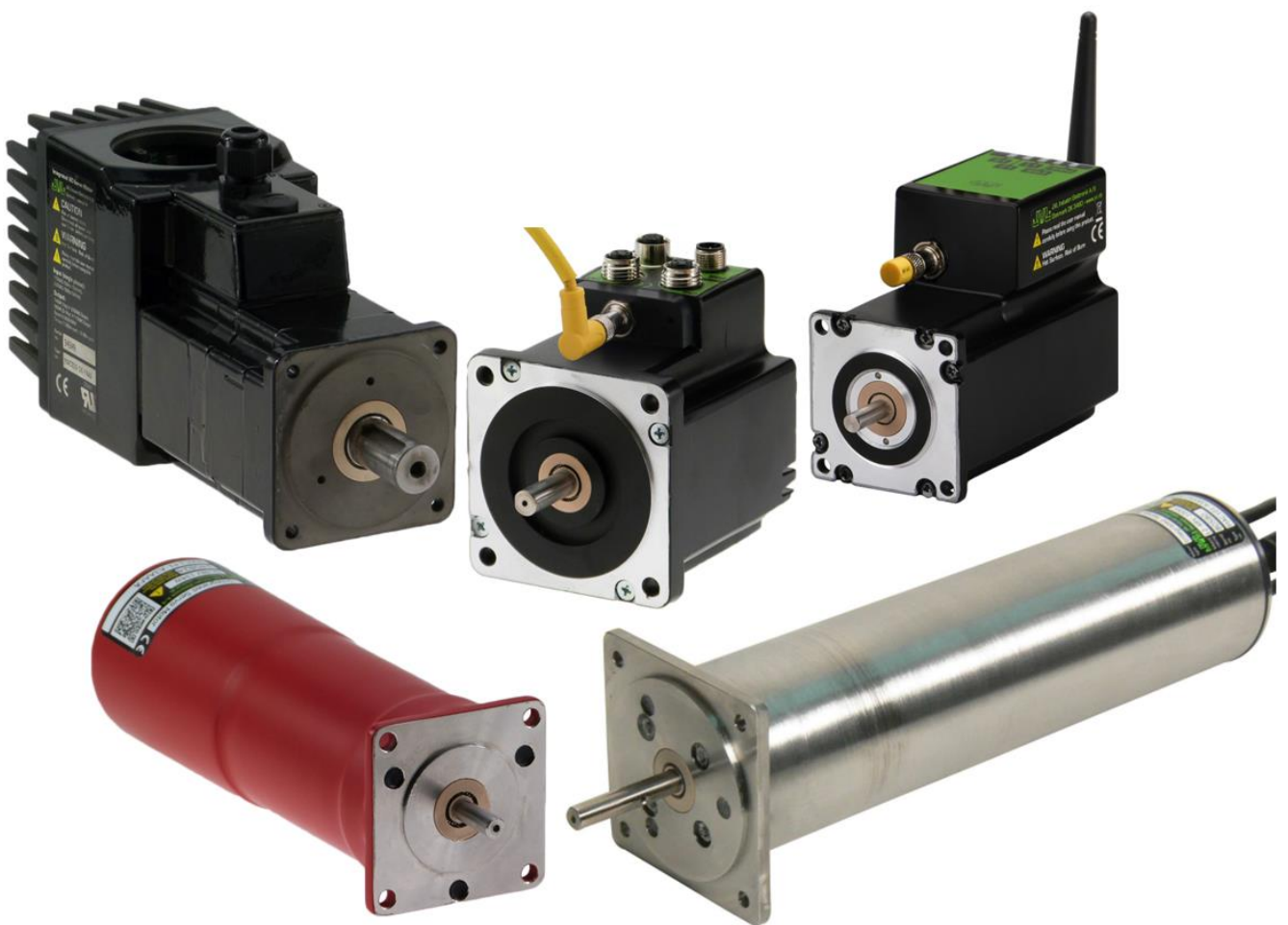




JVL IP65/66/67/69K motors

Installation guide



Installation guide – JVL IPx5/x6/x7/x9K motors

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1 Precautions when installing IPx5/x6/x7/x9K motors

When installing MAC motors with a higher ingress protection (IPx5/x6/x7/x9K) a few rules must be respected to assure no ingress over time.



Please notice:

JVL products are not covered by the warranty if the following rules/guidance is not fully followed.

When installing an IP65+ motor, the motor is often considered waterproof. This is partly correct, but please notice the following:

- If the motor is installed outside without shield, the heating of the sun alone can bring the temperature way above the allowed limit of 40°C ambient temperature.
- If the motor is installed where the temperatures can get below 0°C, or if the temperature is changing, condensation might appear in the motor. In this case we recommend ordering the motor with coated PCB, and in extreme cases you can order the motor with a valve that allows the motor to “breathe” and water to exit.
- If the motor is sprayed with water for hours, e.g., when exposed to rain directly, it is beyond IP65/66/67. Please refer to IP classification, section 1.1.
- If even a small amount of water is present on e.g., a screw or another mechanical connection, and this is not additionally sealed, you will risk the water to enter. This is beyond the IP65/66/67/69K classification. Please refer to IP classification, section 1.1.

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1.1 IP classification

Often the general IP classification is misunderstood. All JVL IP65+ motors have been tested to ensure that they comply with the specified IP class.

Below is an overview of the IP classifications used for various JVL motors.

IP42 - Standard for JVL MAC050-141 motors and JVL MIS motors

Effective against >1mm/0.039" objects	Most wires, slender screws, large ants etc.
Dripping water when tilted at 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle of 15° from its normal position. A total of four positions are tested within two axes. Test duration: 2.5 minutes for every direction of tilt (10 minutes total) Water equivalent to 3 mm (0.12 in) rainfall per minute

IP55 - Standard for JVL MAC400-4500 motors

Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment.
Water jets	Water projected by a nozzle (6.3 mm (0.25 in)) against enclosure from any direction shall have no harmful effects. Test duration: 1 minute per square meter for at least 3 minutes Water volume: 12.5 liter per minute Pressure: 30 kPa (4.4 psi) at distance of 3 meters (9.8 ft)

IP65 - High IP rating for JVL MIS motors

Dust-tight	No ingress of dust; complete protection against contact (dust-tight). A vacuum must be applied. Test duration of up to 8 hours based on airflow.
Water jets	Water projected by a nozzle (6.3 mm (0.25 in)) against enclosure from any direction shall have no harmful effects. Test duration: 1 minute per square meter for at least 3 minutes Water volume: 12.5 liter per minute Pressure: 30 kPa (4.4 psi) at distance of 3 meters (9.8 ft)

IP66 - High IP rating for JVL MAC400-4500 motors

Dust-tight	No ingress of dust; complete protection against contact (dust-tight). A vacuum must be applied. Test duration of up to 8 hours based on airflow.
Powerful water jets	Water projected in powerful jets (12.5 mm (0.49 in)) against the enclosure from any direction shall have no harmful effects. Test duration: 1 minute per square meter for at least 3 minutes Water volume: 100 liters per minute (0.37 impgal/s) Pressure: 100 kPa (15 psi) at distance of 3 meters (9.8 ft)

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IP67 - High IP rating for JVL MAC050-141 motors, standard for JVL MAC100/101/231 motors, standard for JVL expansion modules and standard for JVL M12 cables

Dust-tight	No ingress of dust; complete protection against contact (dust-tight). A vacuum must be applied. Test duration of up to 8 hours based on airflow.
Immersion, up to 1 meter (3 ft 3 in) depth	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 meter (3 ft 3 in) of submersion). Test duration: 30 minutes. Tested with the lowest point of the enclosure 1,000 mm (39 in) below the surface of the water, or the highest point 150 mm (5.9 in) below the surface, whichever is deeper.

IP69K - Extreme IP rating for JVL MAC100/101/231 motors

Dust-tight	No ingress of dust; complete protection against contact (dust-tight). A vacuum must be applied. Test duration of up to 8 hours based on airflow.
Powerful high-temperature water jets	Protected against close-range high pressure, high-temperature spray downs. Smaller specimens rotate slowly on a turntable, from 4 specific angles. Larger specimens are mounted in the intended position when being used, no turntable required, and are tested freehand for at least 3 minutes at a distance of 0.15–0.2 meters (5.9 in – 7.9 in). Test duration: Fixture: 30 sec. in each of 4 angles (2 min. total), Freehand: 1 min/m ² , 3 min. minimum Water volume: 14–16 liters per minute (0.051–0.059 impgal/s) Pressure: 8–10 MPa (80–100 bar) at distance of 0.10–0.15 meters (3.9 in – 5.9 in) Water temperature: 80 °C (176 °F)

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1.2 General rules for installation

Rule 1 - Connectors

- Make sure to tighten all connectors properly to make sure that no moisture/liquids can find a way inside the connector.

All circular connectors at motors and modules including cables with matching connectors offered by JVL are guaranteed to be IP67 or higher but under the condition that they are tightened correctly.

Make sure to use protective caps at unused connectors. Also make sure that the protective caps are tightened properly.

WI1000-M12FCAP1	IP67 Protection Cap for M12 Female
WI1000-M12FCAP2	IP67 Protection metal Cap for M12 for FEMALE
WI1000-M12MCAP1	IP67 Protection Cap for M12 Male
WI1000-M12MCAP2	IP67 Protection Cap Metal M12 for MALE

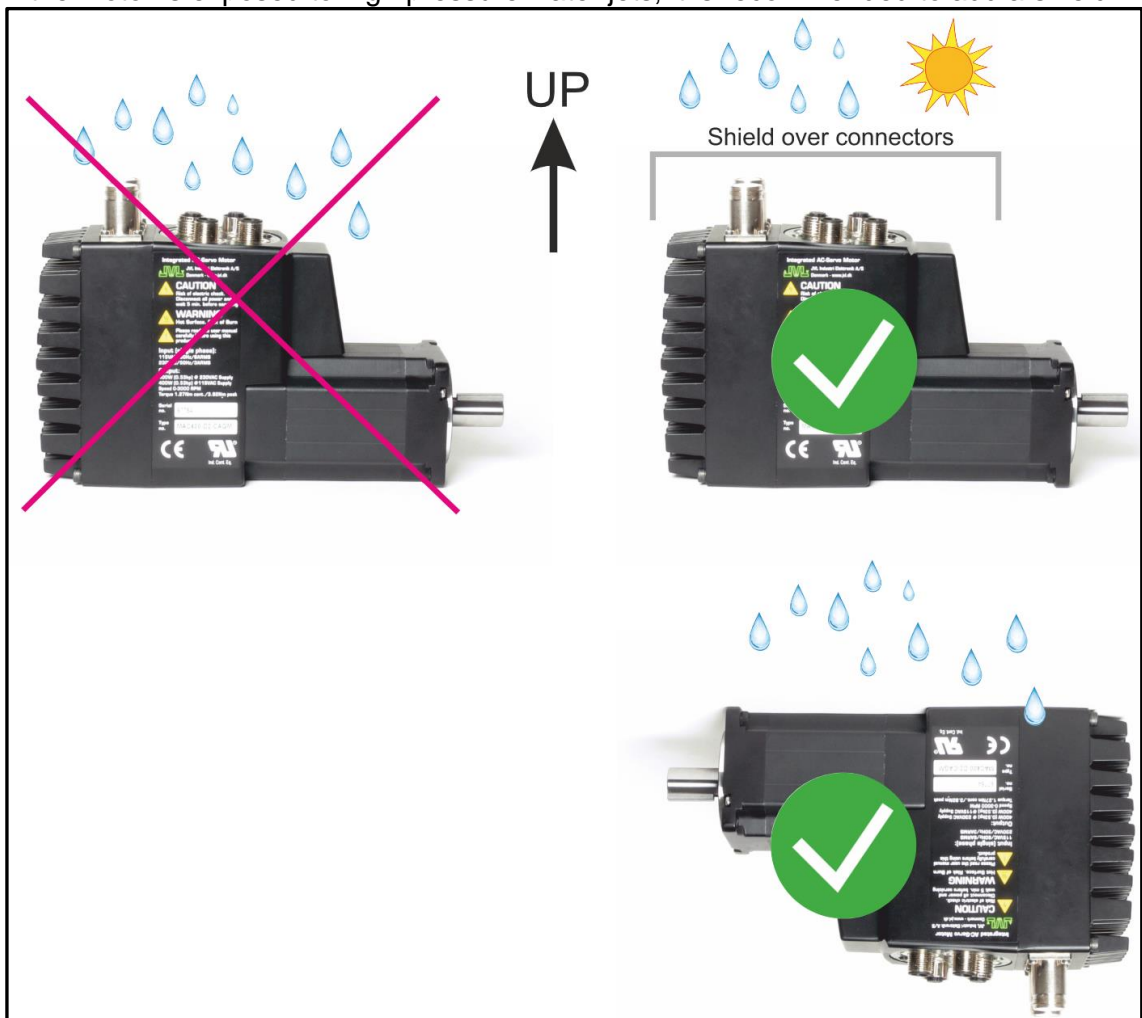
Rule 2 - Motor mounting orientation in IPx5/x6/x7/x9K applications

- It is not recommended to mount the motor with the expansion module/connectors pointing upwards since it will be more exposed to moisture that accumulate at the surface and around the connectors and can leak inside the motor over time.

If the actual application requires this mounting orientation, please add a shield/cup over the motor to shield the connectors. Also avoid direct sunlight if mounted outside in open air.

If the motor is exposed to rain and/or sun, it is strongly recommended in any case to add a shield/cup over the motor.

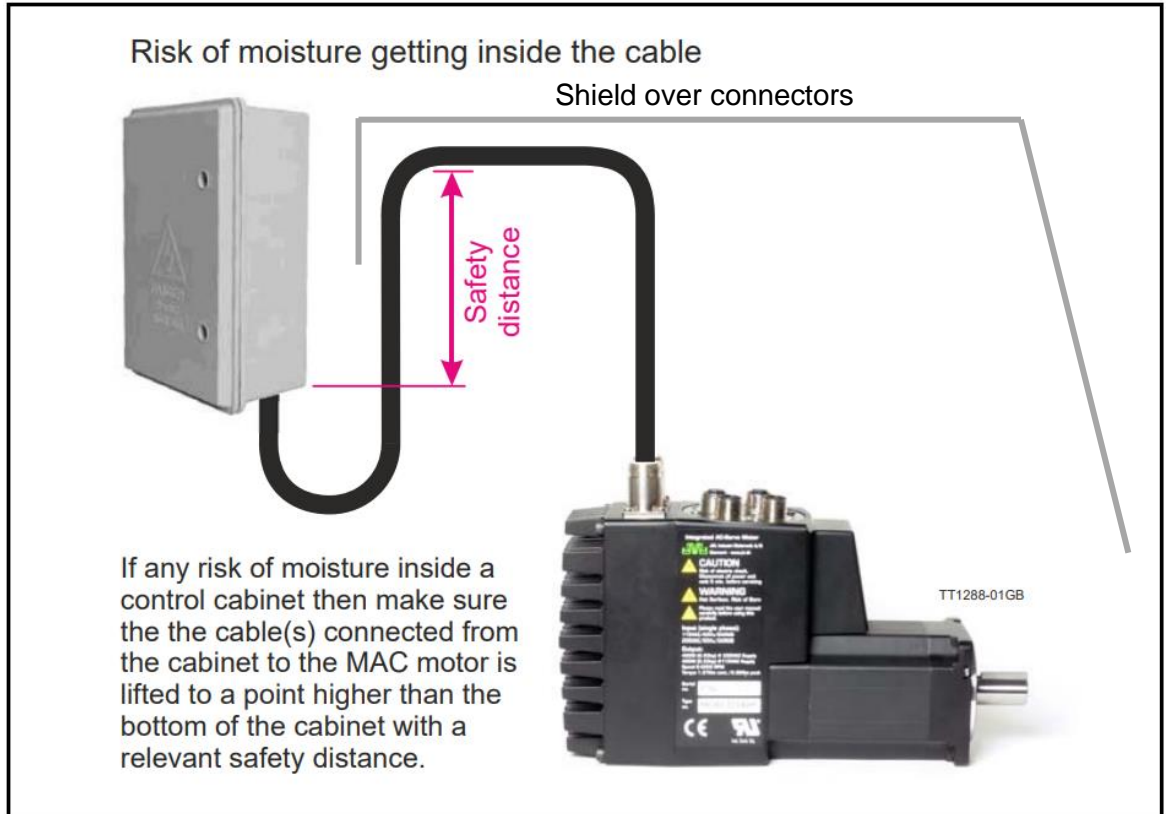
If the motor is exposed to high pressure water jets, it is recommended to add a shield.



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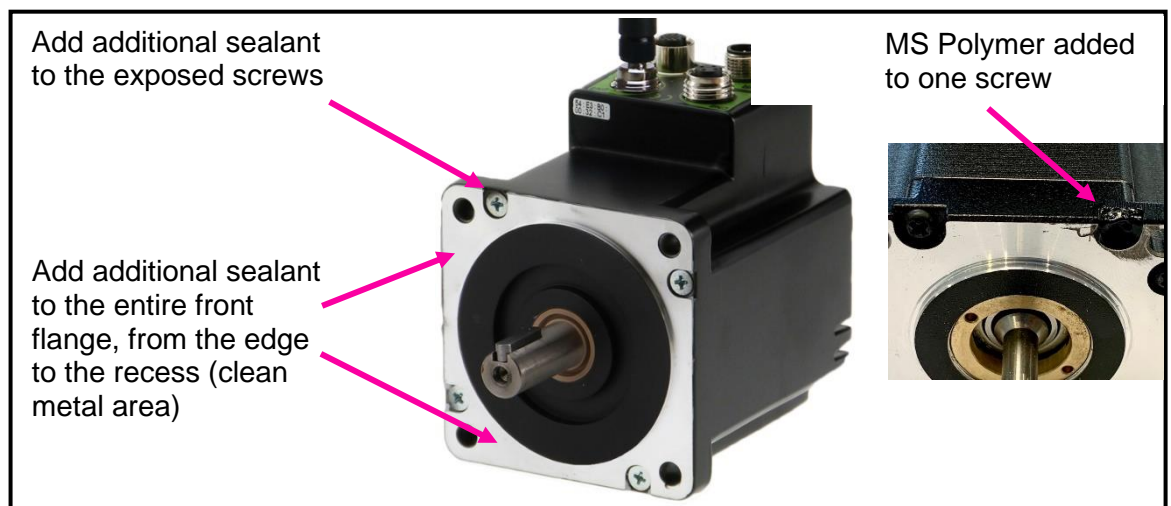
Rule 3 - Cable placement

- In certain environments where the temperature changes fast and often it may be a problem that moisture condensate inside the cabinet. Always consider if condensation, moisture or even liquid can be present in the cabinet or similar where the cables for the MAC motor is drawn from, if this is considered to be a risk then always make sure that the cable is placed as below with a point higher than the cabinet bottom before it connects to the motor to avoid moisture or liquid to flow inside the cable to the motor connectors.



Rule 4 - Protect the flange

- When mounting the flange of the motor to the machine, additional sealant can be applied in between motor flange and the mounting point in the machine. If this is done, it is strictly important to ensure a proper ground connection from the motor house to machine chassis. If any screws are exposed, additional sealant must be applied to ensure that water will not be in contact with the screw over longer periods of time. We recommend MS Polymer, e.g. "SikaHyFlex® 220 Window".



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Rule 5 - Protect the shaft

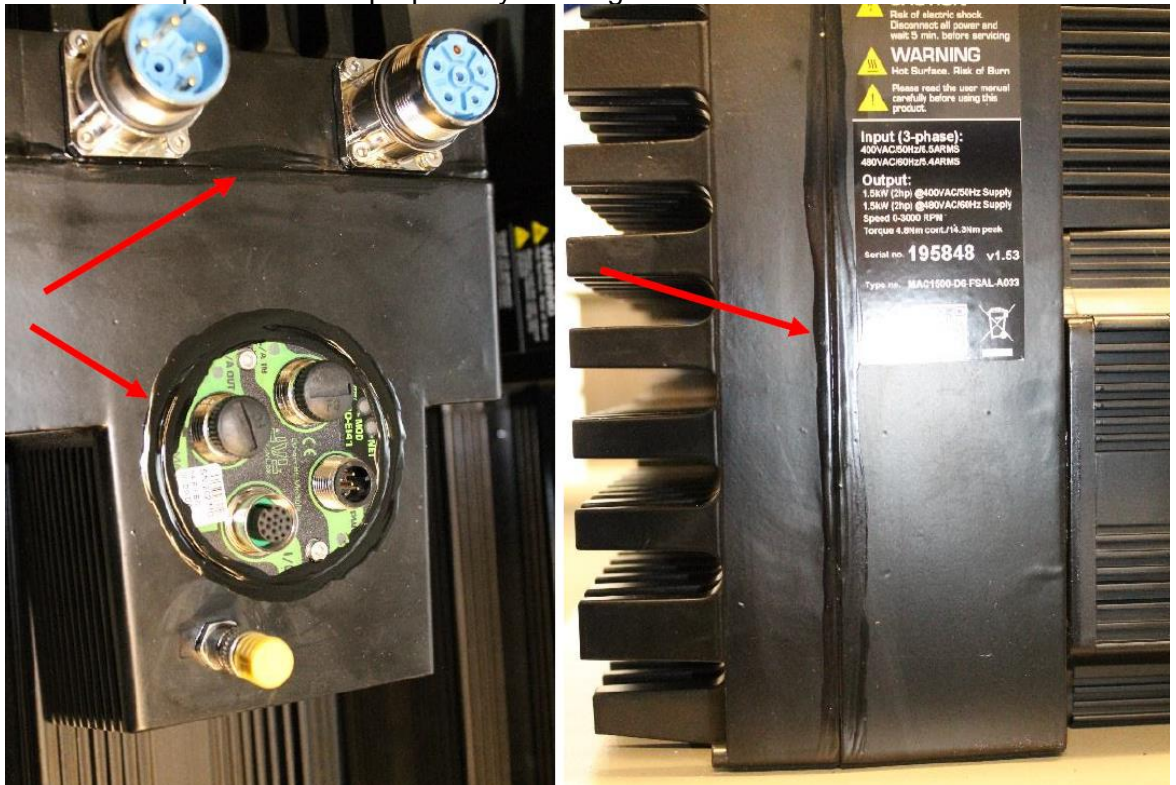
- Even when the shaft is equipped with IP67 seal, it is recommended not to expose the shaft to water. If the shaft is exposed to water for long time, especially while rotating, water is likely to enter the motor at some point.

Rule 6 - Additional protection for connectors, screws and joining points

- If the motor is exposed to water, especially when operating outside, it is recommended to apply additional sealing to screws, module and on the connection to gear or other equipment.

Depending on the application and installation environment, we recommend:

- Generic metal Paint: e.g. “Hammerite” or other alkyd based paint.
- Grease: “SuperLube Multi-purpose synthetic grease”.



Rule 7 - Protect against condensation

- If the motor is installed where the temperatures can get below 0°C, or if the temperature is changing, condensation might appear in the motor. In this case we recommend ordering the motor with coated PCB, and in extreme cases you can order the motor with a valve that allows the motor to “breathe” and water to exit.

By always keeping the control voltage CVI applied, the motor will maintain a higher internal temperature, protecting against condense.

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1.3 Special for MAC motor® with expansion module

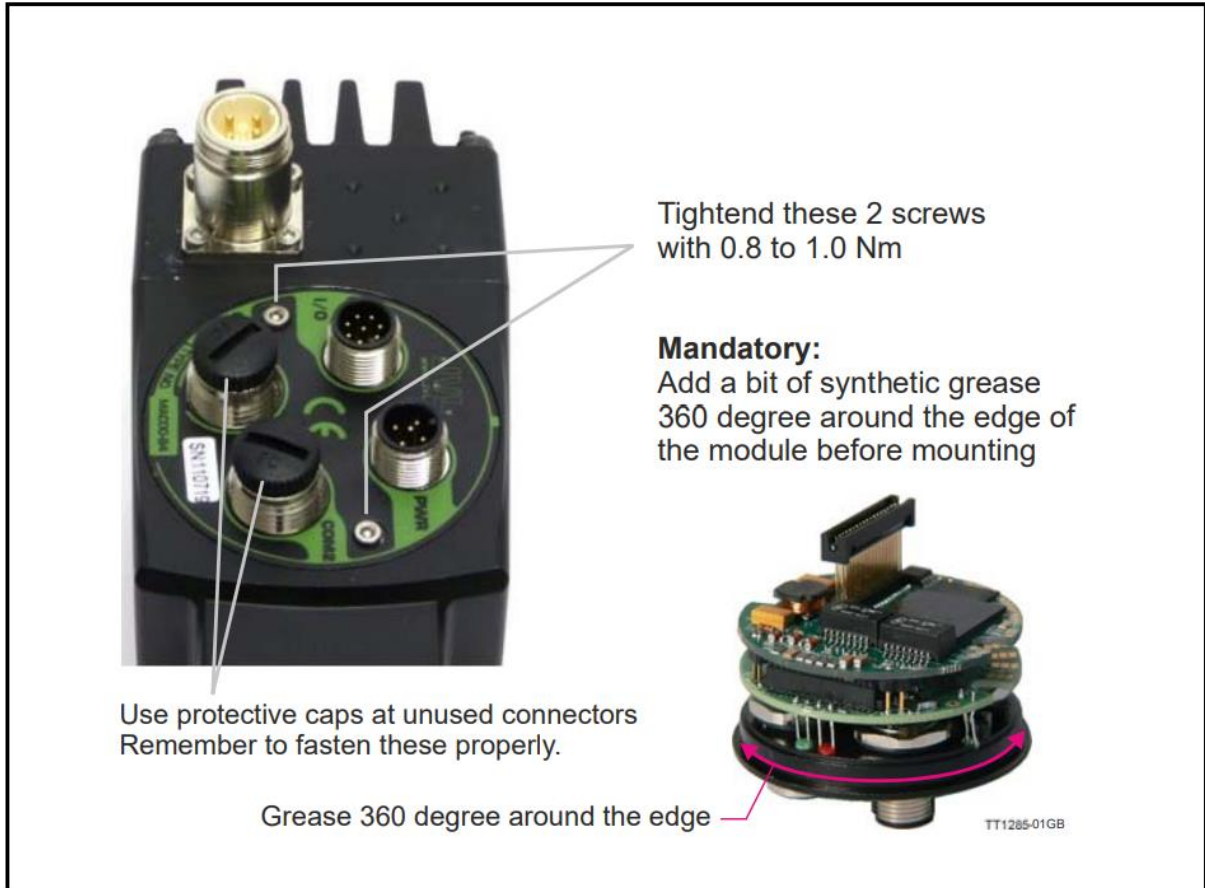
Mounting the expansion module (MAC00-xxx)

All the expansion modules are IP67 rated but under the condition that its mounted correctly in the motor, so the surface of the module is in same level as the surrounding motor surface.

The 2 pcs. M2.5 hexagon screws in the module must also be tightened with **0.8 to 1.0 Nm**.

Use a torque screwdriver to make sure the torque is ok.

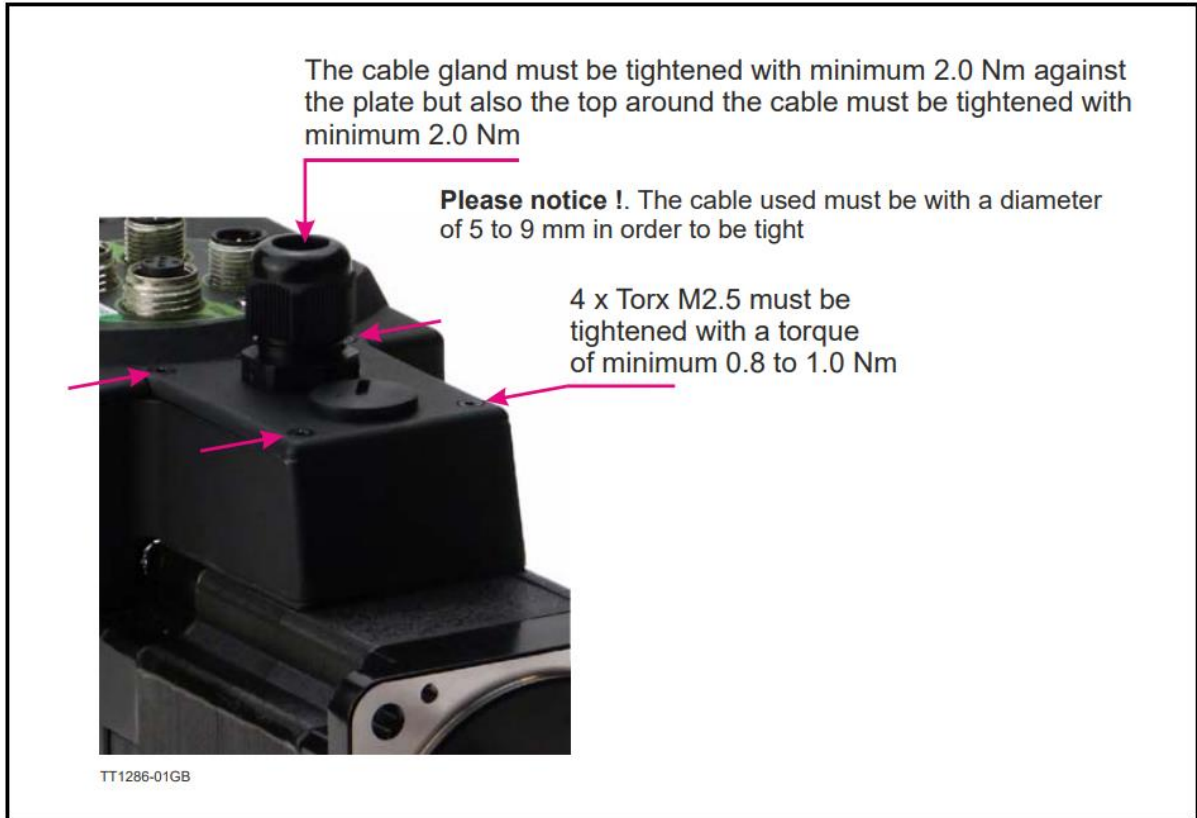
Also make sure to use protective caps on unused connectors.



Precautions concerning MAC800-D3 and -D6

The MAC800-D3 and MAC800-D6 is offering IP66 protection. To obtain this protection degree it is very important that the various components are mounted and fastened properly according to the illustration below.

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1.4 Special for MAC100/101/231 stainless-steel motors

It is recommended to always order the MAC100/101 motor with factory mounted module and cables. This is to ensure that the motor is assembled correctly and complies with the high IP rating. If you must open the stainless-steel tube, it is important to be extremely careful to mount everything back together in the right order, apply grease to the cables and O-rings and tighten all screws and cable glands with the correct torque.

The warranty does not cover any damage related to ingress of water if the stainless-steel tube or cable glands have been opened after delivery.

