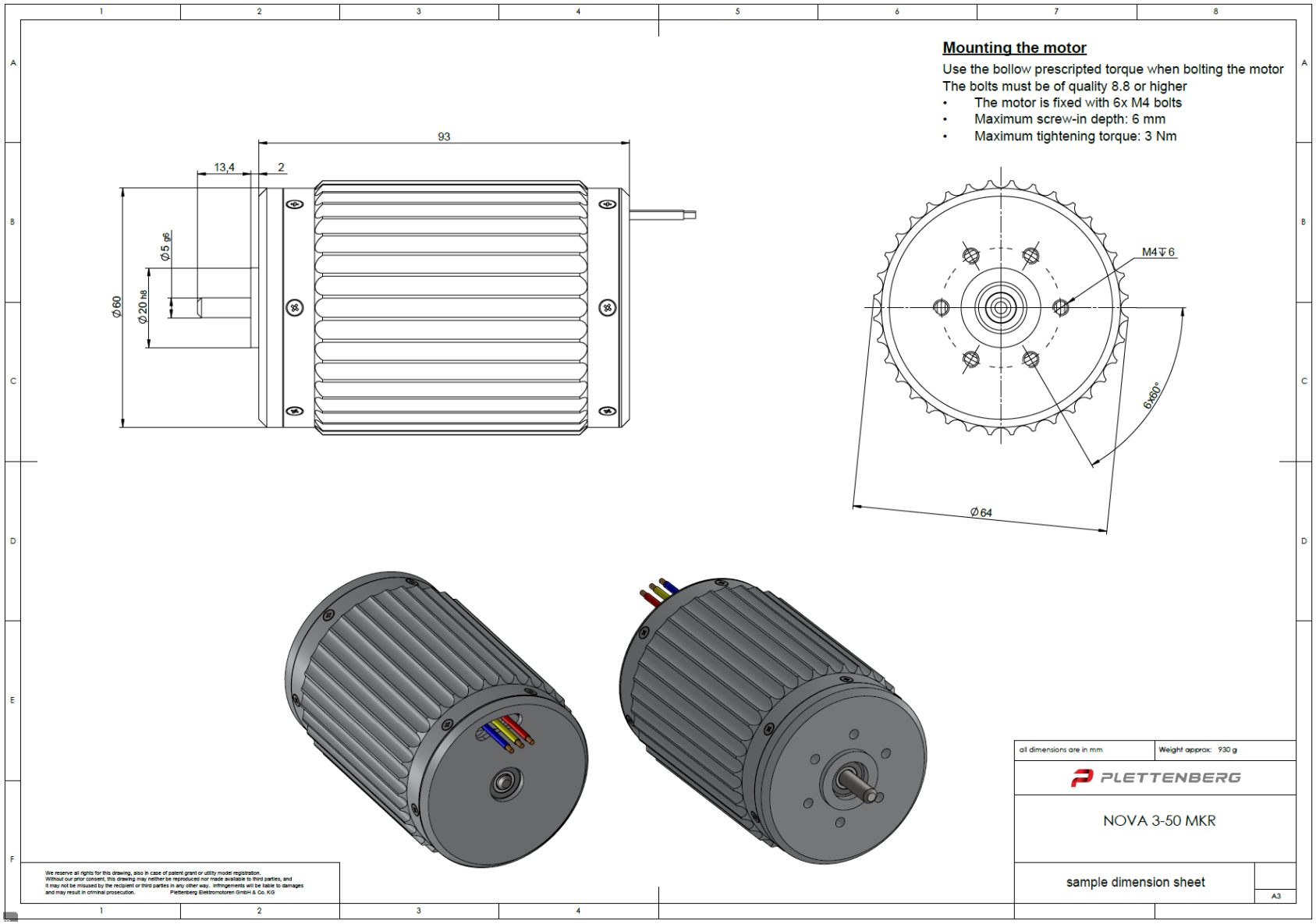
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
93
13,4
2
Ø60
Ø20 h8
Ø5 g6
M4↧6
6x60°
Ø64
all dimensions are in mm
Weight approx: 930 g
PLETTENBERG
NOVA 3-50 MKR
sample dimension sheet
A3
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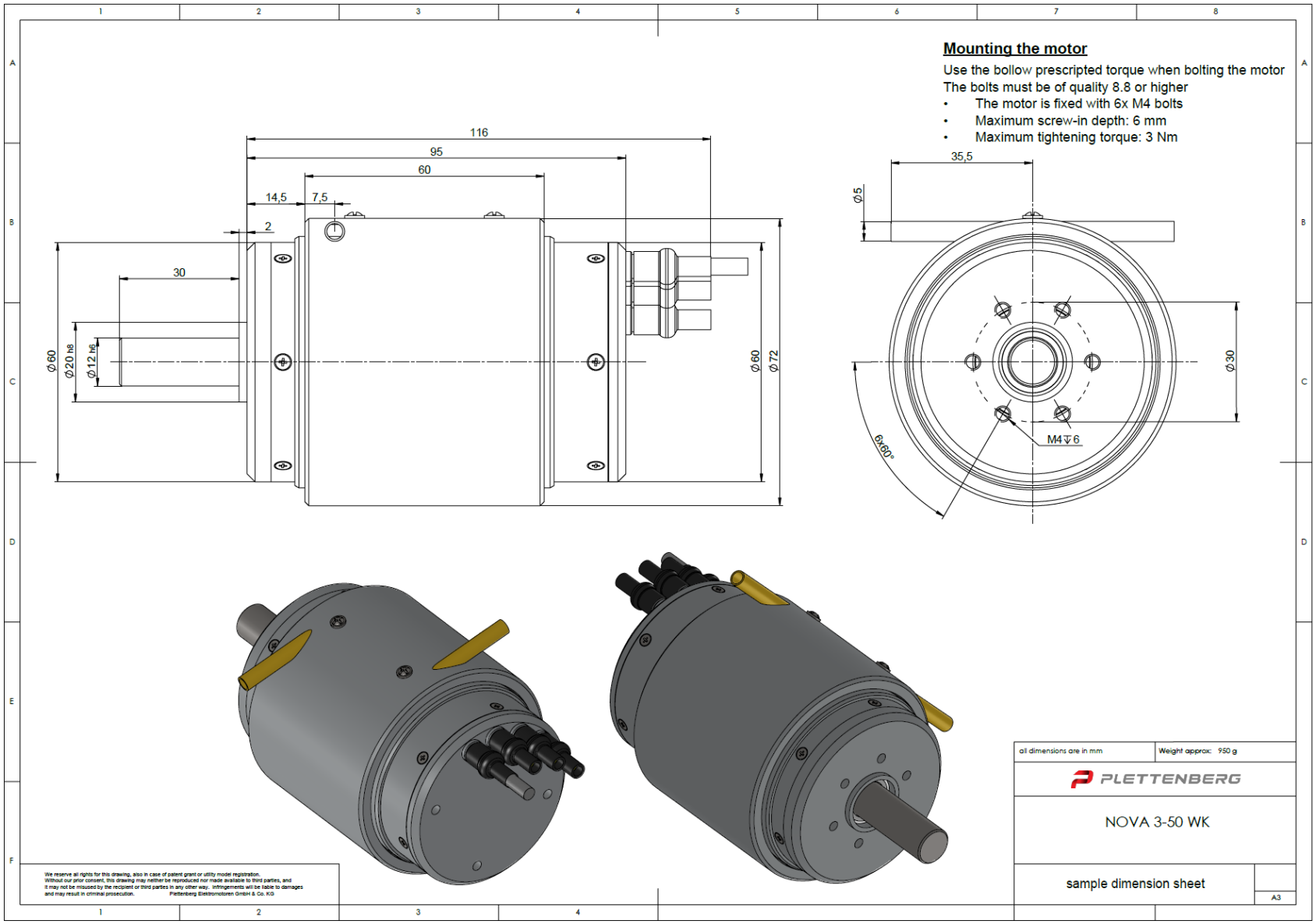
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
116
95
60
14,5
7,5
2
30
Ø60
Ø20 h8
Ø12 h6
Ø60
Ø72
35,5
Ø5
Ø30
6x60°
M4↧6
all dimensions are in mm
Weight approx: 950 g
PLETTENBERG
NOVA 3-50 WK
sample dimension sheet
A3
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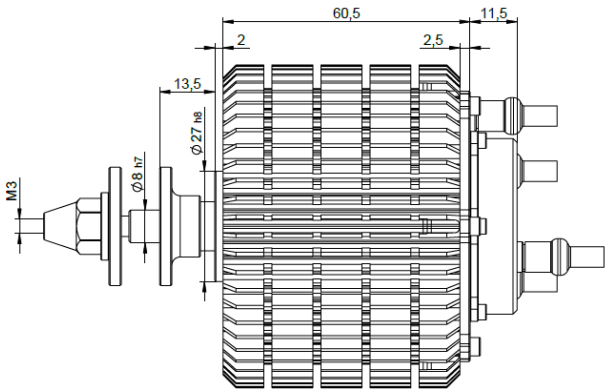
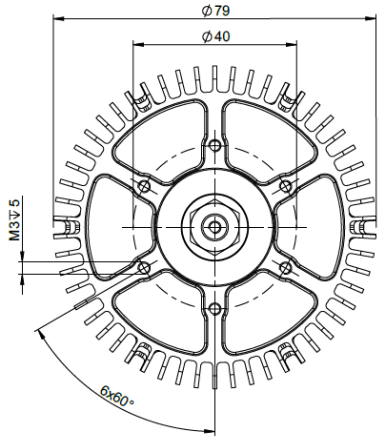
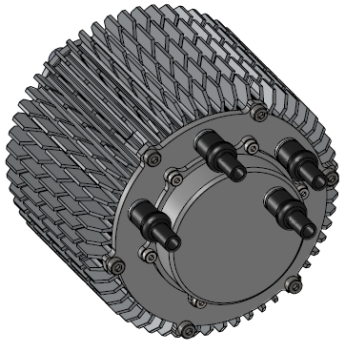
Mounting the motor

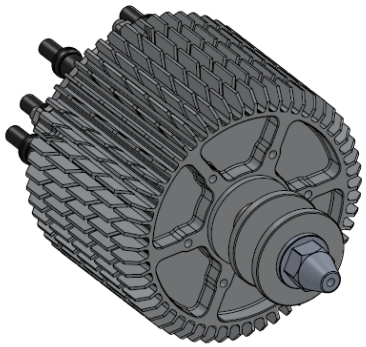
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 6x M3 bolts
- Maximum screw-in depth: 5 mm
- Maximum tightening torque: 1.3 Nm

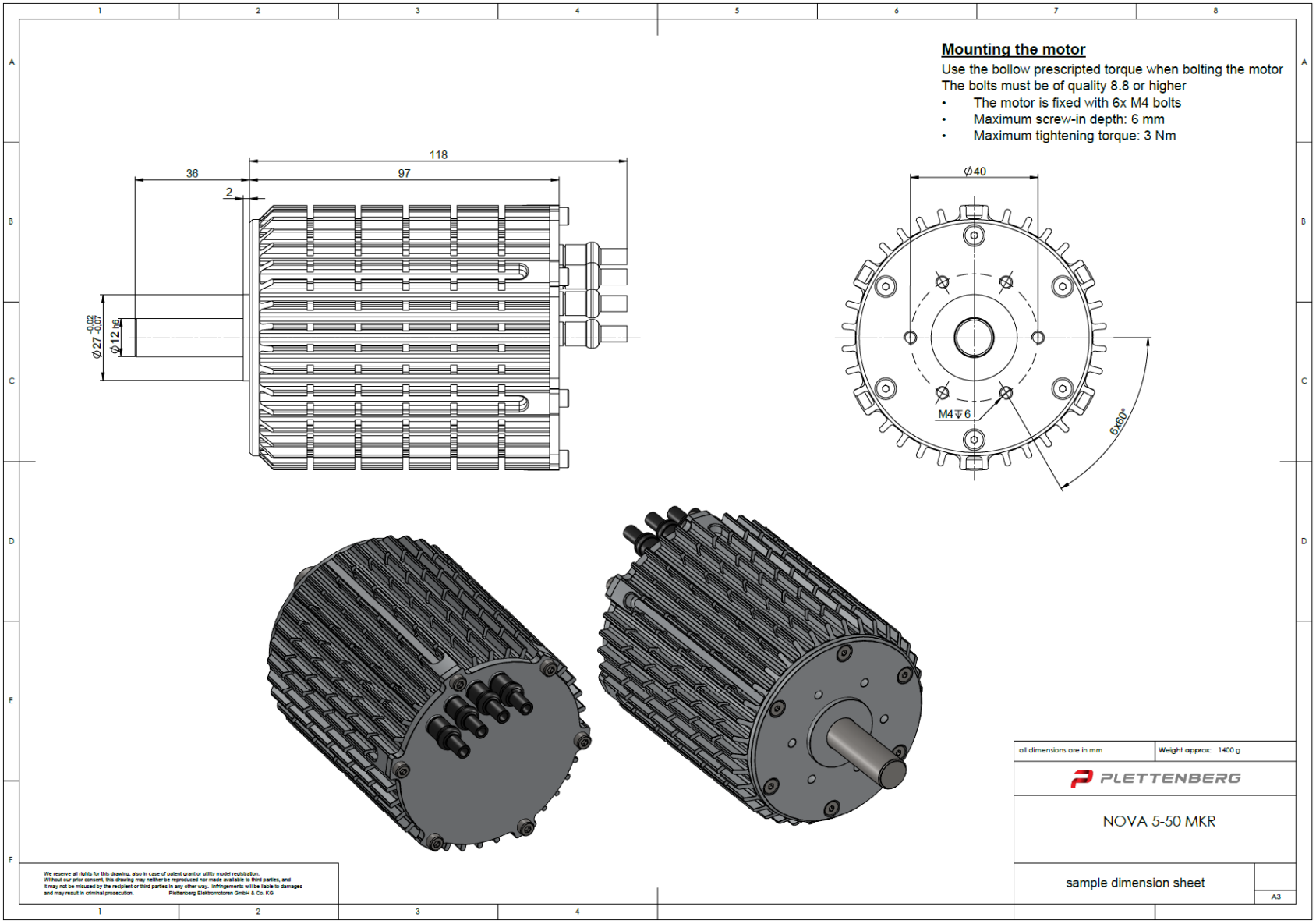








all dimensions are in mm	Weight approx: 700 g
PLETTENBERG	
NOVA 4-30 LW	
sample dimension sheet	A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
118
36
97
2
Ø 27 -0.02 -0.07
Ø 12 h6
Ø40
M4↧6
6x60°
all dimensions are in mm
Weight approx: 1400 g
PLETTENBERG
NOVA 5-50 MKR
sample dimension sheet
A3
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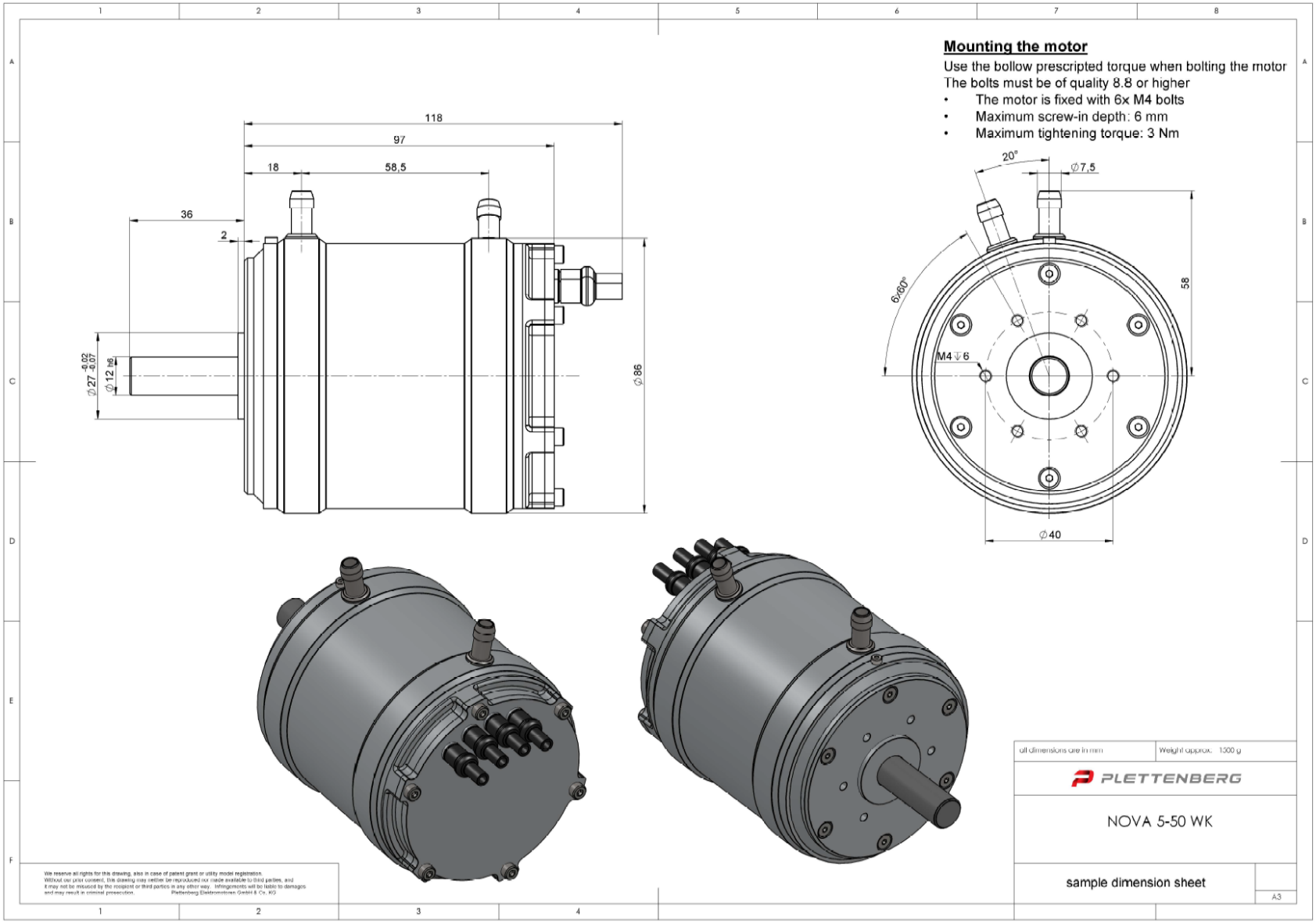
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 3 Nm
118
97
18
58,5
36
2
Ø27 -0.02 -0.07
Ø12 h6
Ø86
20°
Ø7,5
6x60°
58
M4↓6
Ø40
all dimensions are in mm
Weight approx. 1300 g
PLETTENBERG
NOVA 5-50 WK
sample dimension sheet
A3
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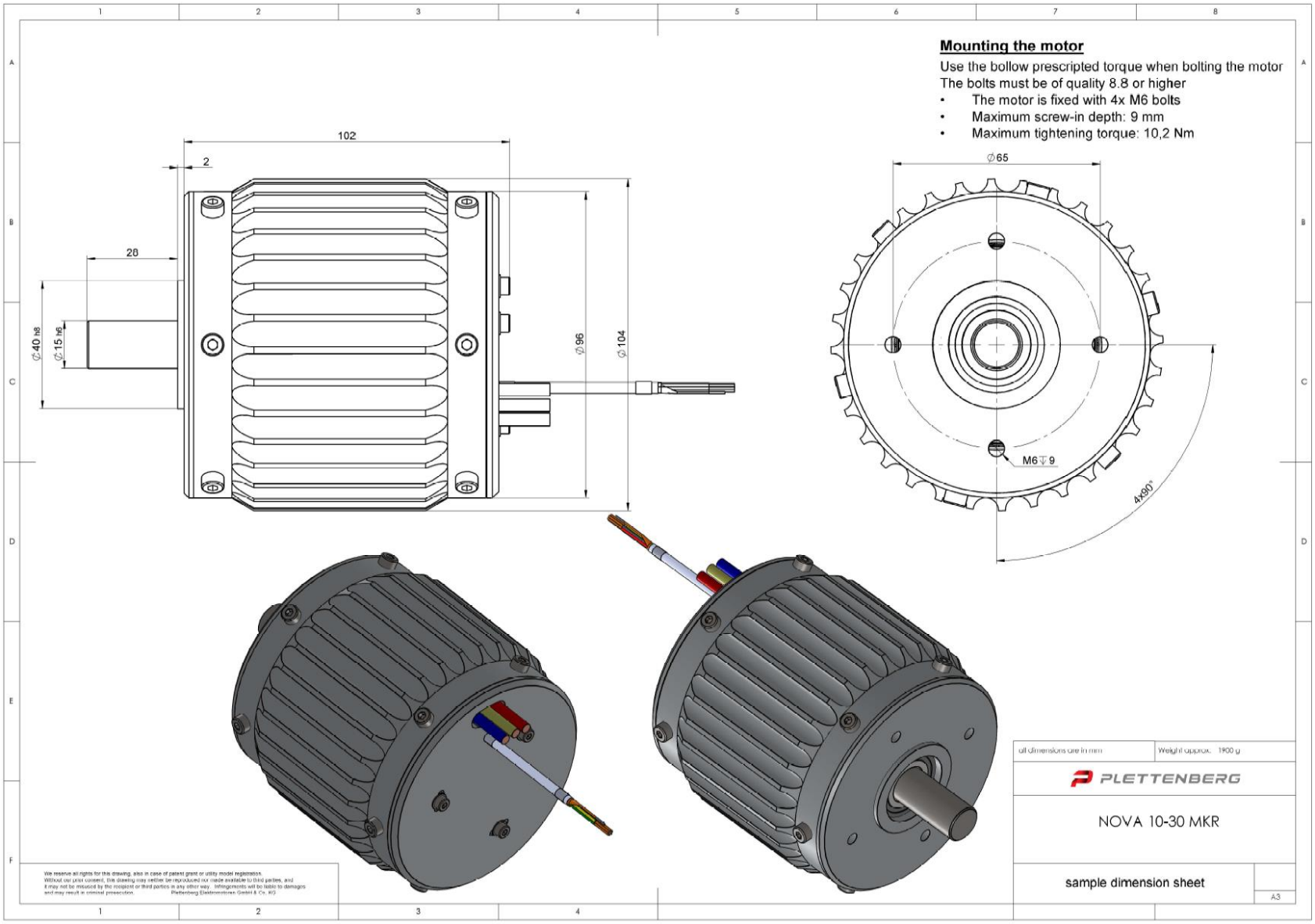
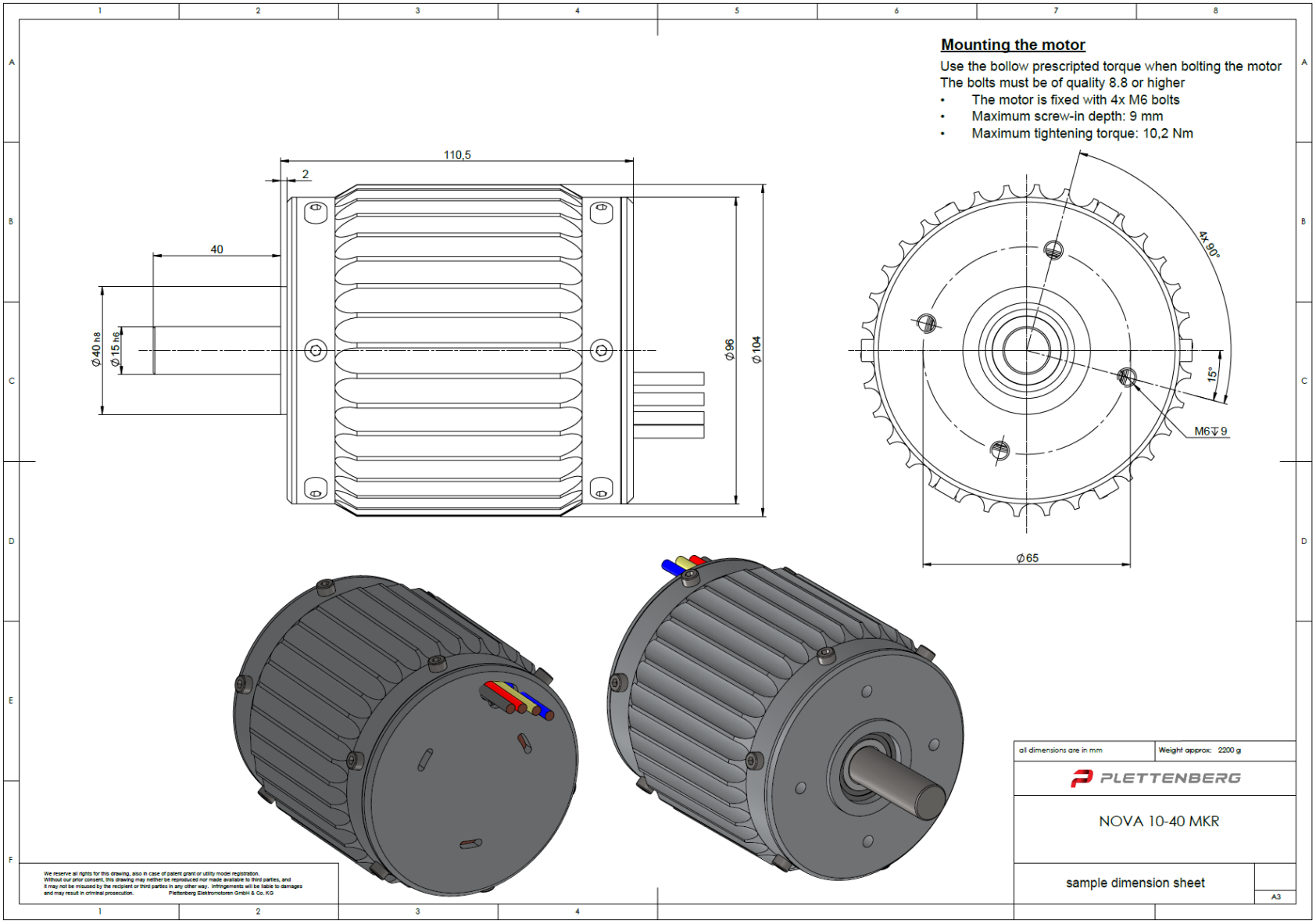

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M6 bolts
• Maximum screw-in depth: 9 mm
• Maximum tightening torque: 10,2 Nm
102
2
28
Ø40 h8
Ø15 h6
Ø96
Ø104
Ø65
M6↧9
4x90°
all dimensions are in mm
Weight approx. 1900 g
PLETTENBERG
NOVA 10-30 MKR
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M6 bolts
• Maximum screw-in depth: 9 mm
• Maximum tightening torque: 10,2 Nm
110,5
2
40
Ø40 h8
Ø15 h6
Ø96
Ø104
4x 90°
15°
M6↧9
Ø65
all dimensions are in mm
Weight approx: 2200 g
PLETTENBERG
NOVA 10-40 MKR
sample dimension sheet
A3
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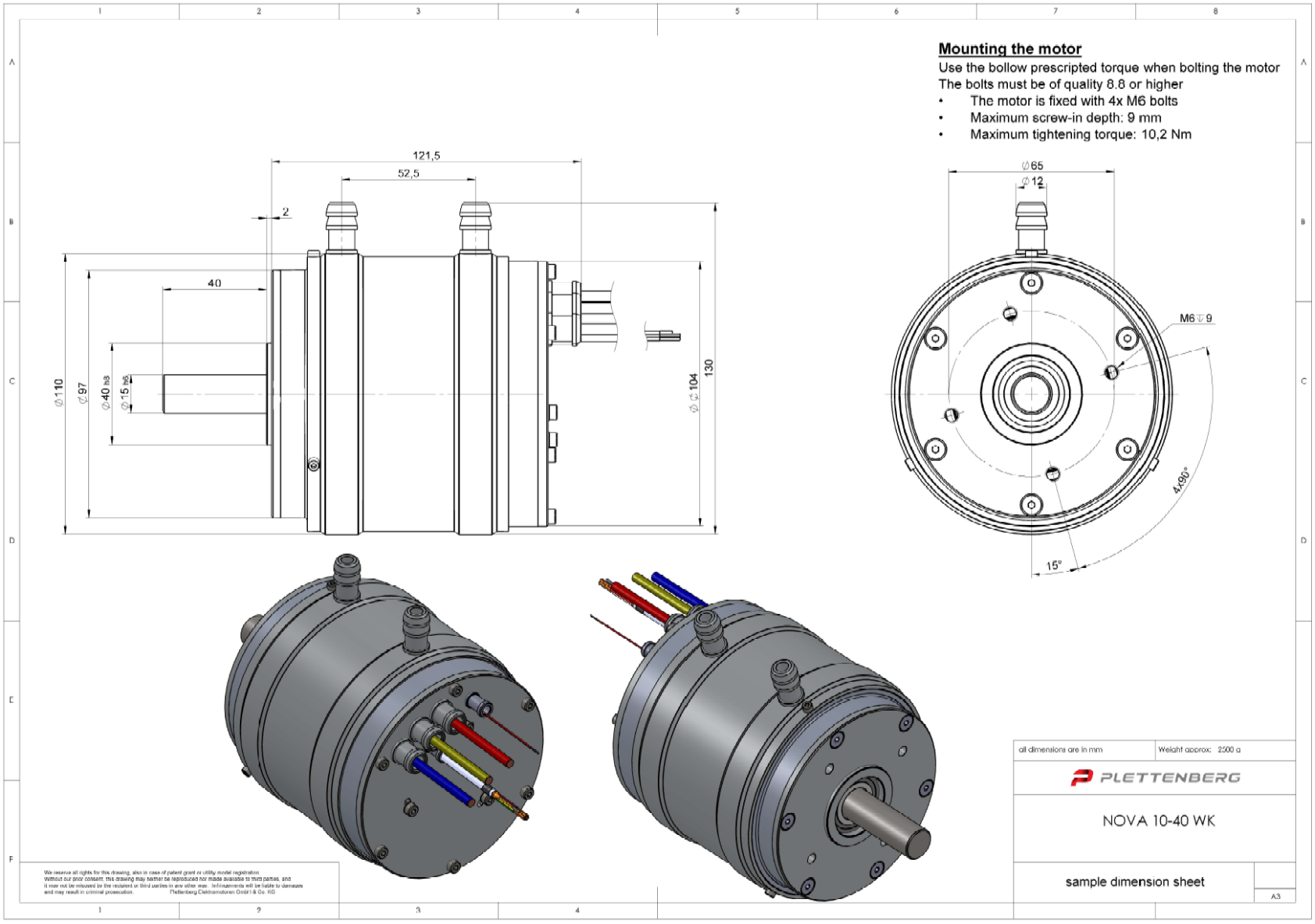
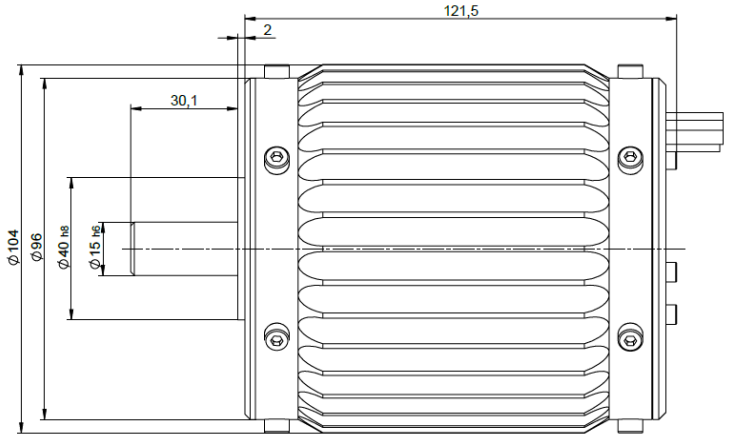
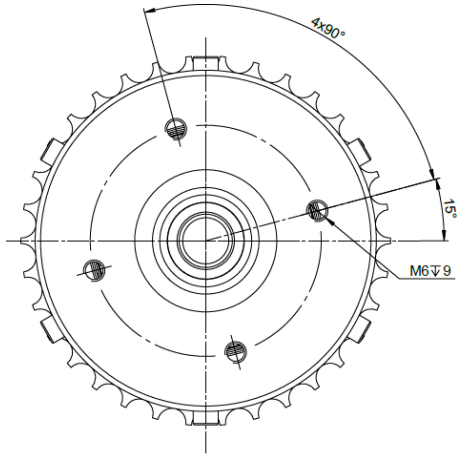

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M6 bolts
• Maximum screw-in depth: 9 mm
• Maximum tightening torque: 10,2 Nm
121,5
52,5
2
40
Ø110
Ø97
Ø40 h8
Ø15 h6
Ø104
130
Ø65
Ø12
M6 ↧ 9
4x90°
15°
all dimensions are in mm
Weight approx: 2500 g
PLETTENBERG
NOVA 10-40 WK
sample dimension sheet
A3

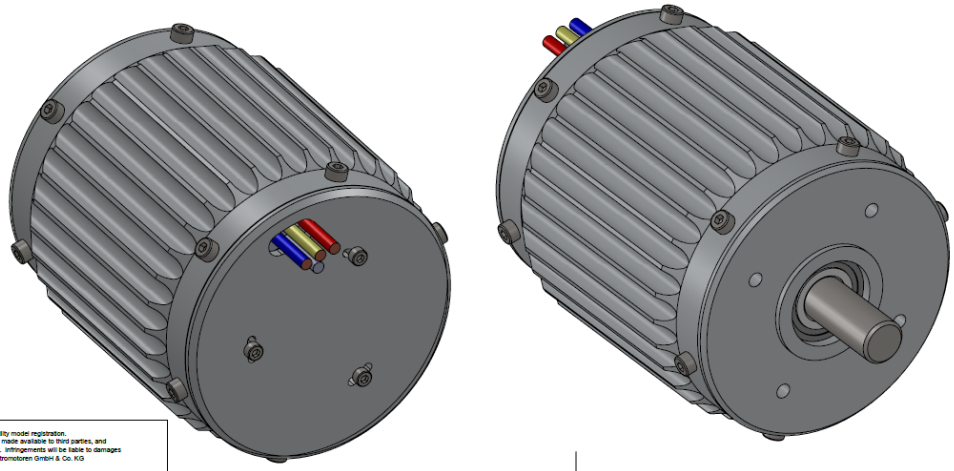
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

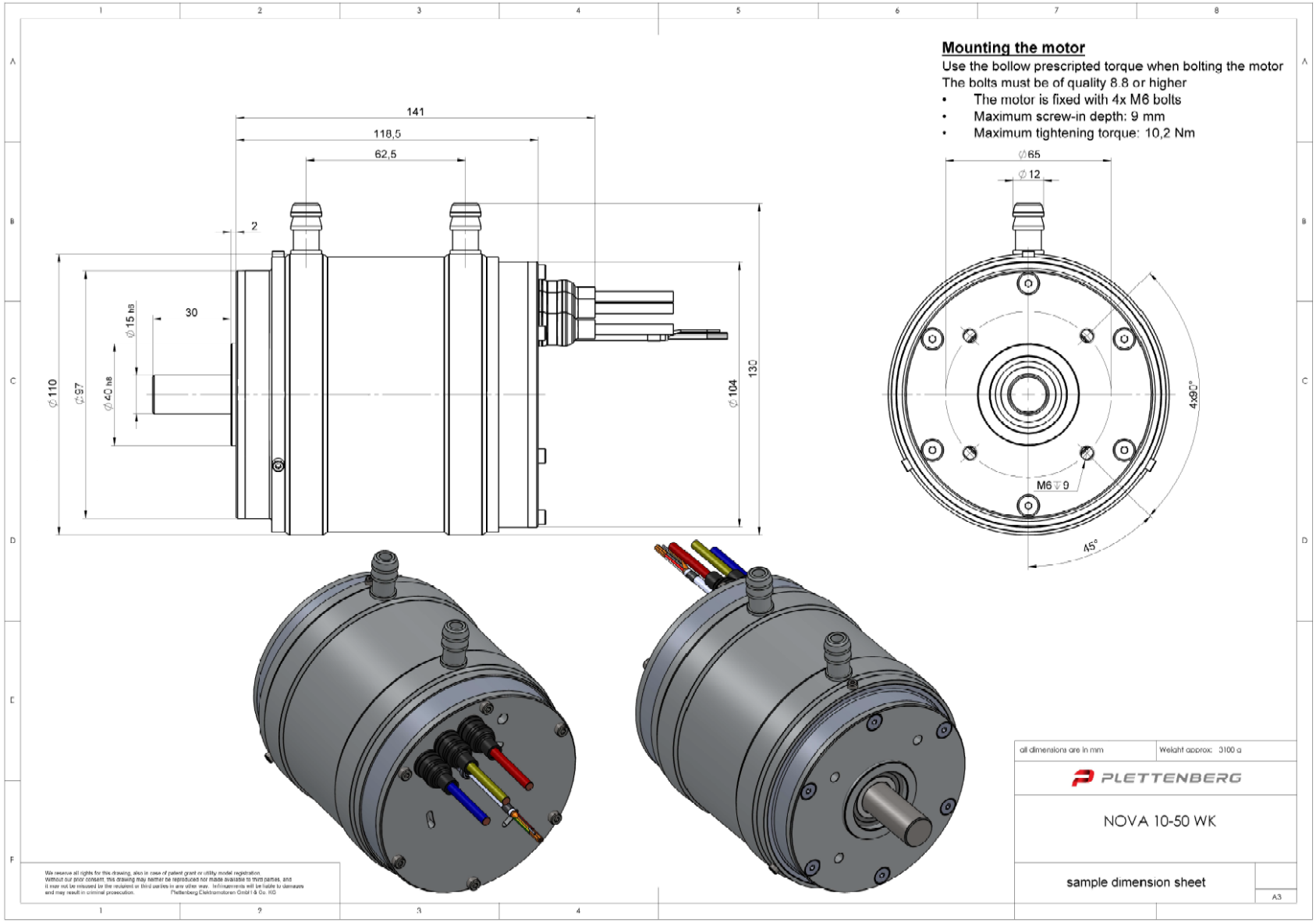
- The motor is fixed with 4x M6 bolts
- Maximum screw-in depth: 9 mm
- Maximum tightening torque: 10,2 Nm







all dimensions are in mm	Weight approx: 2800 g
PLETTENBERG	
NOVA 10-50 MKR	
sample dimension sheet	A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M6 bolts
• Maximum screw-in depth: 9 mm
• Maximum tightening torque: 10,2 Nm
141
118,5
62,5
2
30
⌀15 h8
⌀40 h8
⌀97
⌀110
⌀104
130
⌀65
⌀12
4x90°
M6↧9
45°
all dimensions are in mm
Weight approx. 3100 g
PLETTENBERG
NOVA 10-50 WK
sample dimension sheet
A3
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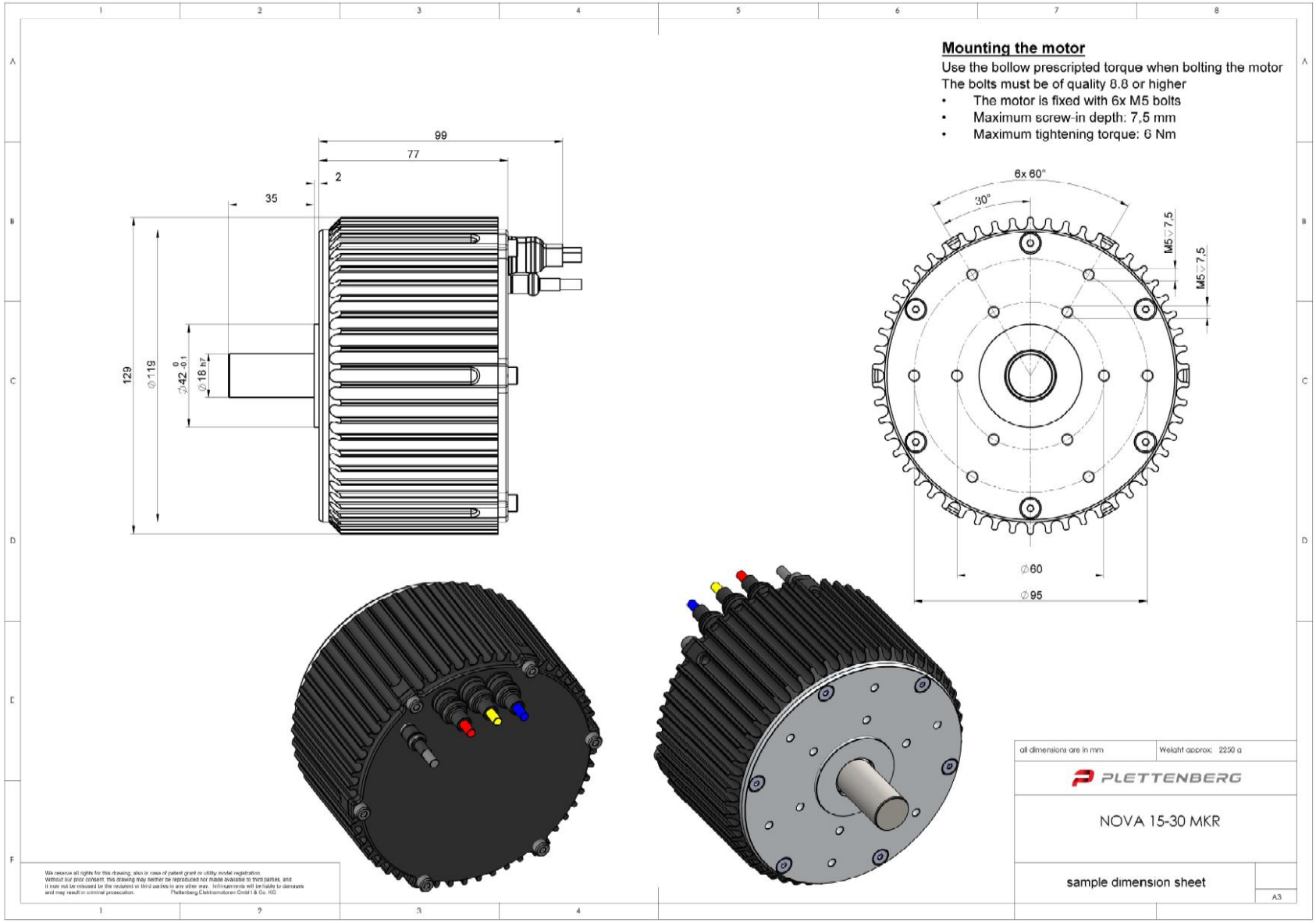
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
99
77
2
35
129
⌀119
⌀42 -0.1
⌀18 h7
6x 60°
30°
M5↧7,5
M5↧7,5
⌀60
⌀95
all dimensions are in mm
Weight approx: 2250 g
PLETTENBERG
NOVA 15-30 MKR
sample dimension sheet
A3
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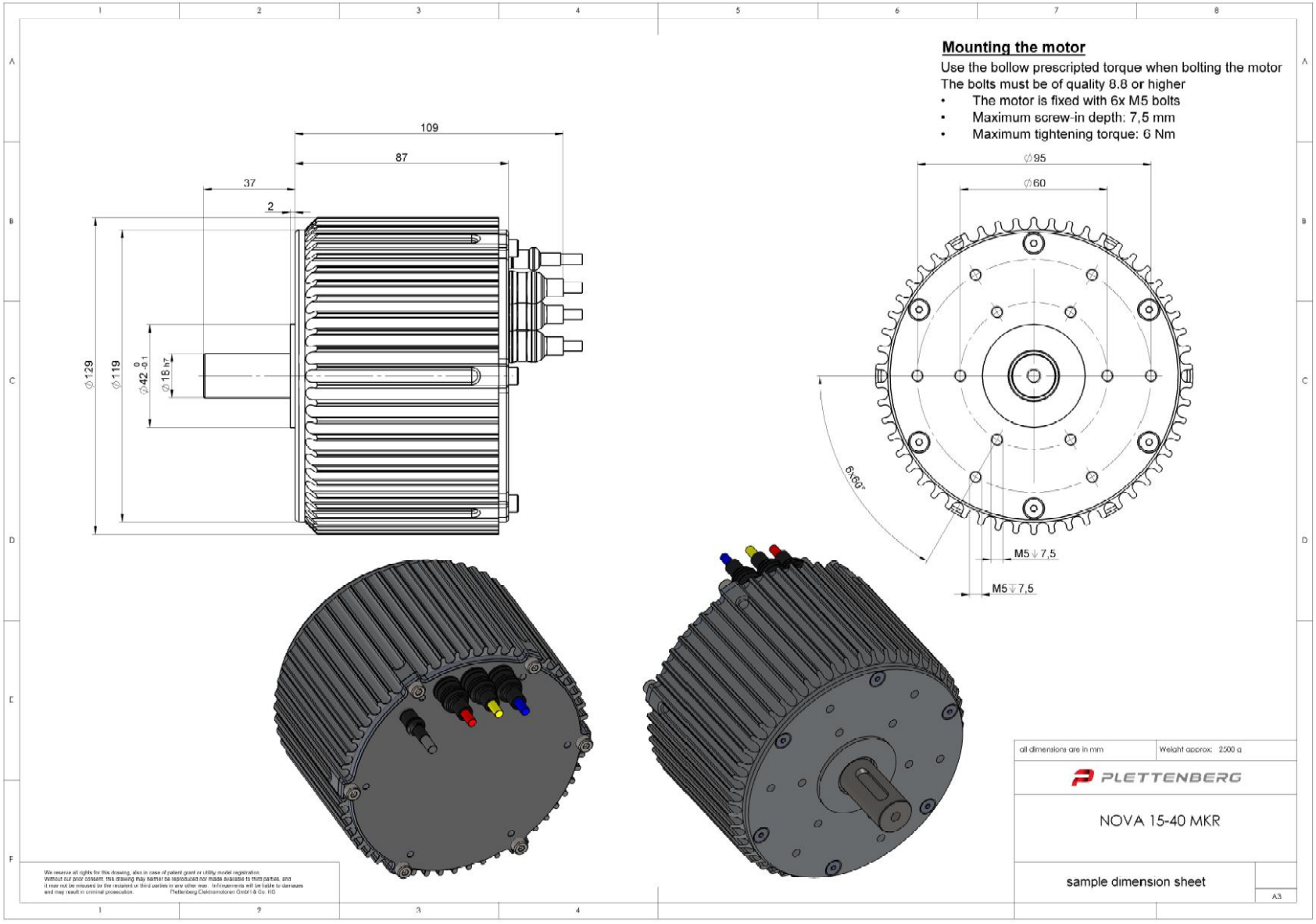
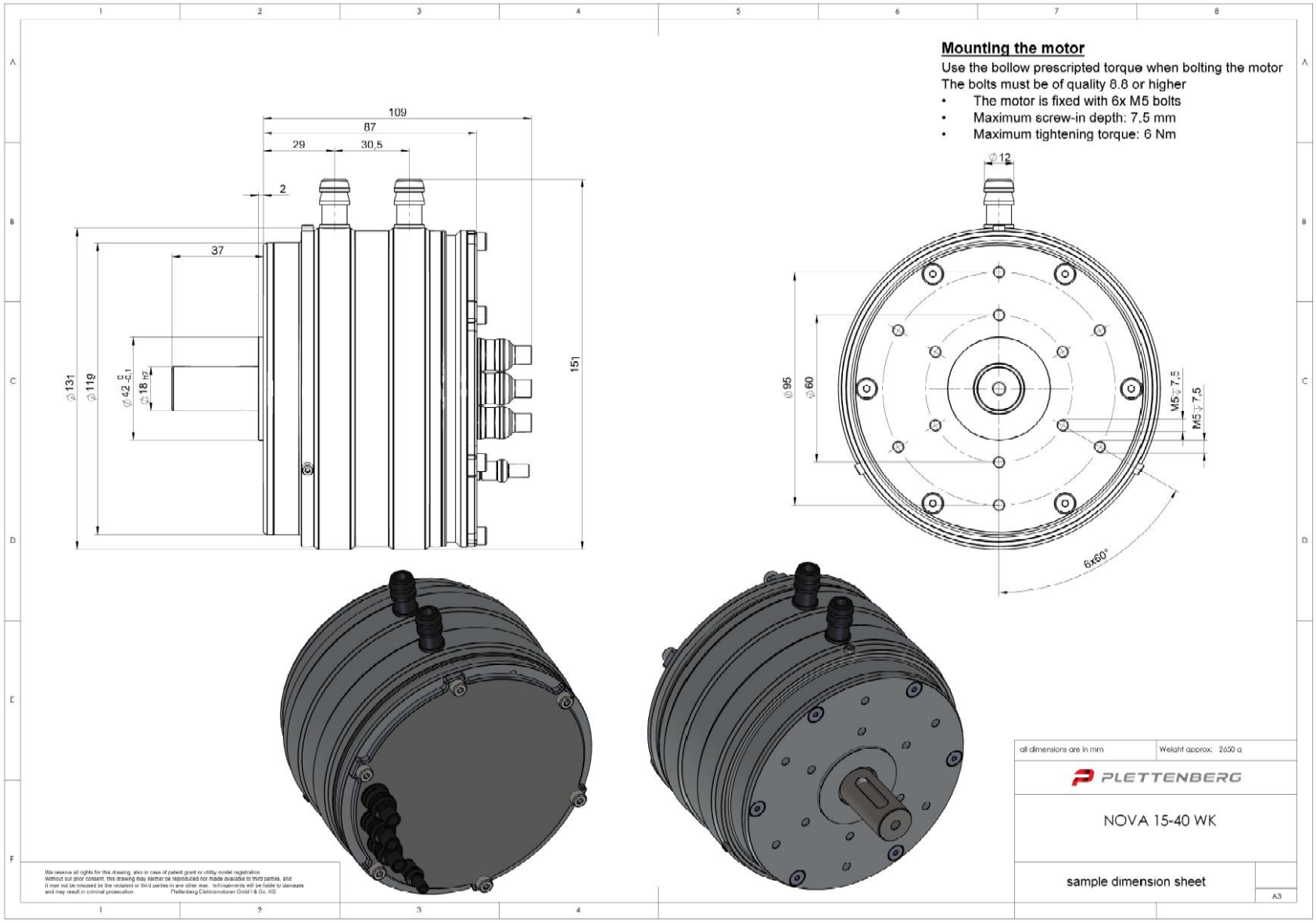
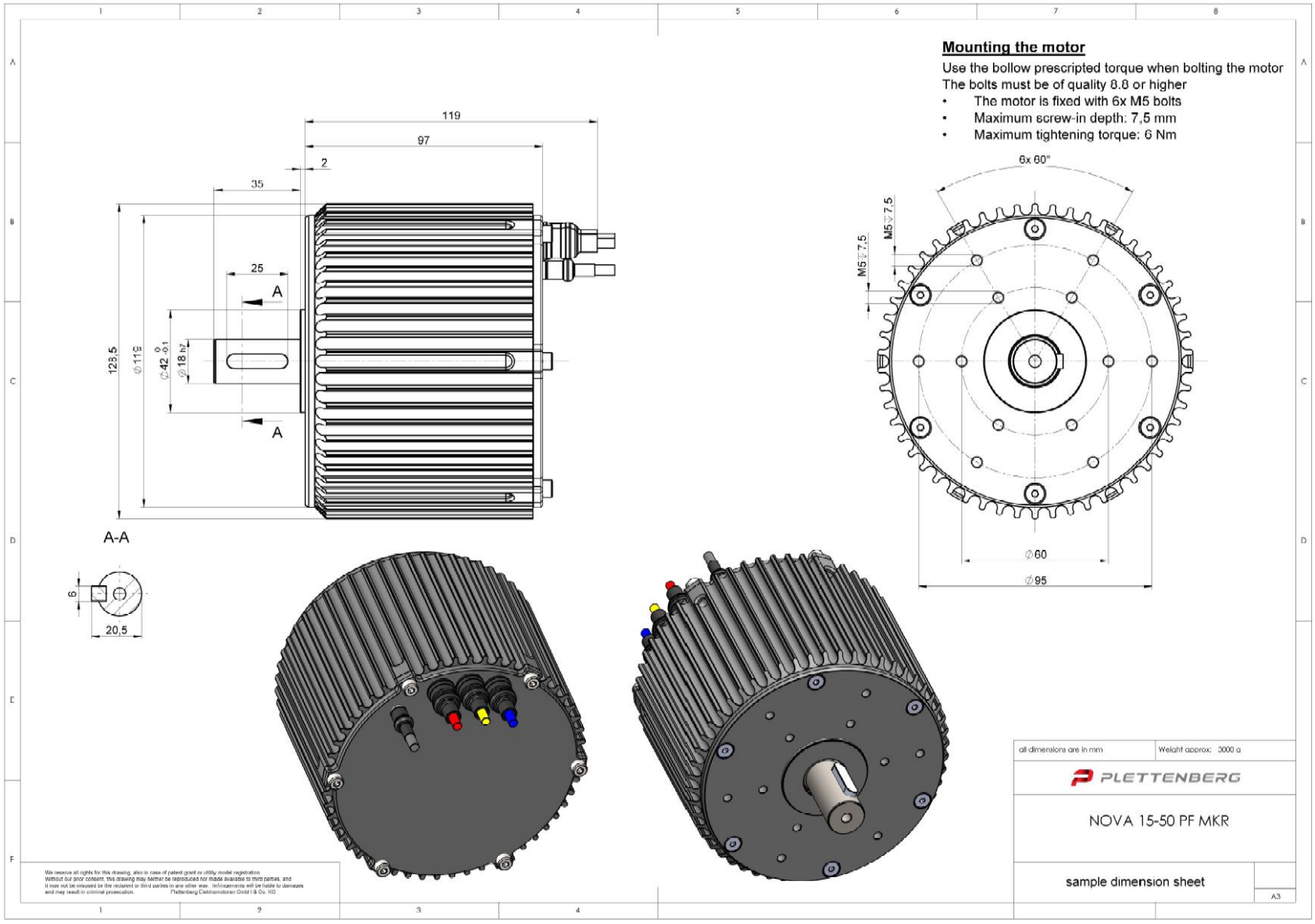
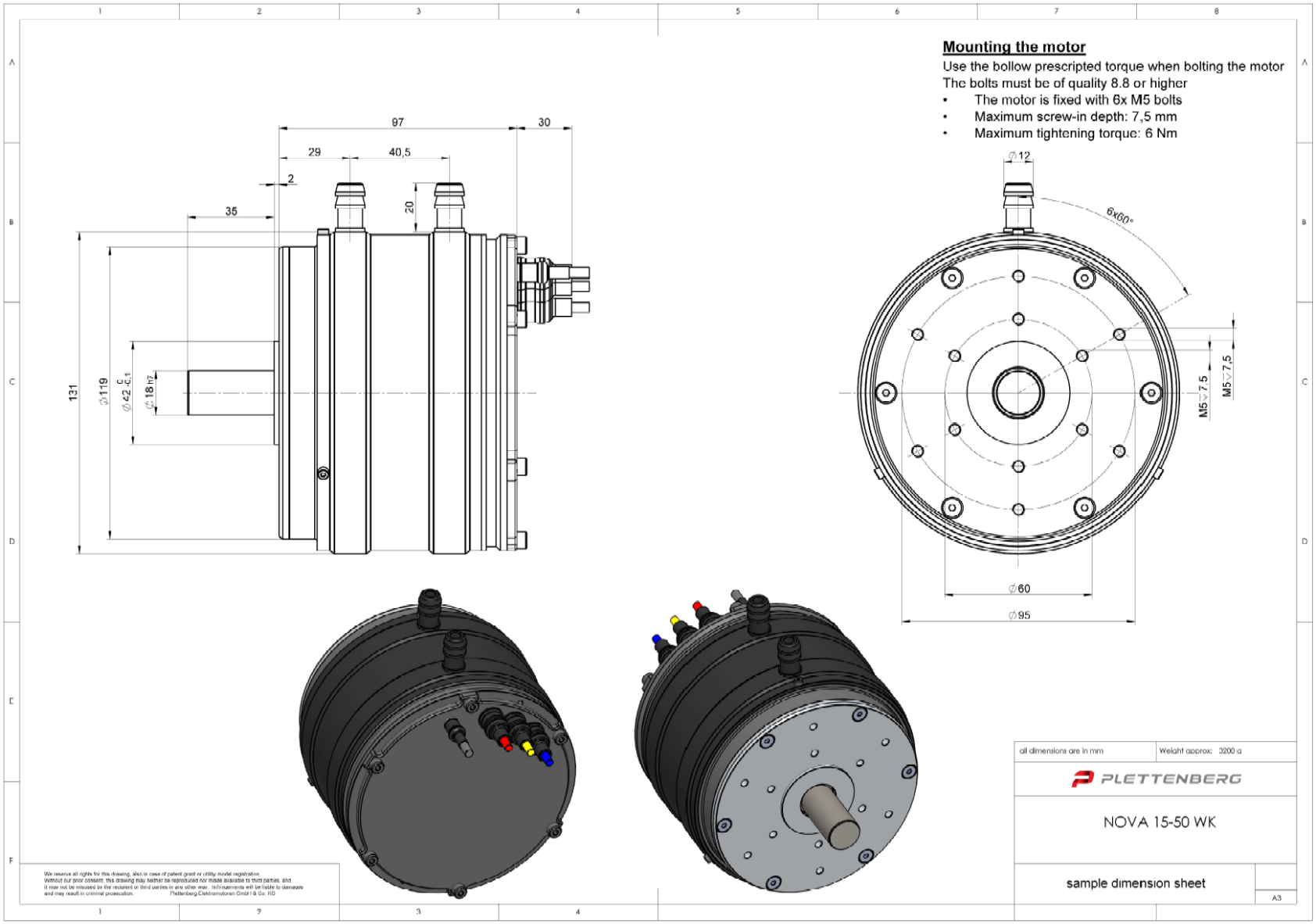

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
109
87
37
2
Ø129
Ø119
Ø42 g6
Ø16 h7
Ø95
Ø60
6x60°
M5↓7,5
M5↓7,5
all dimensions are in mm
Weight approx: 2500 g
PLETTENBERG
NOVA 15-40 MKR
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
109
87
29
30,5
2
37
151
⌀131
⌀119
⌀42
⌀18
⌀12
⌀95
⌀60
M5 ↧7,5
M5 ↧7,5
6x60°
all dimensions are in mm
Weight approx: 2650 g
PLETTENBERG
NOVA 15-40 WK
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
119
97
2
35
25
A
A
123,5
A-A
6
20,5
6x 60°
M5▽7,5
M5▽7,5
⌀60
⌀95
all dimensions are in mm
Weight approx: 3000 g
PLETTENBERG
NOVA 15-50 PF MKR
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
97
30
29
40,5
2
35
20
131
⌀119
⌀42 c,1
⌀18 h7
⌀12
6x60°
M5 ▽7,5
M5 ▽7,5
⌀60
⌀95
all dimensions are in mm
Weight approx: 3200 g
PLETTENBERG
NOVA 15-50 WK
sample dimension sheet
A3
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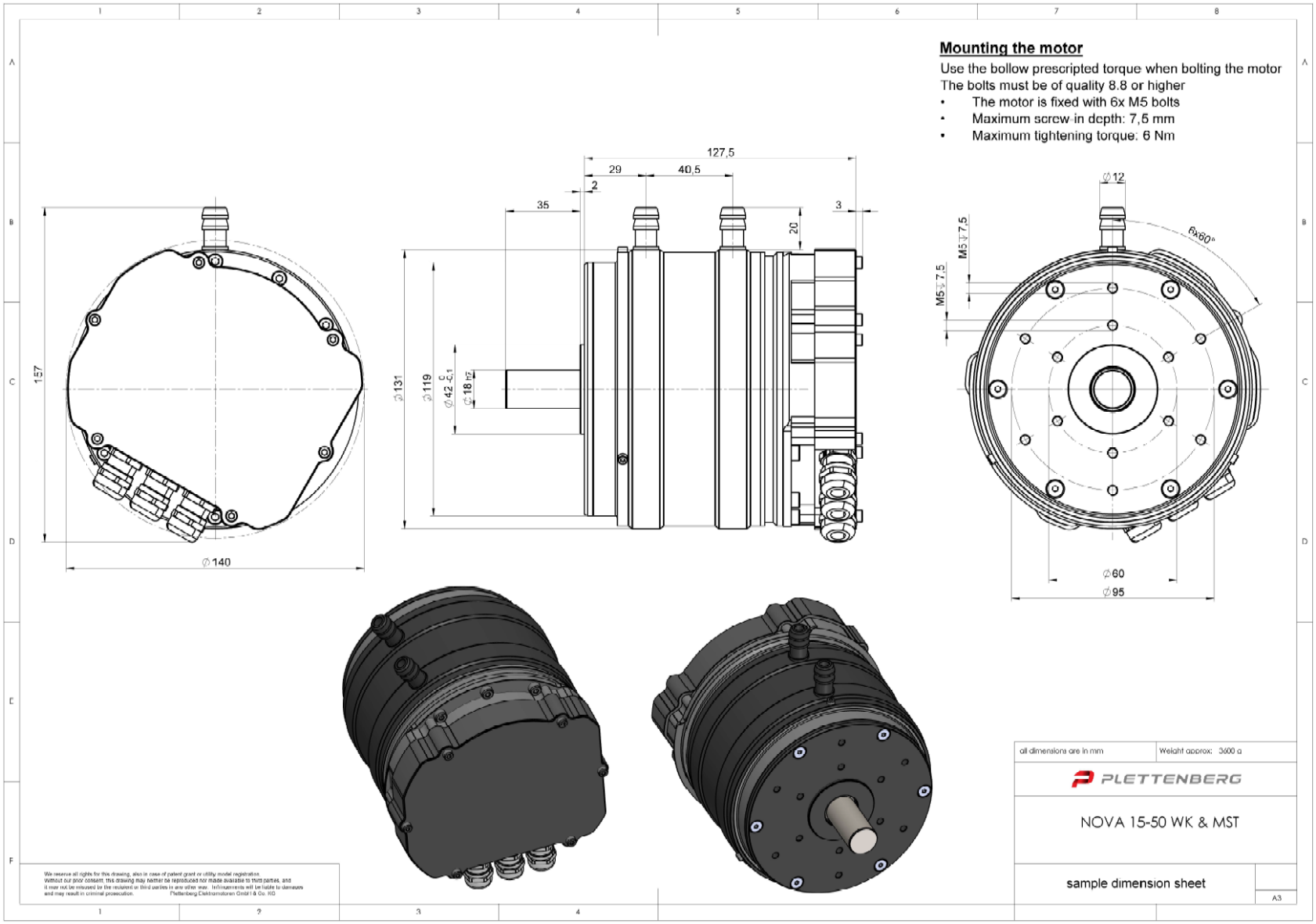
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M5 bolts
• Maximum screw-in depth: 7,5 mm
• Maximum tightening torque: 6 Nm
127,5
29
40,5
2
35
3
20
157
⌀131
⌀119
⌀42 e,1
⌀18 h7
⌀140
⌀12
6x60°
M5↧7,5
M5↧7,5
⌀60
⌀95
all dimensions are in mm
Weight approx: 3600 g
PLETTENBERG
NOVA 15-50 WK & MST
sample dimension sheet
A3
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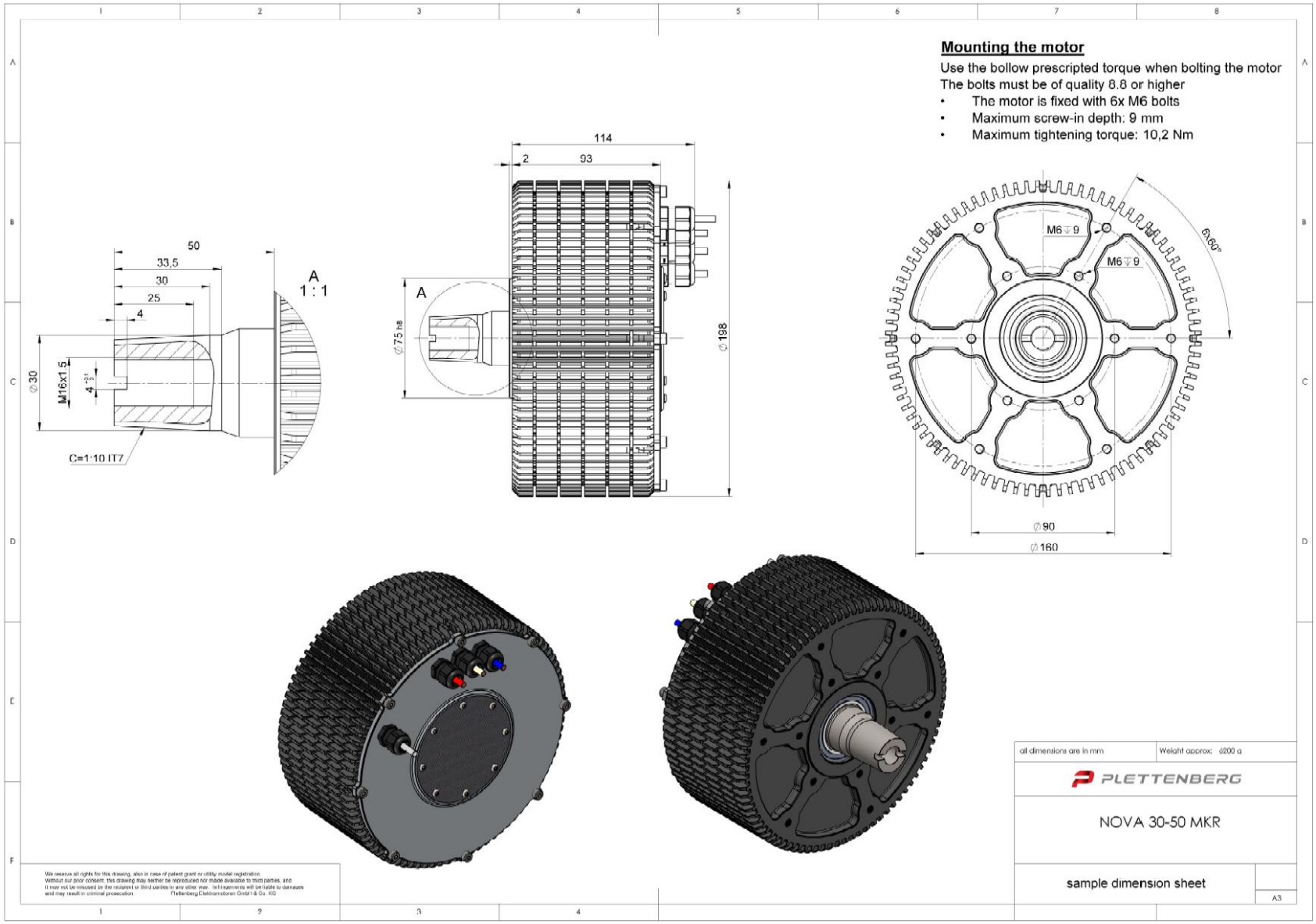
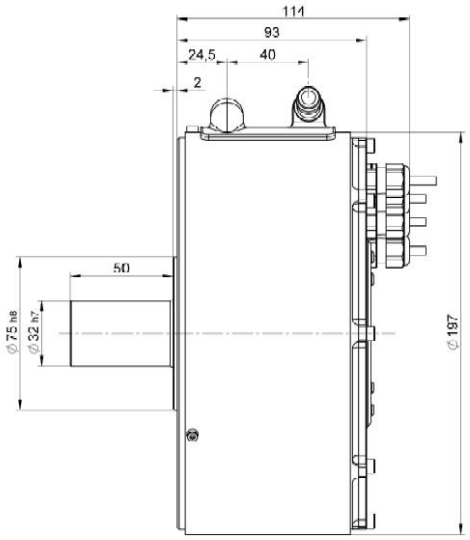
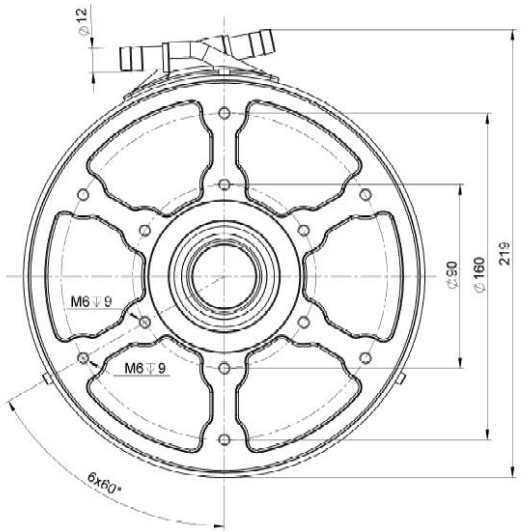

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M6 bolts
• Maximum screw-in depth: 9 mm
• Maximum tightening torque: 10,2 Nm
50
33,5
30
25
4
A
1 : 1
M16x1.5
C=1:10 IT7
114
2
93
198
M6↧9
M6↧9
6x60°
90
160
all dimensions are in mm
Weight approx: 6200 g
PLETTENBERG
NOVA 30-50 MKR
sample dimension sheet
A3

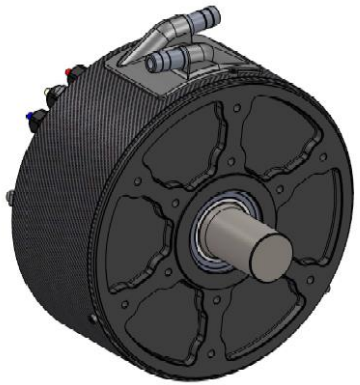
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 6x M6 bolts
- Maximum screw-in depth: 9 mm
- Maximum tightening torque: 10,2 Nm







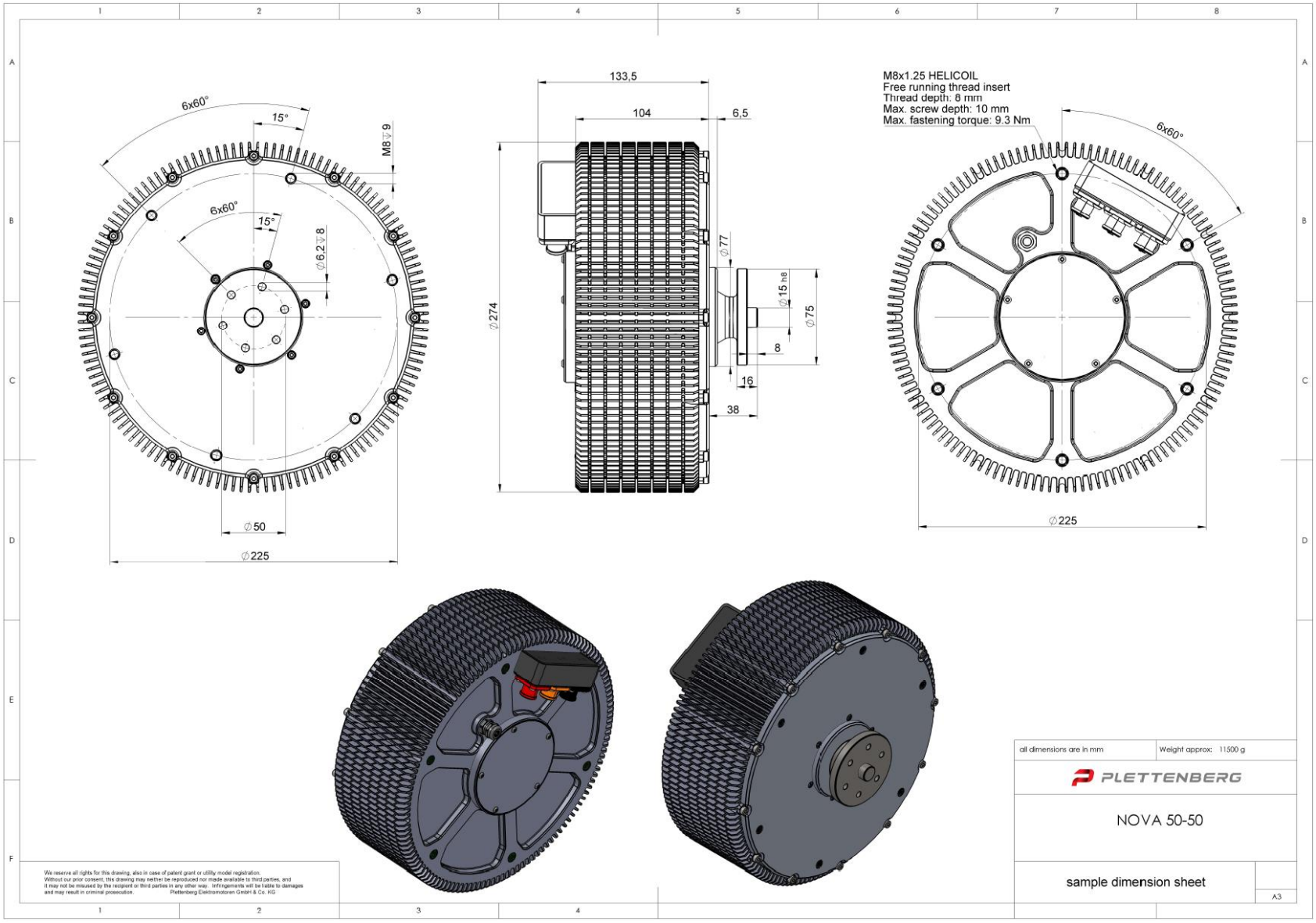
all dimensions are in mm	Weight approx: 5000 g

PLETTENBERG

NOVA 30-50 WK

sample dimension sheet

A3


6x60°
15°
M8↧9
6x60°
15°
⌀6.2↧8
⌀50
⌀225
133,5
104
6,5
⌀274
⌀77
⌀15 h8
⌀75
8
16
38
M8x1.25 HELICOIL
Free running thread insert
Thread depth: 8 mm
Max. screw depth: 10 mm
Max. fastening torque: 9.3 Nm
6x60°
⌀225
all dimensions are in mm
Weight approx: 11500 g
PLETTENBERG
NOVA 50-50
sample dimension sheet
A3
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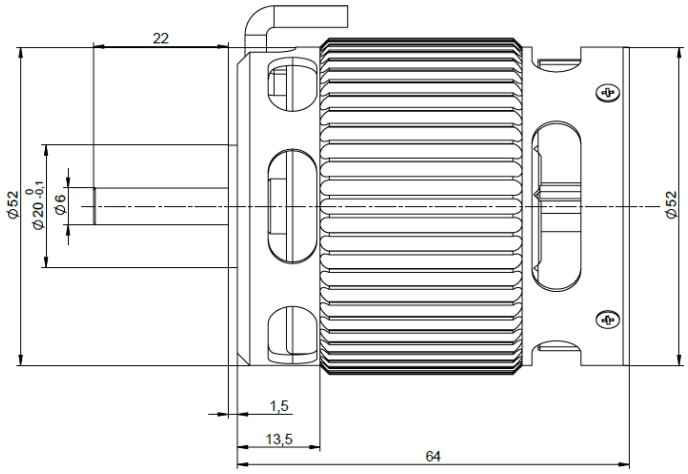
ADVANCE Series

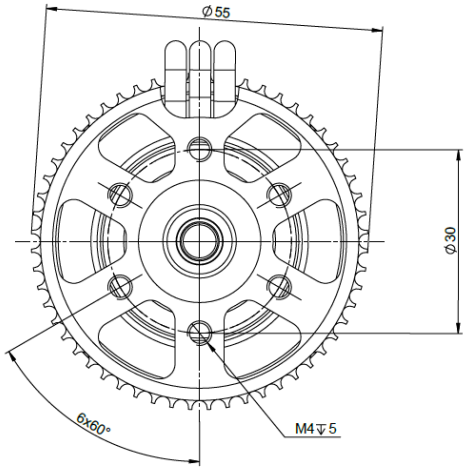
The ADVANCE series of inrunners feature a weight-optimized open housing design. This allows for best-in-class power-to-weight ratios and makes the motors very suitable for applications with constraints in space, weight and power supply. The ADVANCE series is available in the power range from 1kW to 5kW.

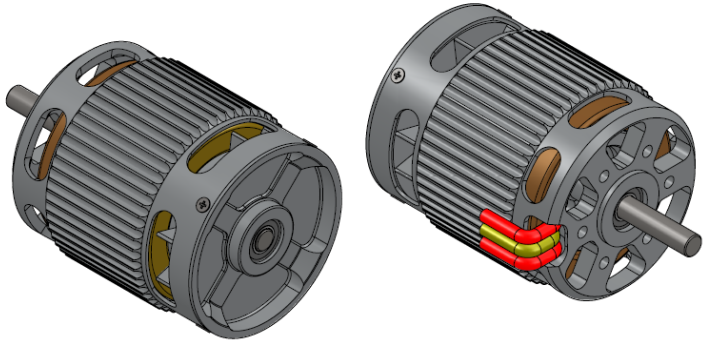
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 6x M4 bolts
- Maximum screw-in depth: 5 mm
- Maximum tightening torque: 3 Nm





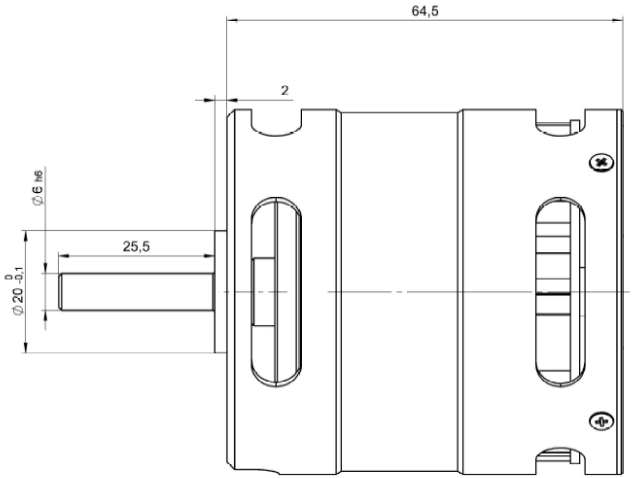


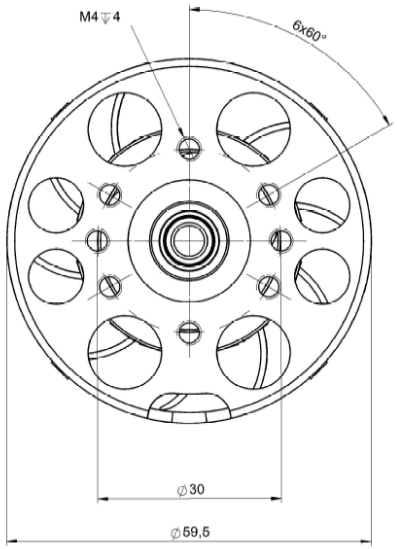
all dimensions are in mm	Weight approx: 420 g
PLETTENBERG	
ADVANCE 1-30	
sample dimension sheet	A3

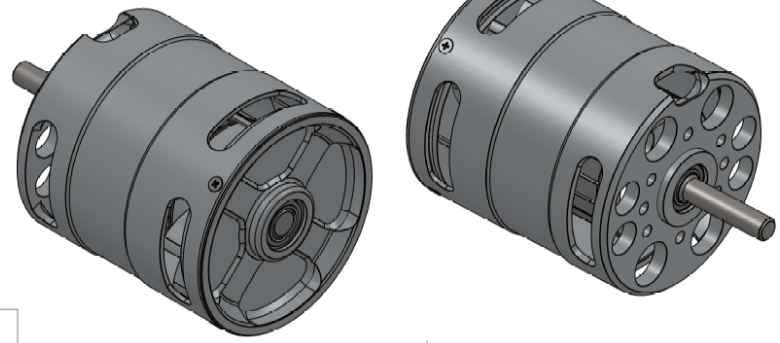
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 4x M4 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 3 Nm





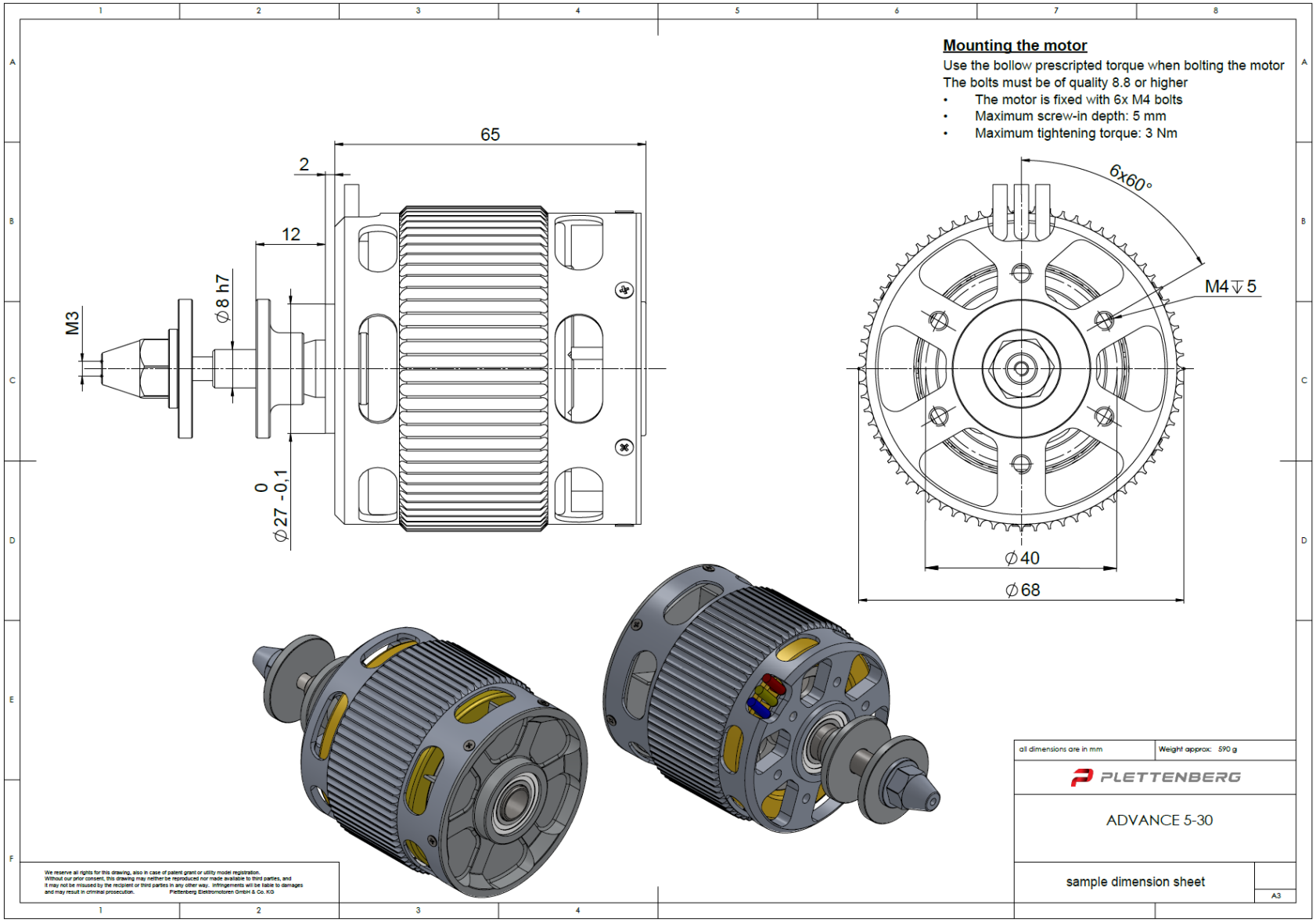


all dimensions are in mm | Weight approx. 480 g

PLETTENBERG

ADVANCE 3-30

sample dimension sheet | A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 5 mm
• Maximum tightening torque: 3 Nm
65
2
12
M3
⌀8 h7
0
⌀27 -0,1
6x60°
M4↧5
⌀40
⌀68
all dimensions are in mm
Weight approx: 590 g
PLETTENBERG
ADVANCE 5-30
sample dimension sheet
A3
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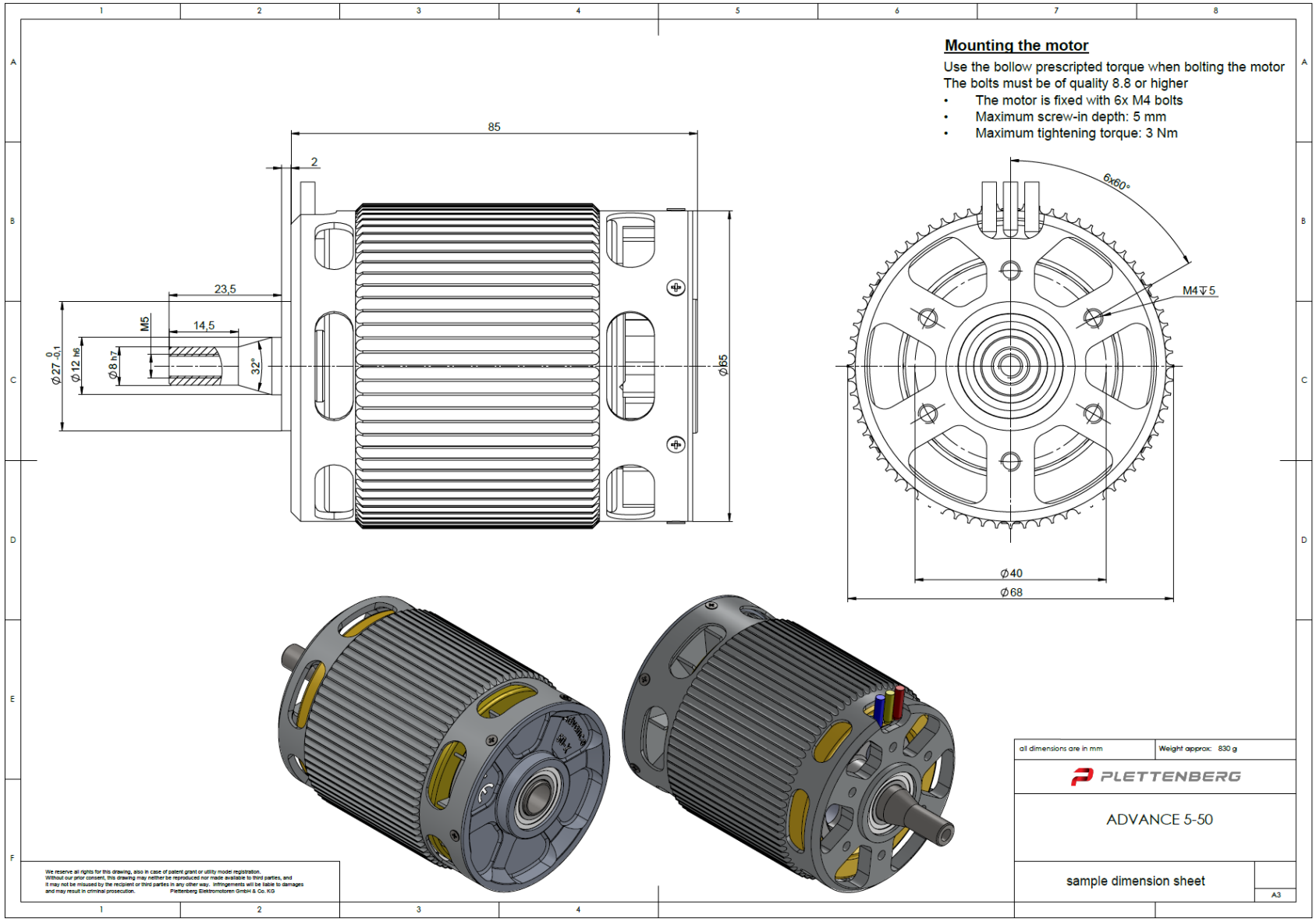
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 6x M4 bolts
• Maximum screw-in depth: 5 mm
• Maximum tightening torque: 3 Nm
85
2
23,5
14,5
M5
32°
Ø65
6x60°
M4↧5
Ø40
Ø68
all dimensions are in mm
Weight approx: 830 g
PLETTENBERG
ADVANCE 5-50
sample dimension sheet
A3
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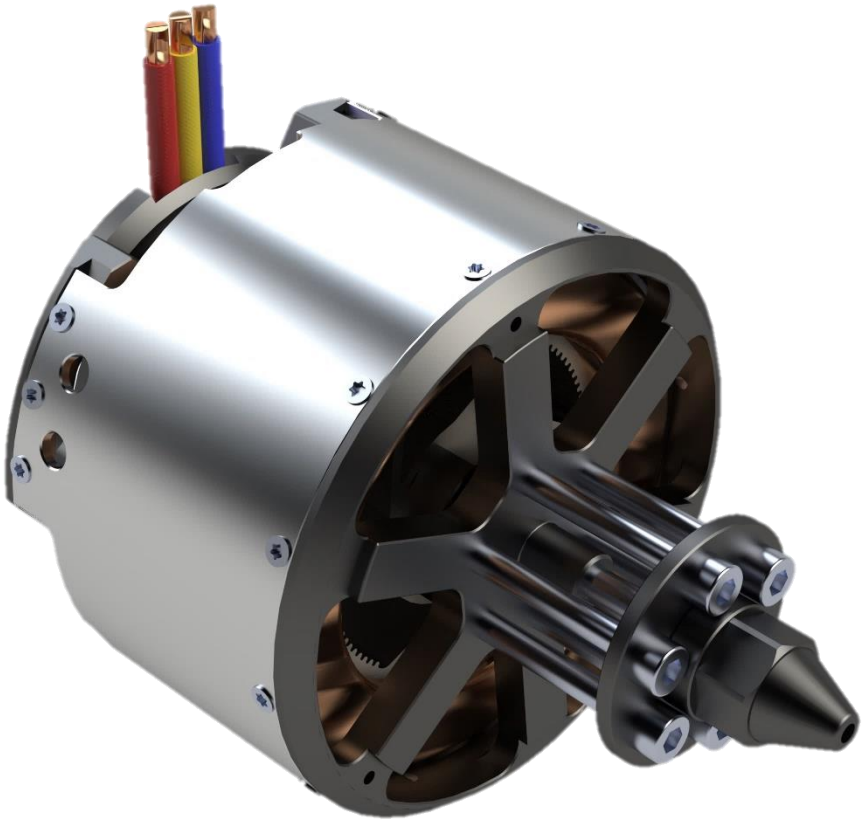
ORBIT Series

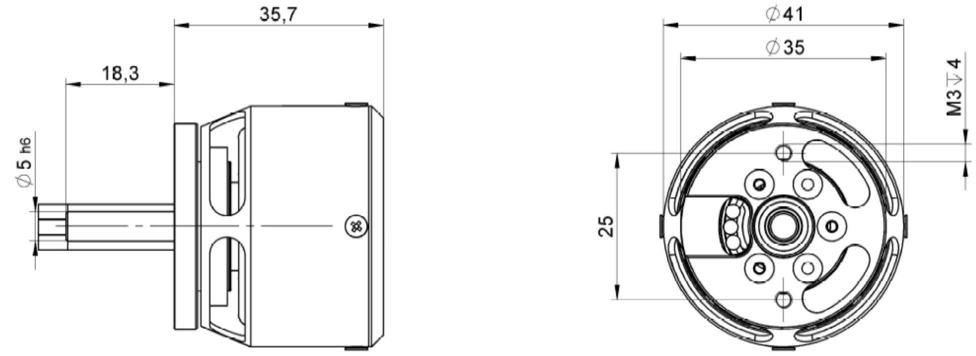
The ORBIT series of outrunners have been developed for applications with constraints in space, weight and power supply. Compared to other outrunners in the market, the ORBIT series is built much more robust and features a reinforced rotor casing. The ORBIT Series is available in the power range from below 1kW to 15kW.

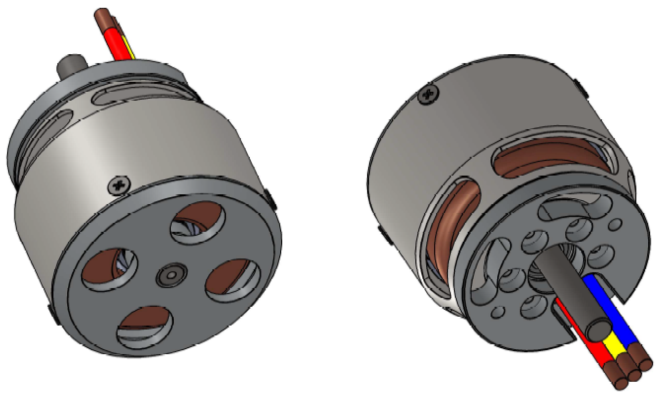


Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm



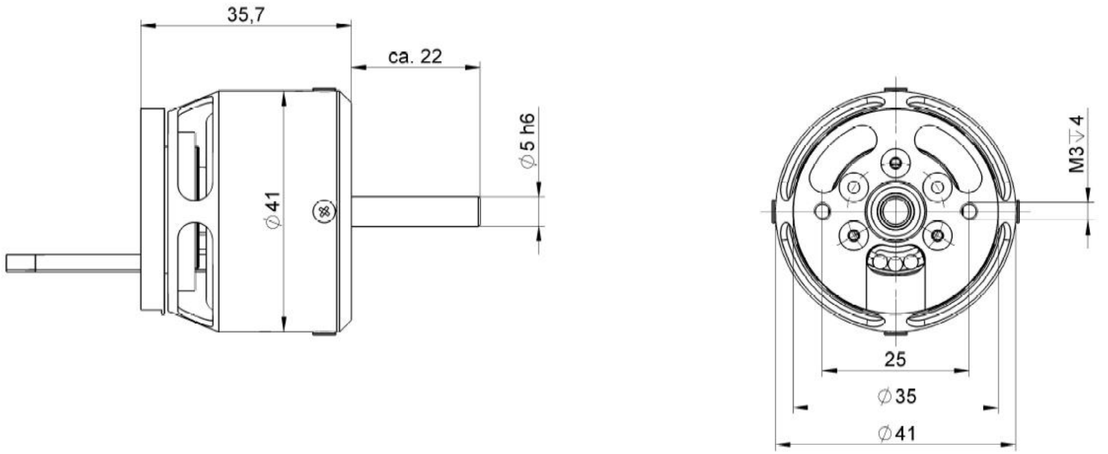


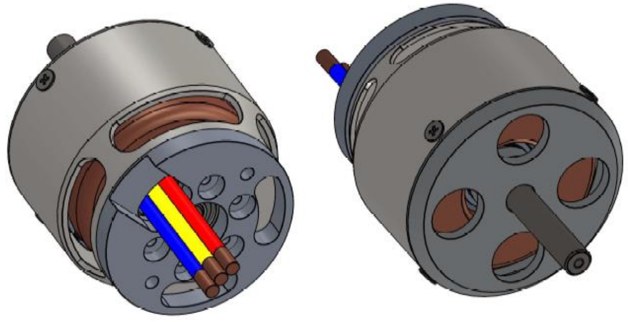
all dimensions are in mm	Weight approx: 135 g
PLETTENBERG	
ORBIT 1-10	
sample dimension sheet	Sheet A4

Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm



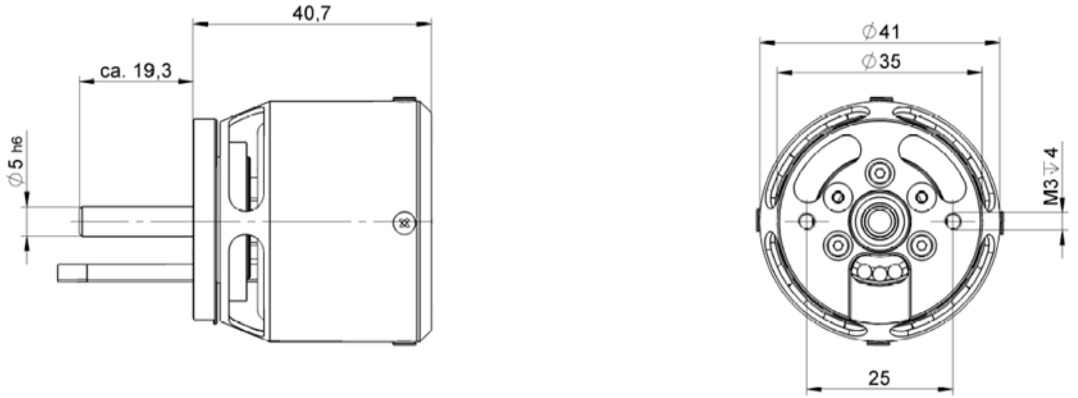


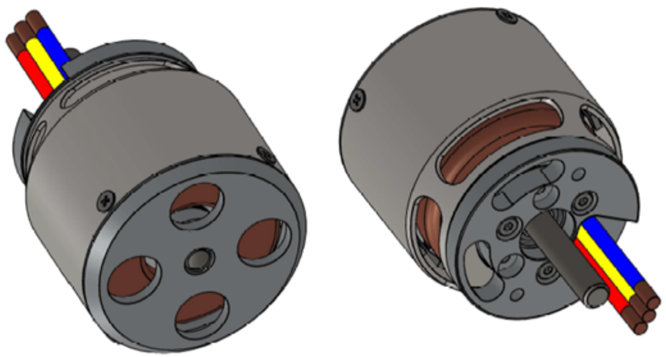
all dimensions are in mm	Weight approx: 135 g
PLETTENBERG	
ORBIT 1-10 with shaft on back	
sample dimension sheet	Sheet A4

Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm



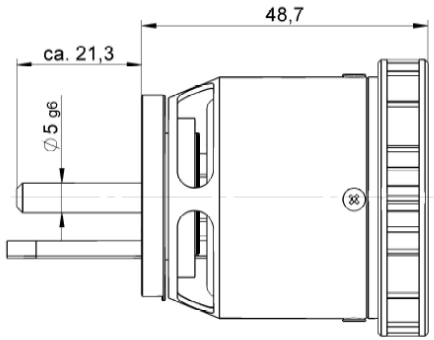


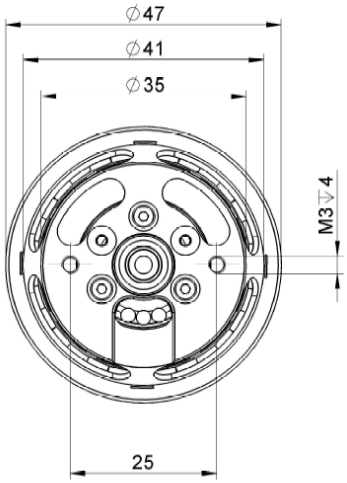
all dimensions are in mm	Weight approx: 170 g
PLETTENBERG	
ORBIT 1-15	
sample dimension sheet	Sheet A4

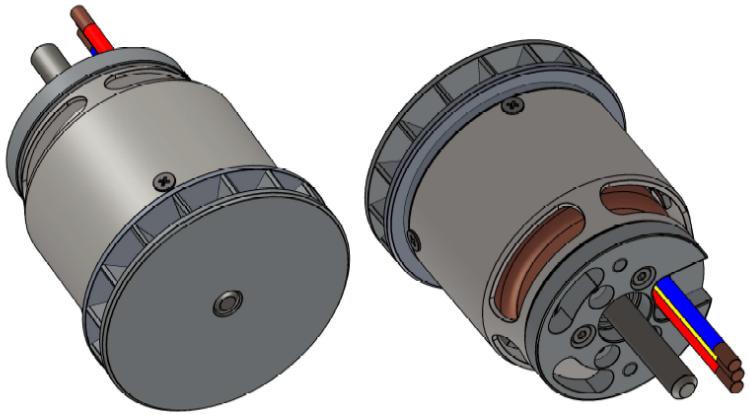
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm





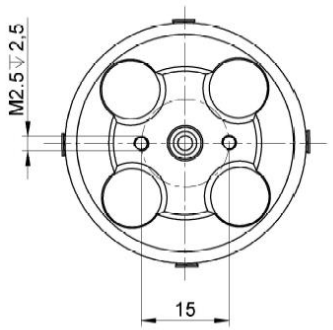


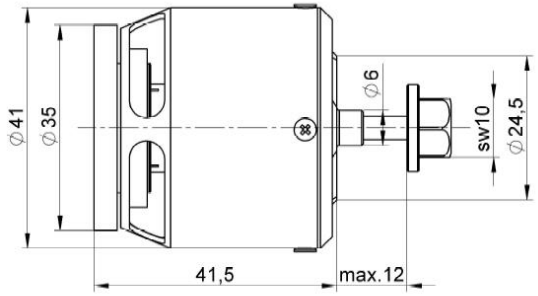
all dimensions are in mm	Weight approx: 180 g
PLETTENBERG	
ORBIT 1-15 with fan	
sample dimension sheet	Sheet A4

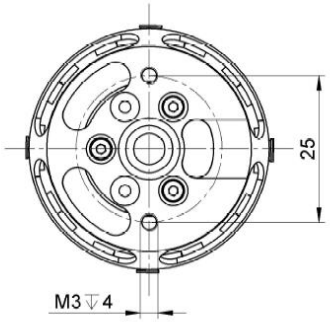
Mounting the motor

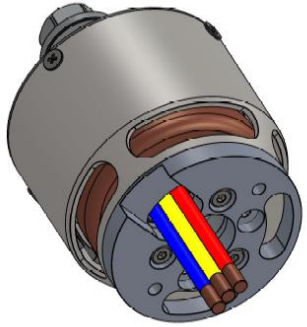
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

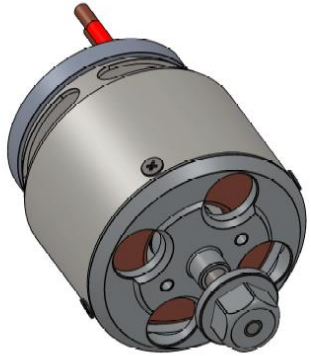
- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm









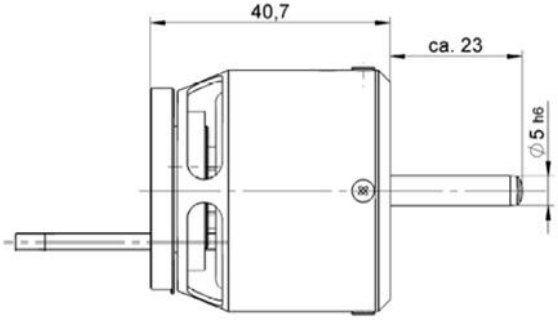


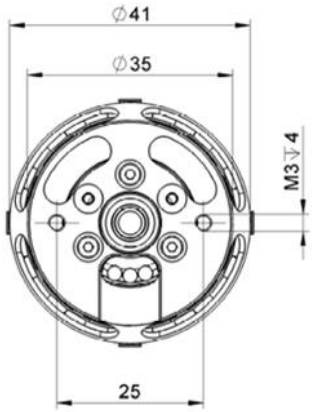
all dimensions are in mm	Weight approx: 170 g
PLETTENBERG	
ORBIT 1-15 for multicopter	
sample dimesion sheet	Sheet A4

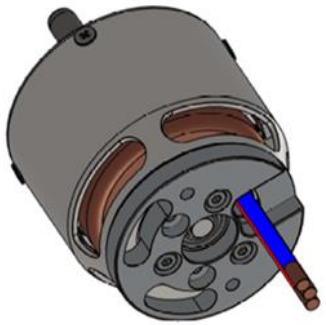
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm





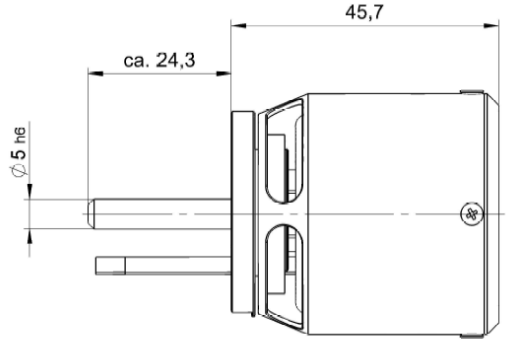


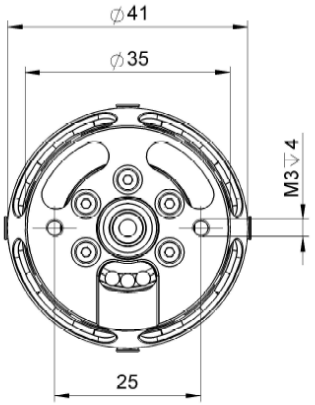
all dimensions are in mm	Weight approx: 170 g
PLETTENBERG	
ORBIT 1-15 with shaft on back	
sample dimension sheet	Sheet A4

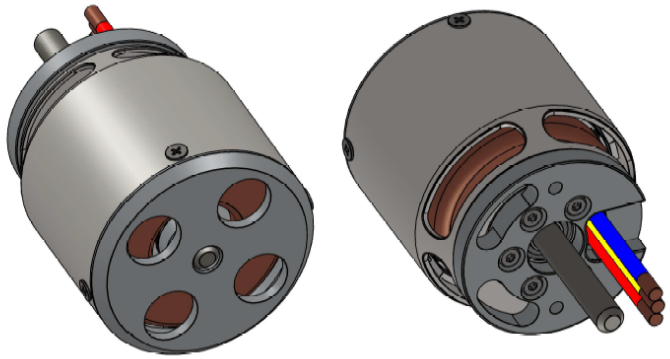
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

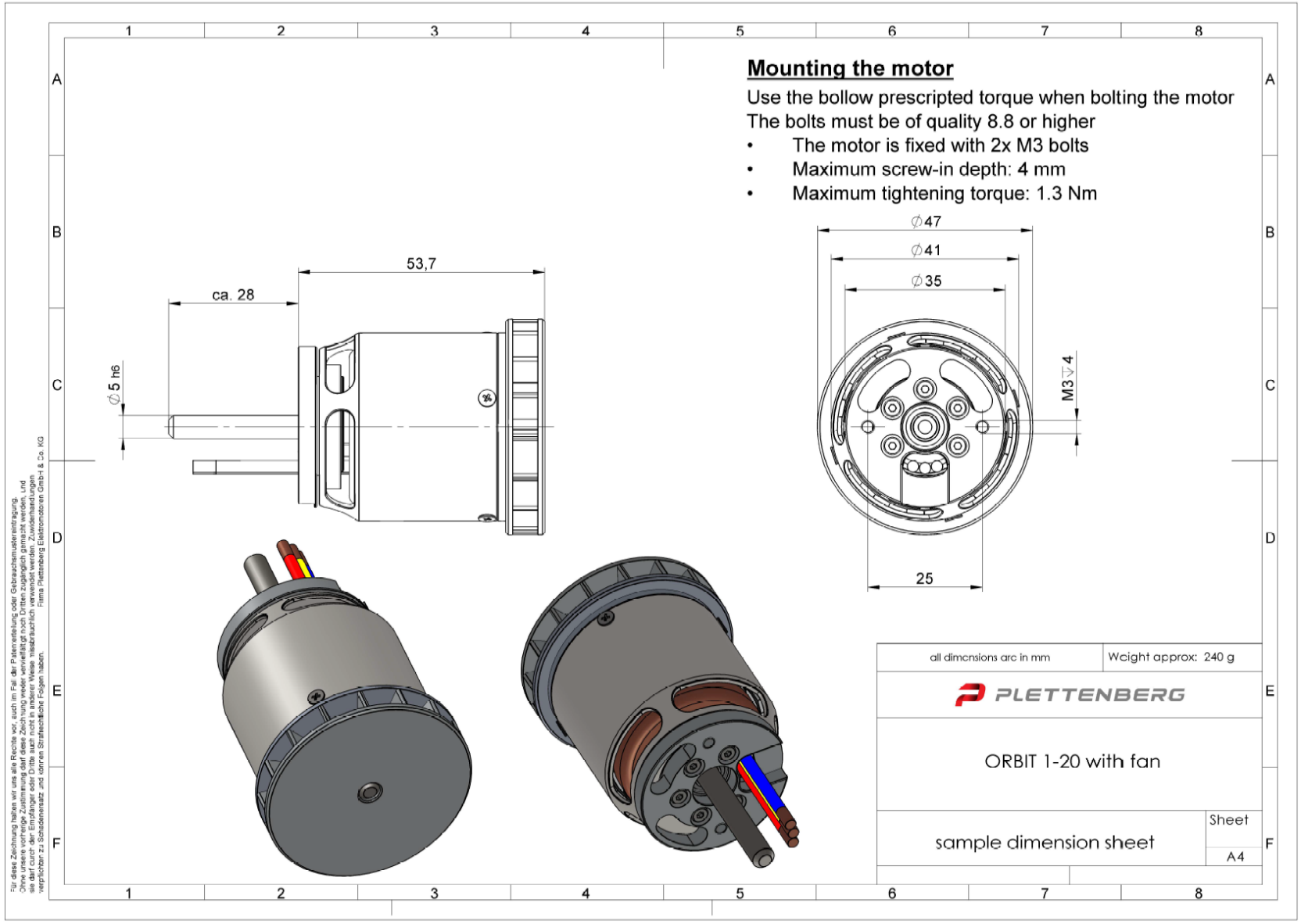
- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm







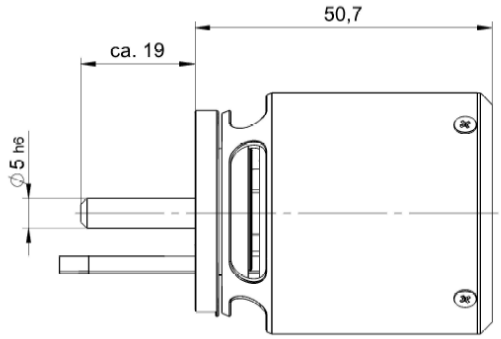
all dimensions are in mm	Weight approx: 230 g
PLETTENBERG	
ORBIT 1-20	
sample dimension sheet	Sheet A4

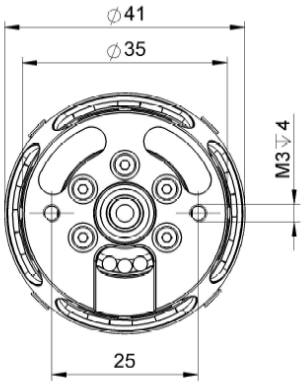

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 2x M3 bolts
• Maximum screw-in depth: 4 mm
• Maximum tightening torque: 1.3 Nm
53,7
ca. 28
∅5 h6
∅47
∅41
∅35
M3▽4
25
all dimensions are in mm
Weight approx: 240 g
PLETTENBERG
ORBIT 1-20 with fan
sample dimension sheet
Sheet
A4

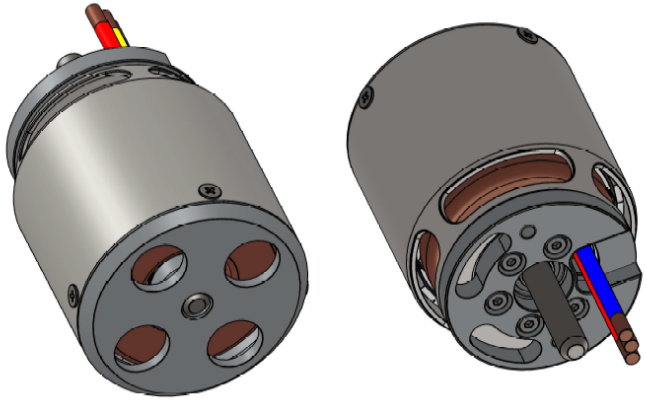
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm





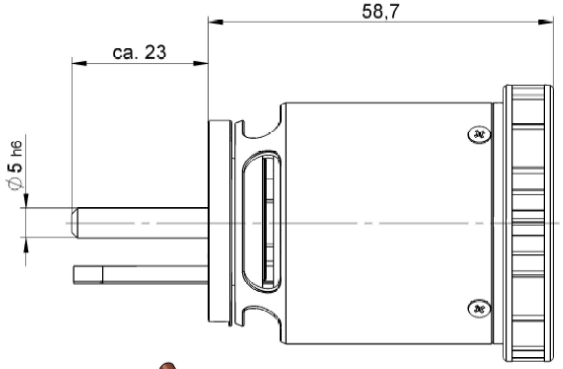


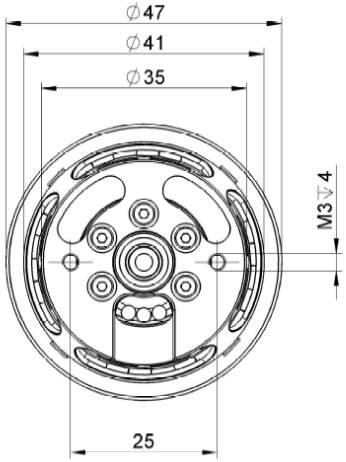
all dimensions are in mm	Weight approx: 255 g
PLETTENBERG	
ORBIT 1-25	
sample dimension sheet	Sheet A4

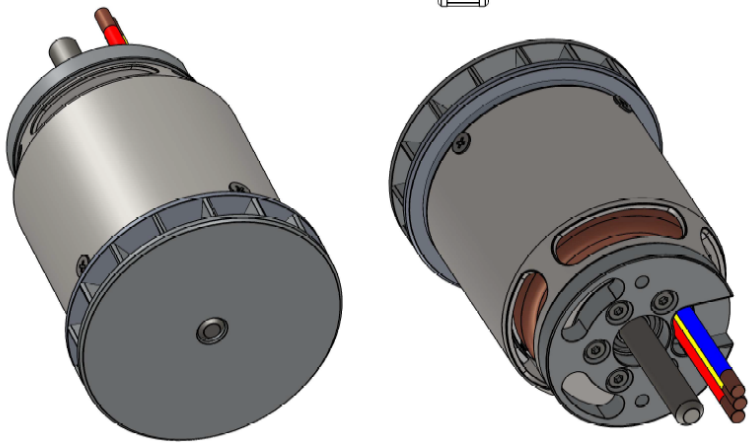
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm





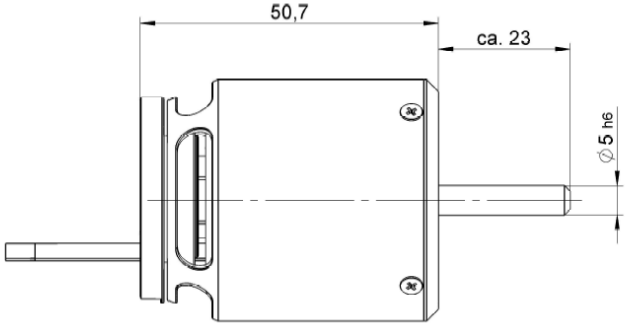


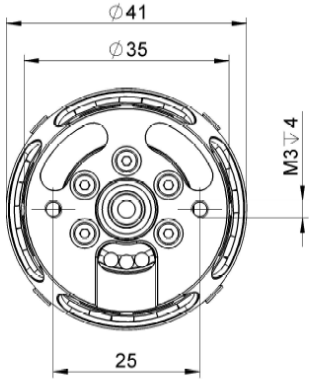
all dimensions are in mm	Weight approx: 260 g
PLETTENBERG	
ORBIT 1-25 with fan	
sample dimension sheet	Sheet A4

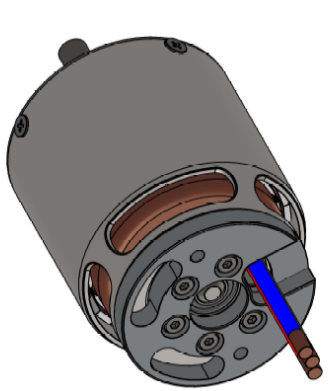
Mounting the motor

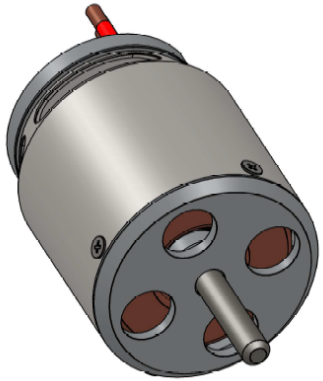
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm







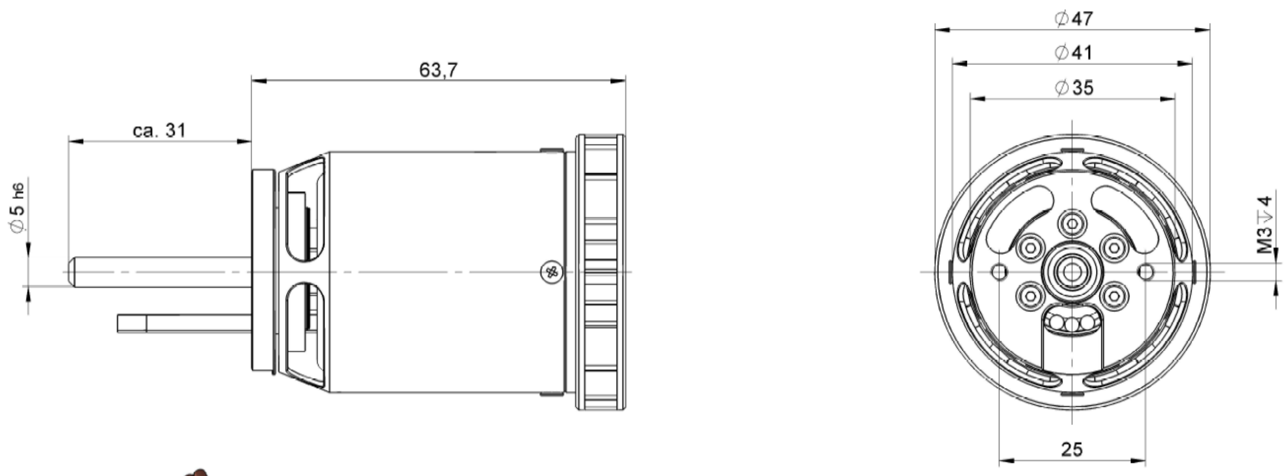


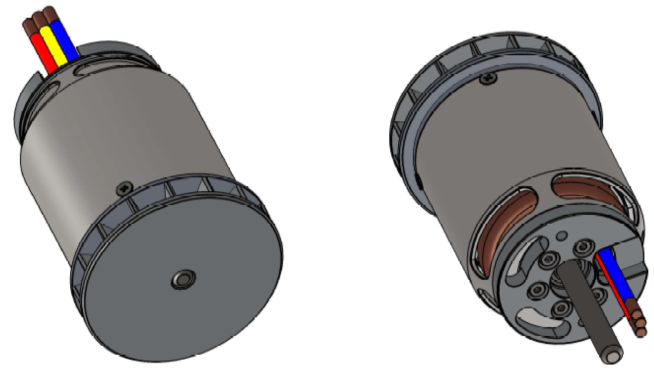
all dimensions are in mm	Weight approx: 255 g
PLETTENBERG	
ORBIT 1-25 with shaft on back	
sample dimension sheet	Sheet A4

Mounting the motor

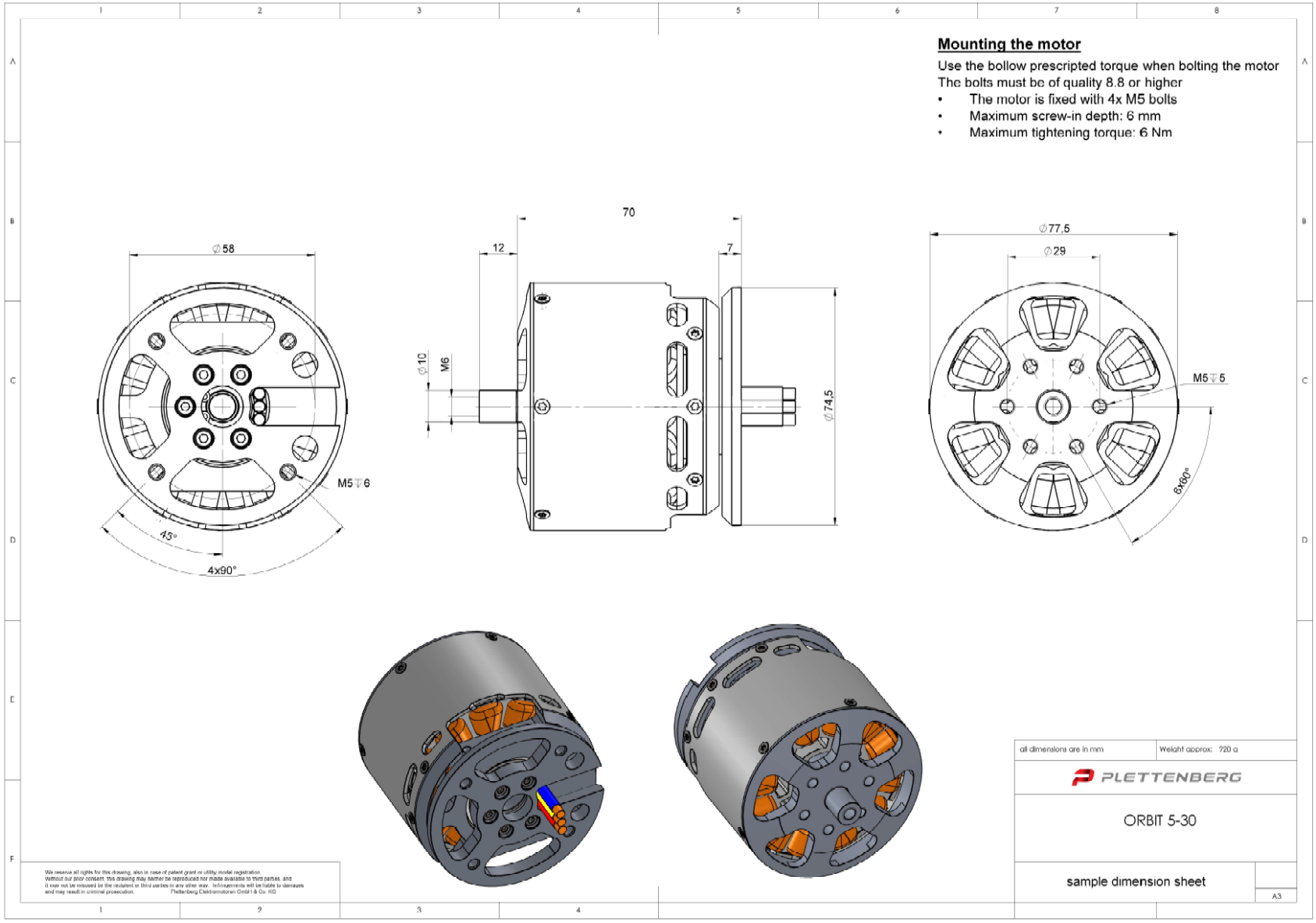
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

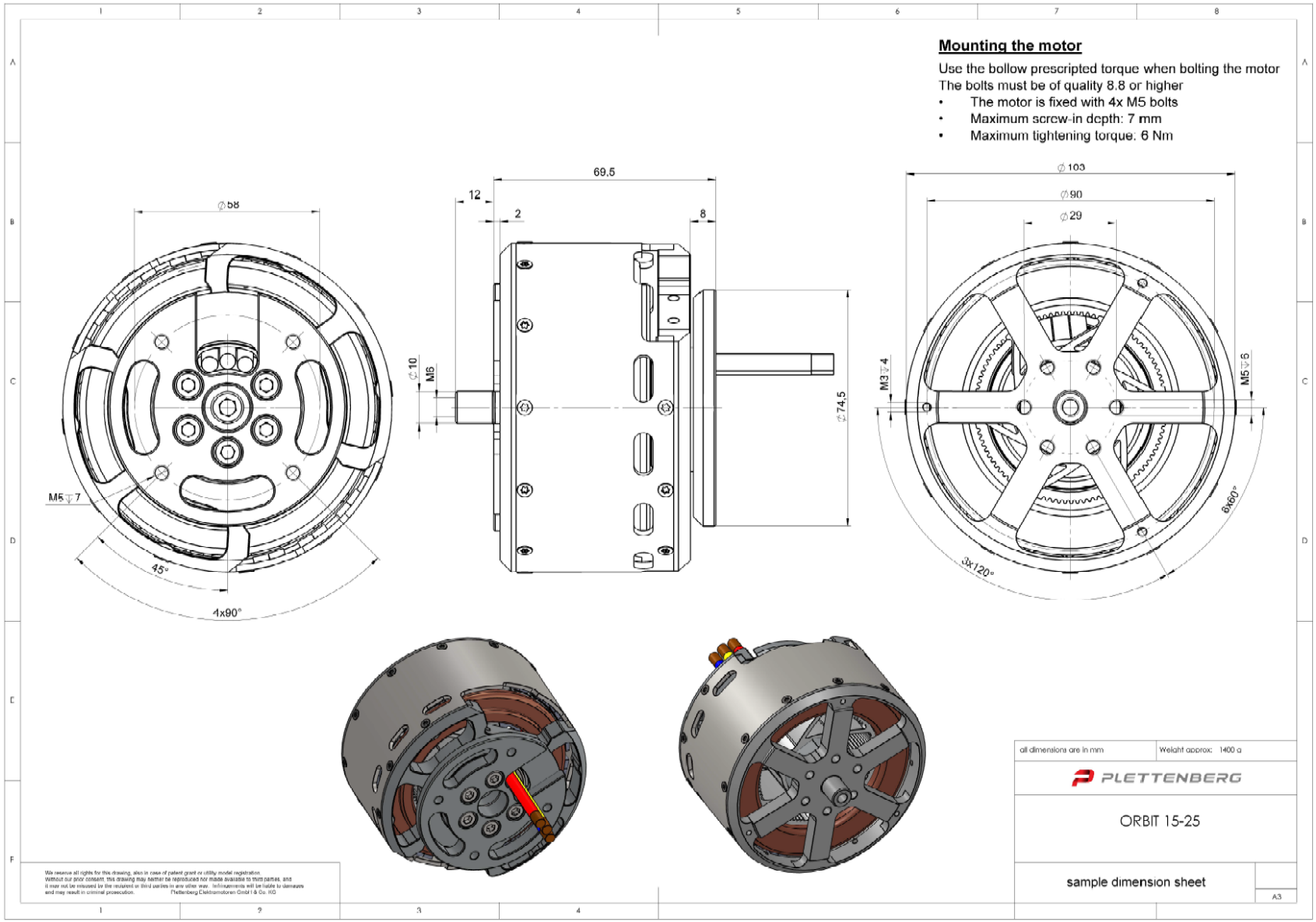
- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 4 mm
- Maximum tightening torque: 1.3 Nm





all dimensions are in mm	Weight approx: 315 g
PLETTENBERG	
ORBIT 1-30	
sample dimension sheet	Sheet A4


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M5 bolts
• Maximum screw-in depth: 6 mm
• Maximum tightening torque: 6 Nm
∅58
M5↧6
45°
4x90°
70
12
7
∅10
M6
∅74,5
∅77,5
∅29
M5↧5
6x60°
all dimensions are in mm
Weight approx: 720 g
PLETTENBERG
ORBIT 5-30
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M5 bolts
• Maximum screw-in depth: 7 mm
• Maximum tightening torque: 6 Nm
∅58
M5 ▽7
45°
4x90°
69.5
12
2
8
∅10
M6
∅74.5
∅103
∅90
∅29
M3 ▽4
M5 ▽6
6x60°
3x120°
all dimensions are in mm
Weight approx: 1400 g
PLETTENBERG
ORBIT 15-25
sample dimension sheet
A3
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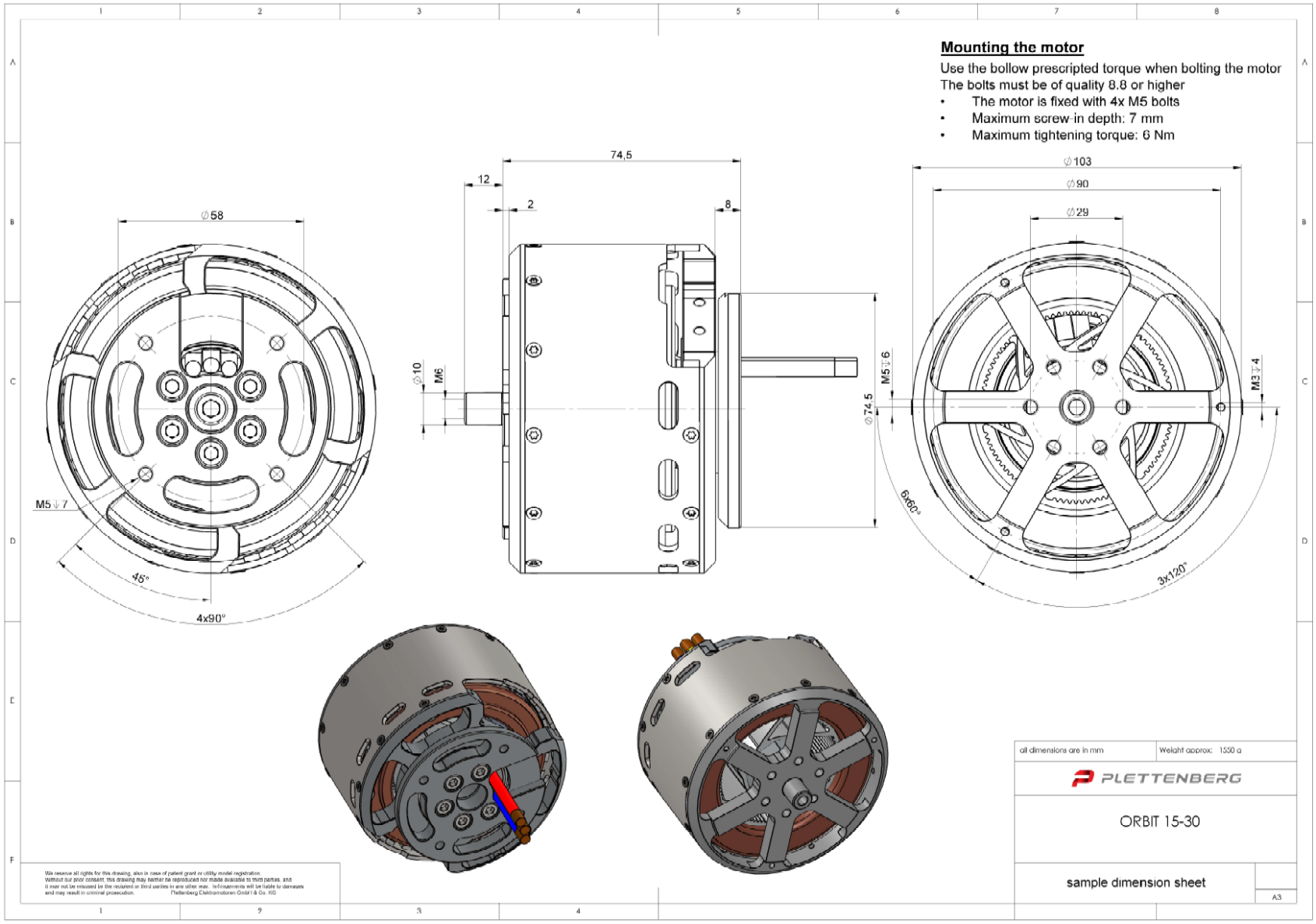
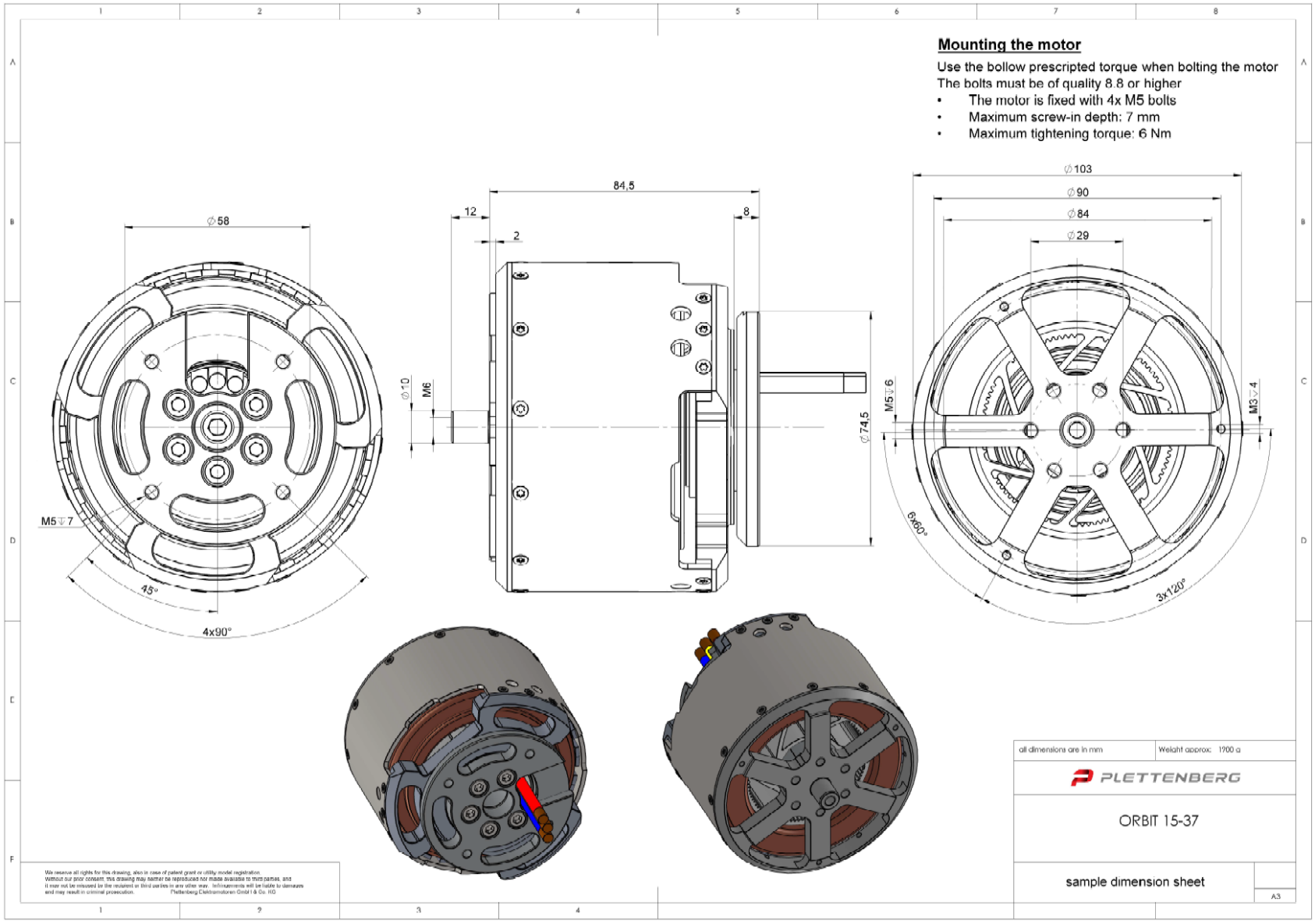

Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M5 bolts
• Maximum screw-in depth: 7 mm
• Maximum tightening torque: 6 Nm
74,5
12
2
8
∅58
∅10
M6
∅74,5
M5↧6
M3↧4
∅103
∅90
∅29
M5↧7
45°
4x90°
6x60°
3x120°
all dimensions are in mm
Weight approx: 1550 g
PLETTENBERG
ORBIT 15-30
sample dimension sheet
A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 4x M5 bolts
• Maximum screw-in depth: 7 mm
• Maximum tightening torque: 6 Nm
∅58
84,5
12
2
8
∅103
∅90
∅84
∅29
∅10
M6
∅74,5
M5↧6
M3↧4
M5↧7
45°
4x90°
6x60°
3x120°
all dimensions are in mm
Weight approx. 1900 g
PLETTENBERG
ORBIT 15-37
sample dimension sheet
A3

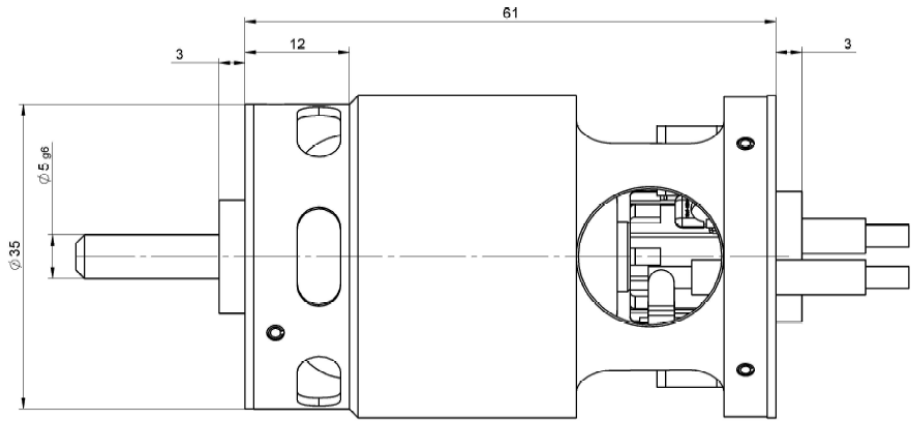
ALPHA Series

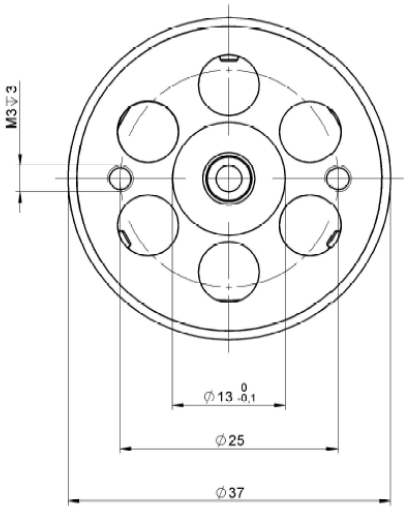
The ALPHA series of brushed DC motors are ideally suited for industrial and other applications, with highest requirements regarding power-to-weight ratio, durability, efficiency and cost. The ALPHA series is available in the power range from below 500W to 1.5kW.

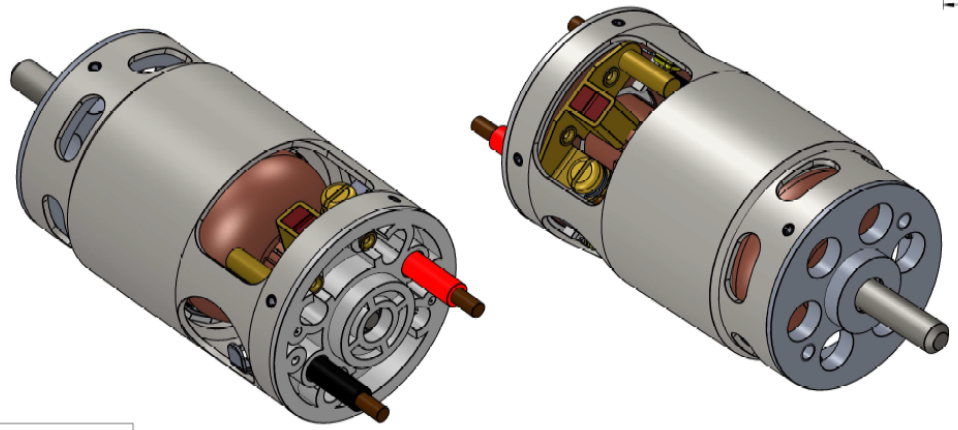
Mounting the motor

Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher

- The motor is fixed with 2x M3 bolts
- Maximum screw-in depth: 3 mm
- Maximum tightening torque: 1.3 Nm





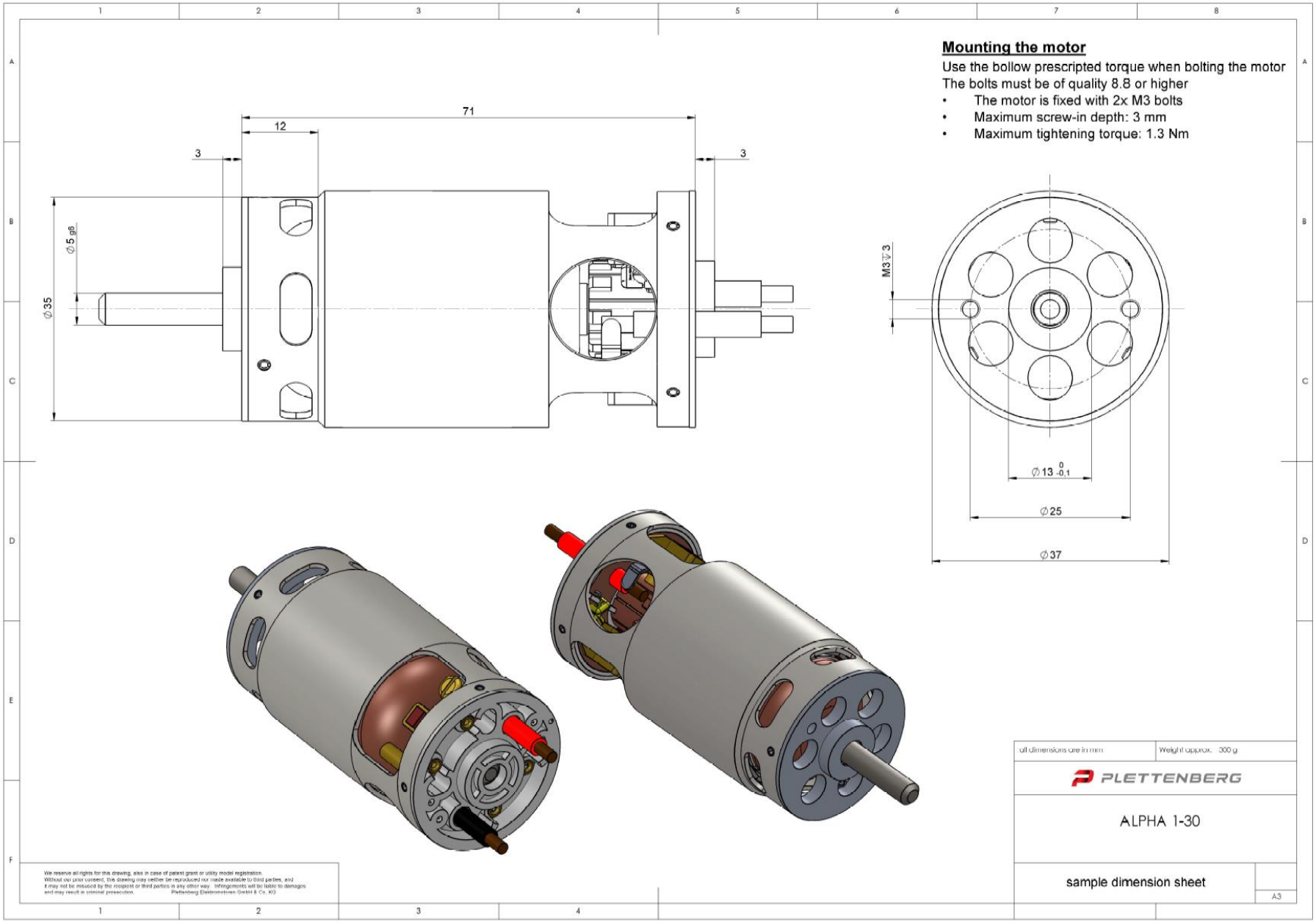


all dimensions are in mm | Weight approx. 270 g

PLETTENBERG

ALPHA 1-20

sample dimension sheet | A3


Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 2x M3 bolts
• Maximum screw-in depth: 3 mm
• Maximum tightening torque: 1.3 Nm
71
12
3
3
Ø 5 g6
Ø 35
M3 ↧3
Ø 13 0 -0,1
Ø 25
Ø 37
all dimensions are in mm
Weight approx. 300 g
PLETTENBERG
ALPHA 1-30
sample dimension sheet
A3
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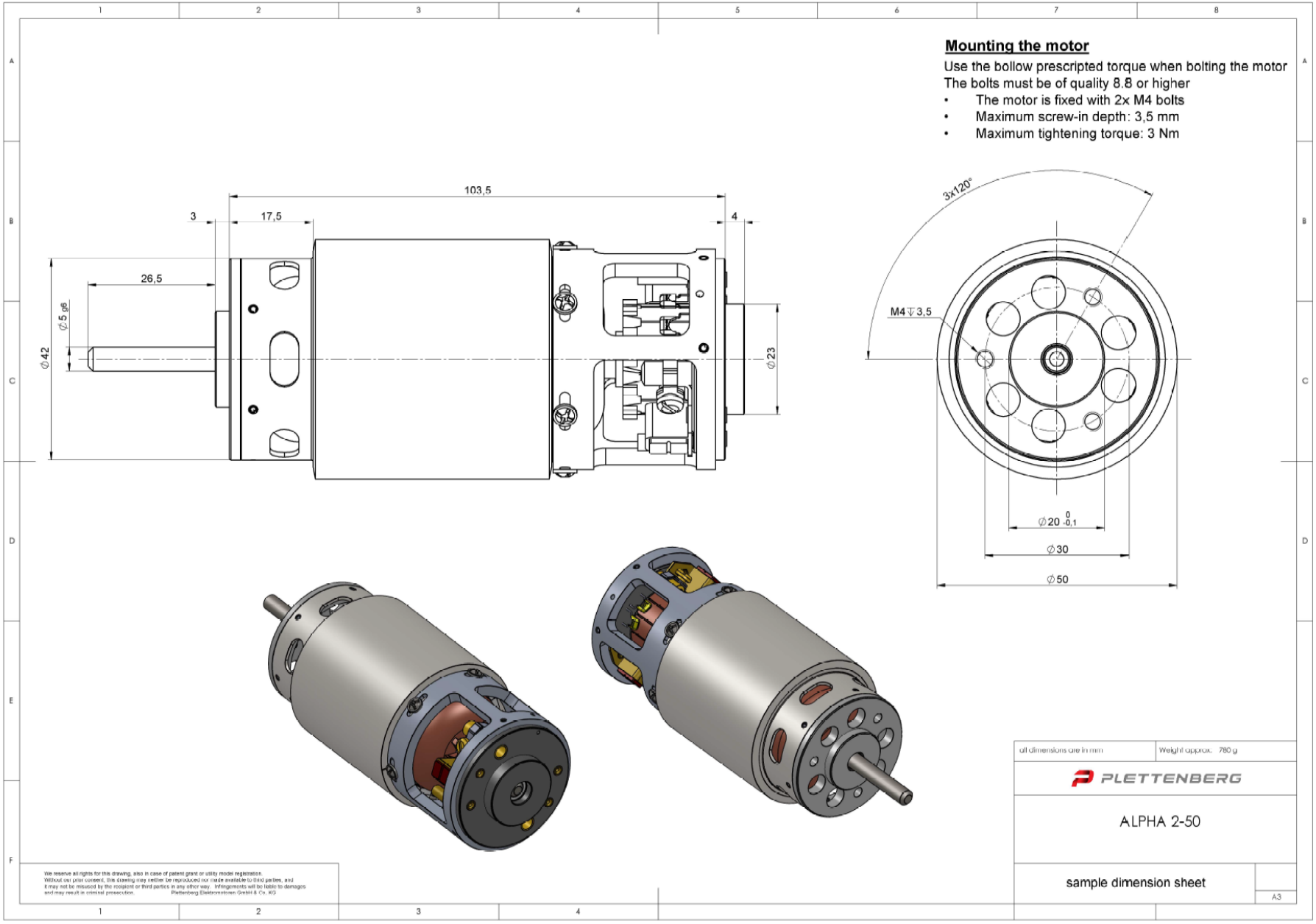
Mounting the motor
Use the bollow prescripted torque when bolting the motor
The bolts must be of quality 8.8 or higher
• The motor is fixed with 2x M4 bolts
• Maximum screw-in depth: 3,5 mm
• Maximum tightening torque: 3 Nm
103,5
3
17,5
4
26,5
⌀5 g6
⌀42
⌀23
3x120°
M4 ↧3,5
⌀20 0 -0,1
⌀30
⌀50
all dimensions are in mm
Weight approx. 780 g
PLETTENBERG
ALPHA 2-50
sample dimension sheet
A3
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