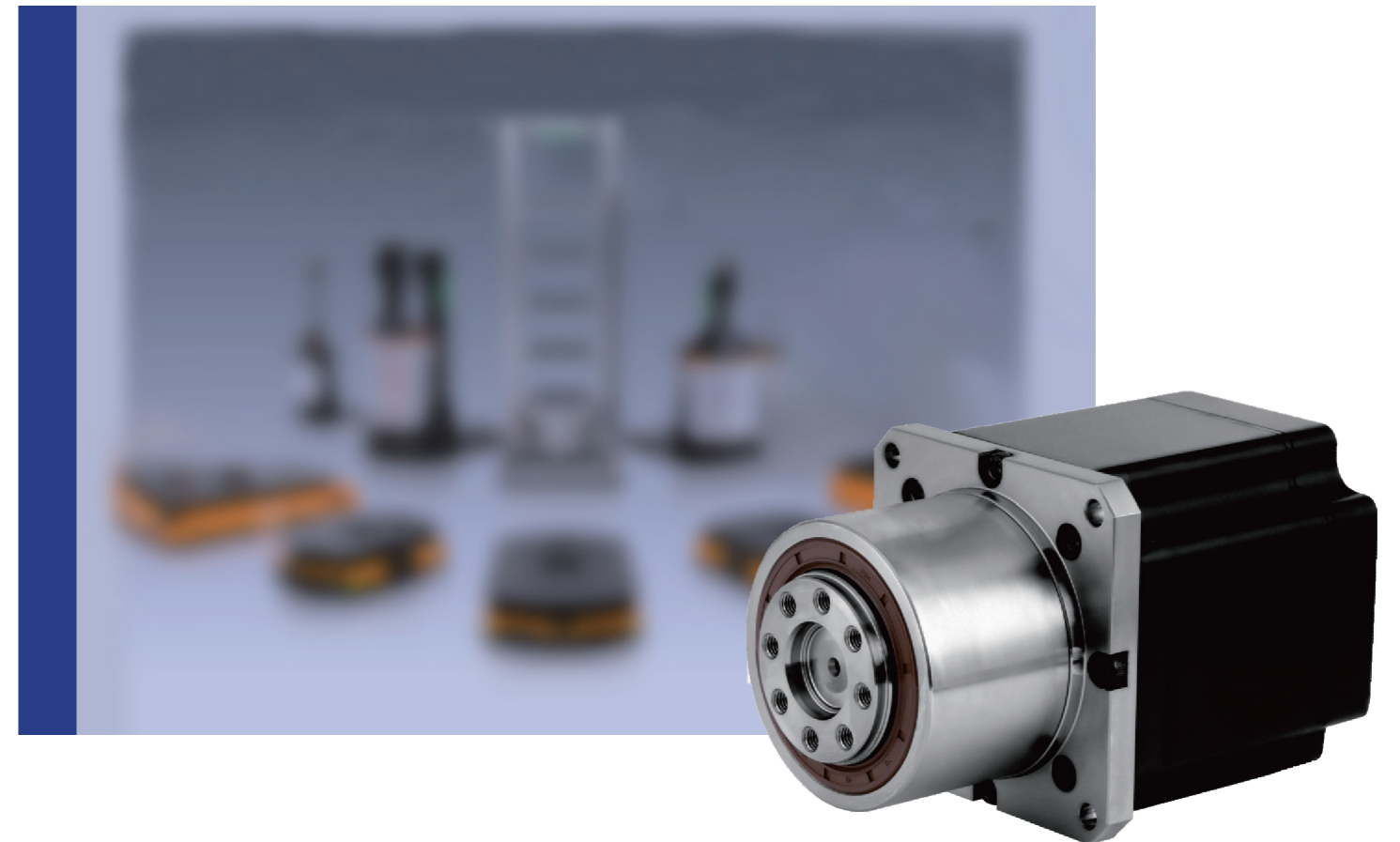
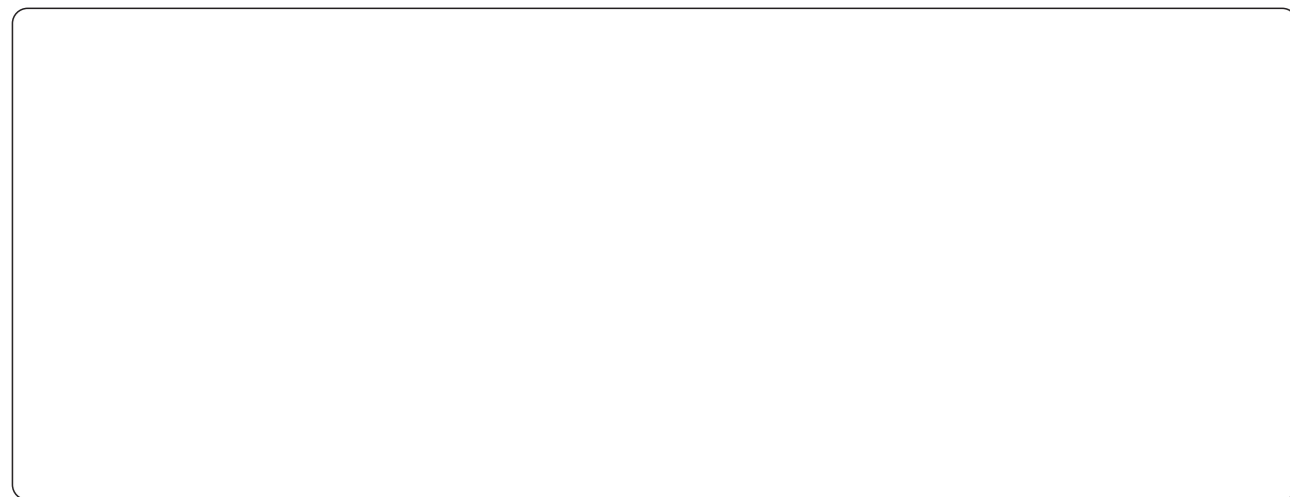


移动机器人专用减速电机
The Reducer for AGV
(Automated Guided Vehicle)



www.makikawa-motion.com



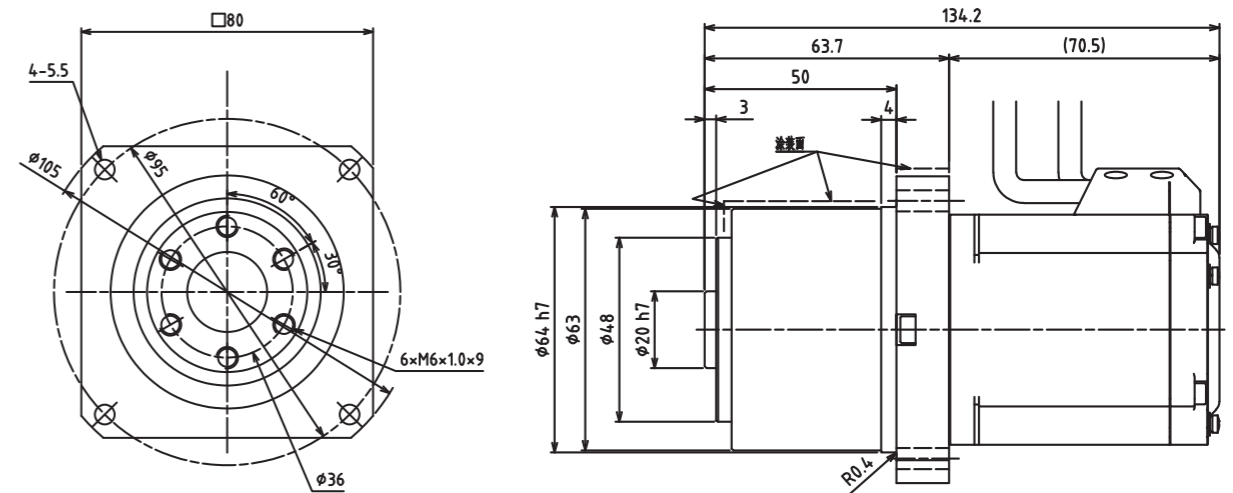
01

行走系列

WALKING SERIES



法兰输出一体机 (Flange Output Integrated)
RCF-060-16/20-400 应用 Application --- 400KG

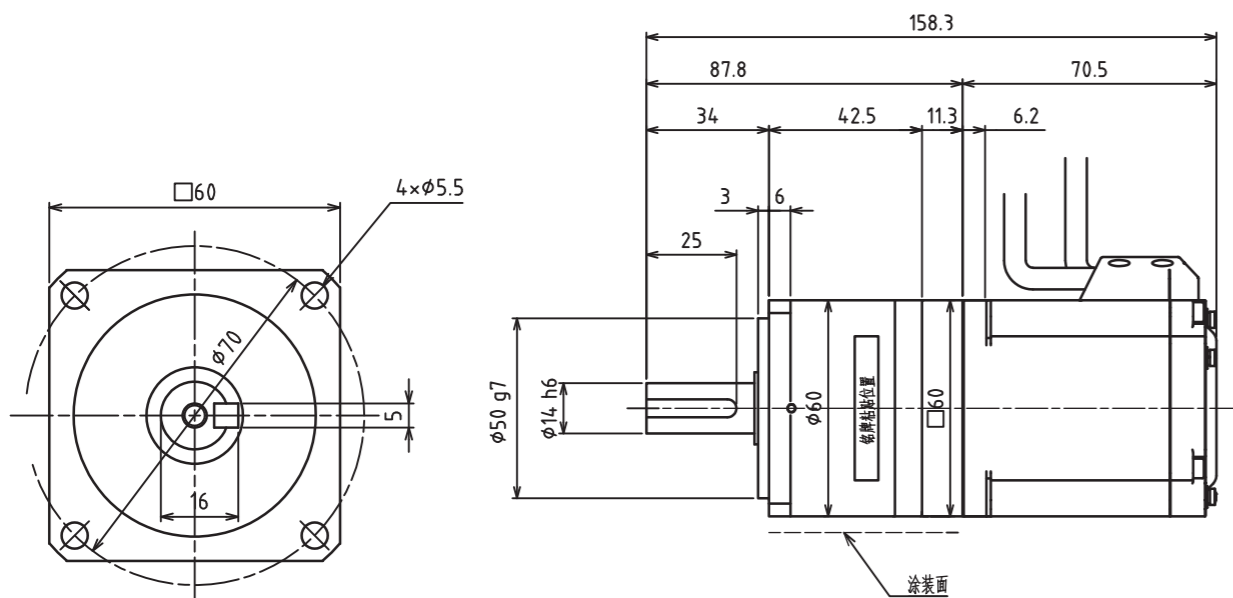


减速比	Ratio		16	20
容许平均输出扭矩	Nominal output torque	Nm	18	22
容许最大输出扭矩	Maximum output torque	Nm	50	50
平均输入回转速度	Nominal input speed	rpm	3000	3000
最高输入回转速度	Maximum input speed	rpm	3750	3750
容许径向负载	Permitted radial load	N	900	1000
容许轴向负载	Permitted axial load	N	650	720

轴输出一体机 (Shaft Output Integrated)

RCS-060-25/35/40-400

应用 Application --- 400KG

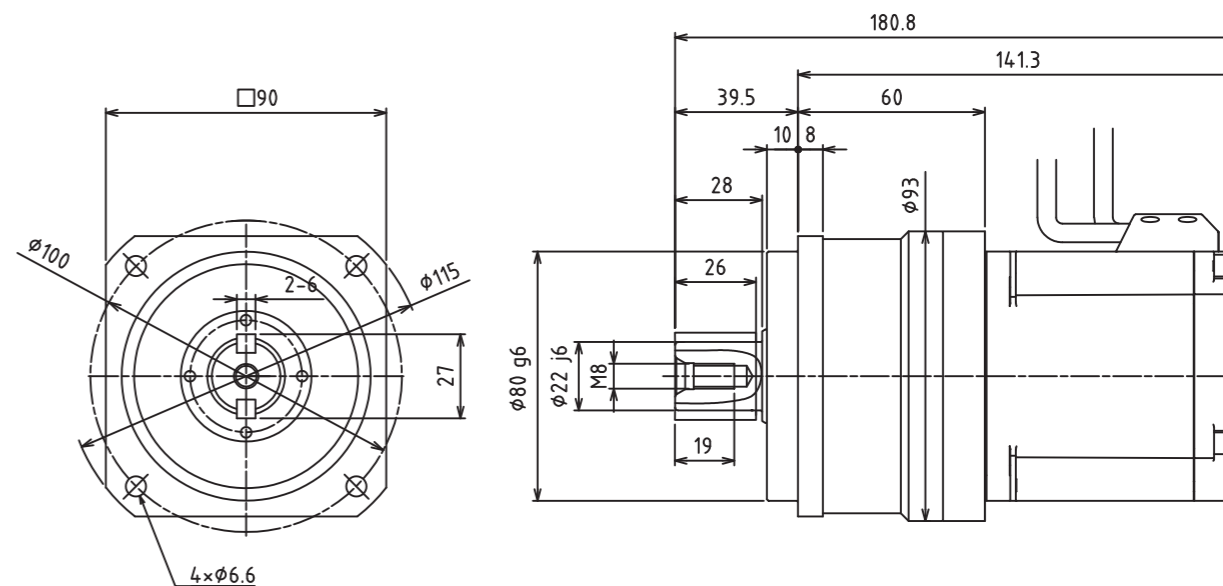


减速比	Ratio	25	35	40
额定输出扭矩	Nominal output torque Nm	27	27	27
最大输出扭矩	Maximum output torque Nm	50	50	50
额定输出转速	Nominal output speed rpm	3000	3000	3000
最大输出转速	Maximum output speed rpm	6000	6000	6000
容许径向负载	Permitted radial load N	700	1000	1000
容许轴向负载	Permitted axial load N	550	700	750

轴输出一体机 (Shaft Output Integrated)

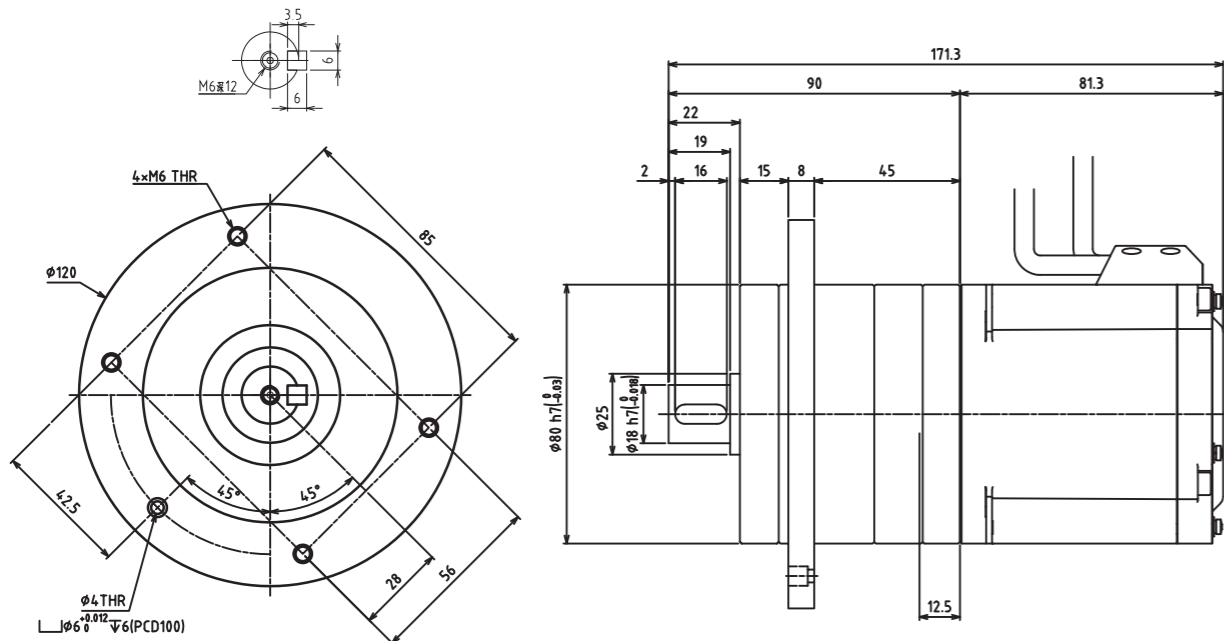
RCS-090-10-750

应用 Application --- 600KG



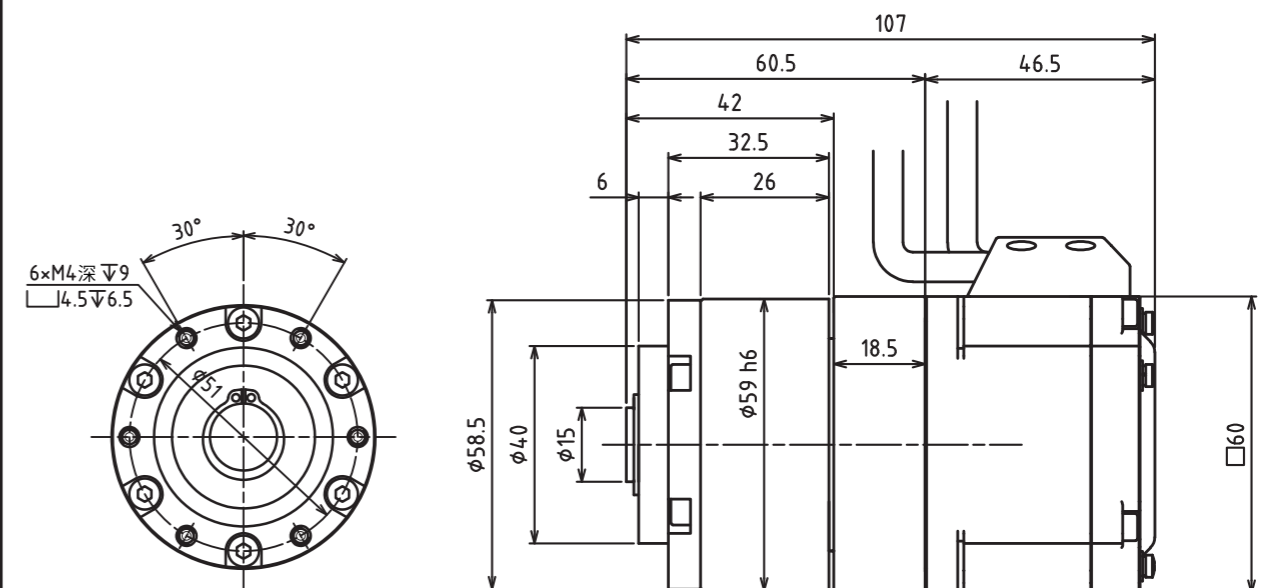
减速比	Ratio	10
容许平均输出扭矩	Nominal output torque Nm	24
容许最大输出扭矩	Maximum output torque Nm	72
平均输入回转速度	Nominal input speed rpm	3000
最高输入回转速度	Maximum input speed rpm	3750
容许径向负载	Permitted radial load N	2350
容许轴向负载	Permitted axial load N	1700

轴输出一体机 (Shaft Output Integrated)
RCS-090-20-750 应用 Application --- 600KG



减速比	Ratio		20
容许平均输出扭矩	Nominal output torque	Nm	41
容许最大输出扭矩	Maximum output torque	Nm	74
平均输入回转速度	Nominal input speed	rpm	3000
最高输入回转速度	Maximum input speed	rpm	6000
容许径向负载	Permitted radial load	N	850
容许轴向负载	Permitted axial load	N	300

齿圈输出一体机 (Ring Output Integrated)
RCI-060-9-200 应用 Application --- 200KG

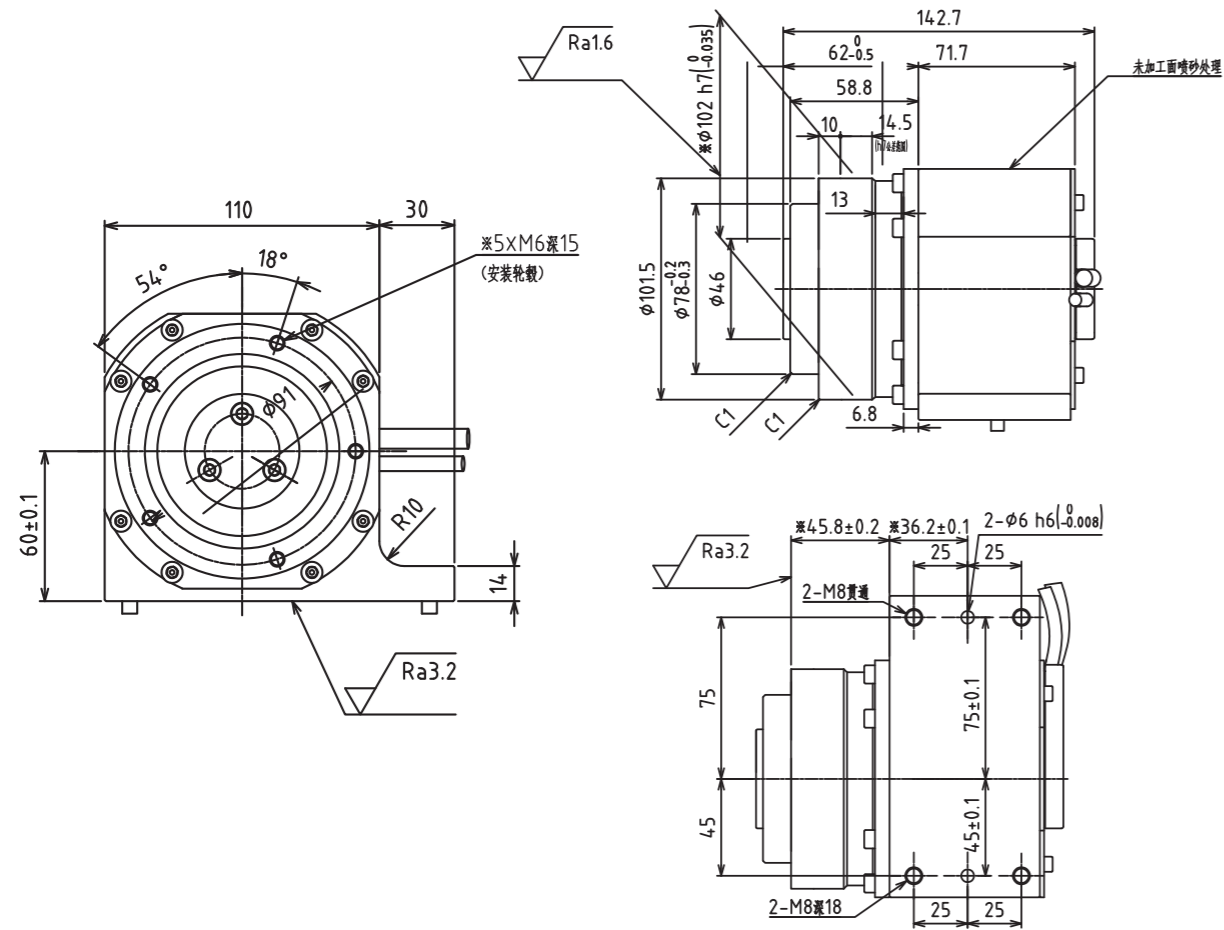


减速比	Ratio		9
容许平均输出扭矩	Nominal output torque	Nm	18
容许最大输出扭矩	Maximum output torque	Nm	35
平均输入回转速度	Nominal input speed	rpm	3000
最高输入回转速度	Maximum input speed	rpm	6000
容许径向负载	Permitted radial load	N	2300
容许轴向负载	Permitted axial load	N	700

齿圈输出一体机 (Ring Output Integrated)

RCI-090-9-850L/R

应用 Application --- 600KG

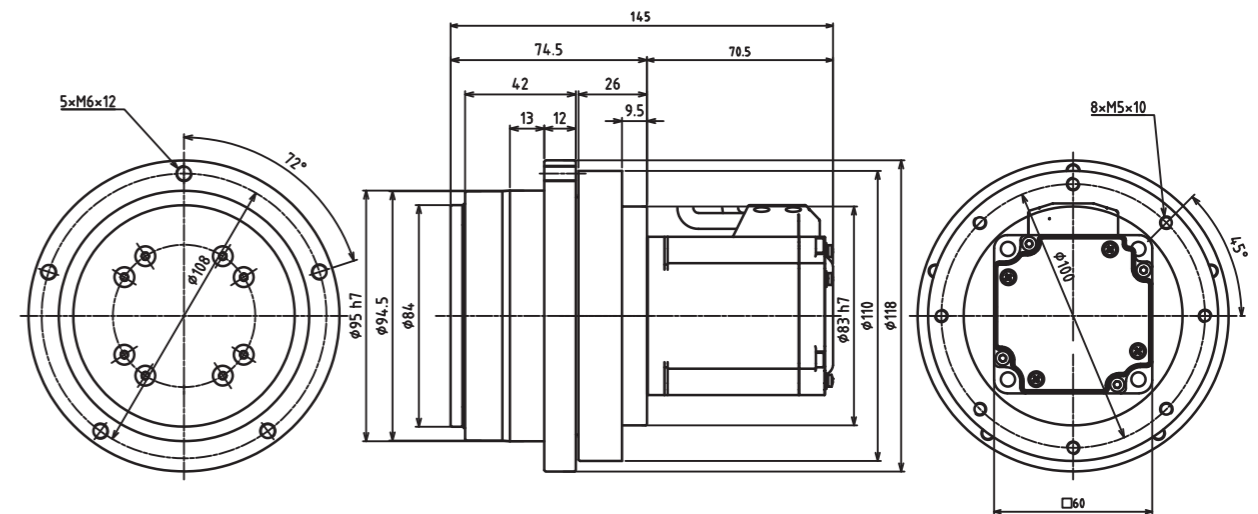


减速比	Ratio		9
容许平均输出扭矩	Nominal output torque	Nm	36
容许最大输出扭矩	Maximum output torque	Nm	72
平均输入回转速度	Nominal input speed	rpm	1910
最高输入回转速度	Maximum input speed	rpm	2225
容许径向负载	Permitted radial load	N	4200
容许轴向负载	Permitted axial load	N	2000

齿圈输出一体机 (Ring Output Integrated)

RCI-090-16-400

应用 Application --- 600KG

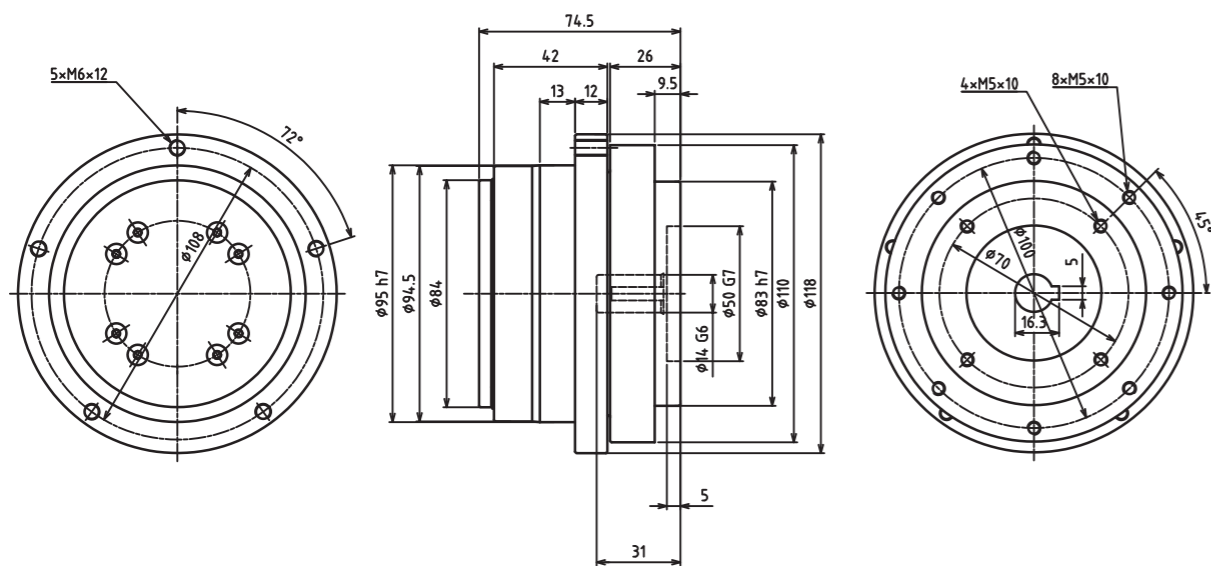


减速比	Ratio		16
容许平均输出扭矩	Nominal output torque	Nm	70
容许最大输出扭矩	Maximum output torque	Nm	140
平均输入回转速度	Nominal input speed	rpm	3000
最高输入回转速度	Maximum input speed	rpm	6000
容许径向负载	Permitted radial load	N	3000
容许轴向负载	Permitted axial load	N	600

齿圈输出分体机 (Ring Output Reducer)

RCI-090-16-400

应用 Application --- 600KG

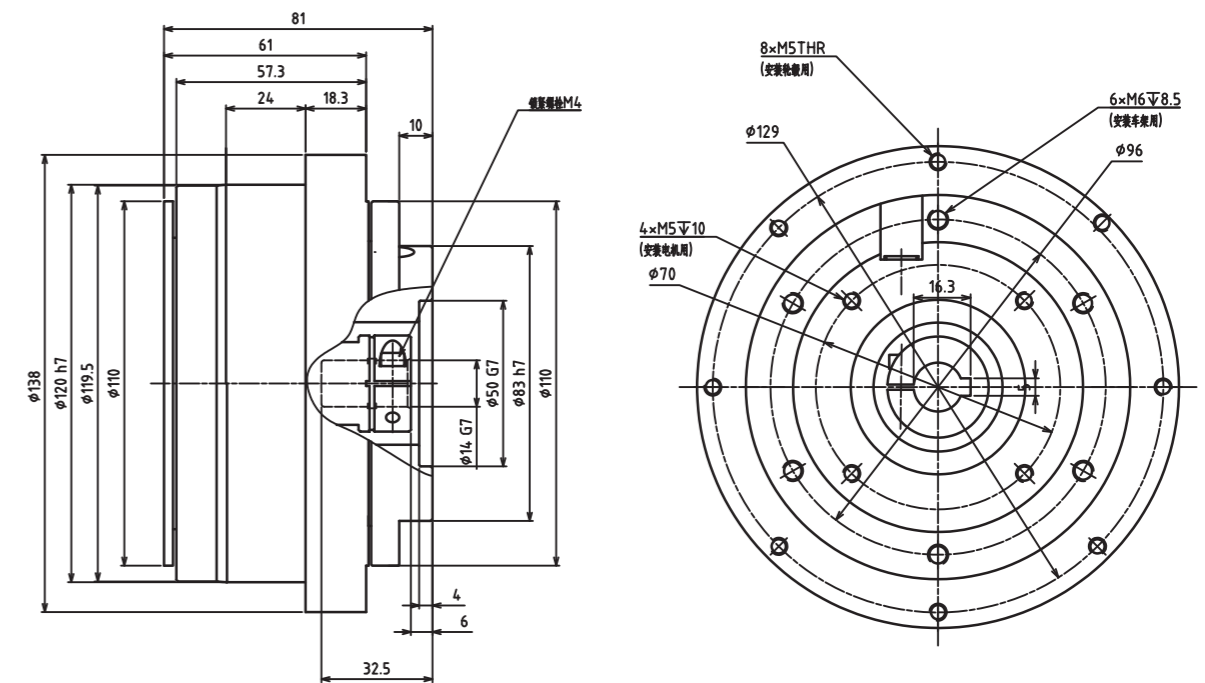


减速比	Ratio	16
容许平均输出扭矩	Nominal output torque Nm	70
容许最大输出扭矩	Maximum output torque Nm	140
平均输入回转速度	Nominal input speed rpm	3000
最高输入回转速度	Maximum input speed rpm	6000
容许径向负载	Permitted radial load N	3000
容许轴向负载	Permitted axial load N	600

齿圈输出分体机 (Ring Output Reducer)

RCI-120-15/21/30-400

应用 Application --- 600KG

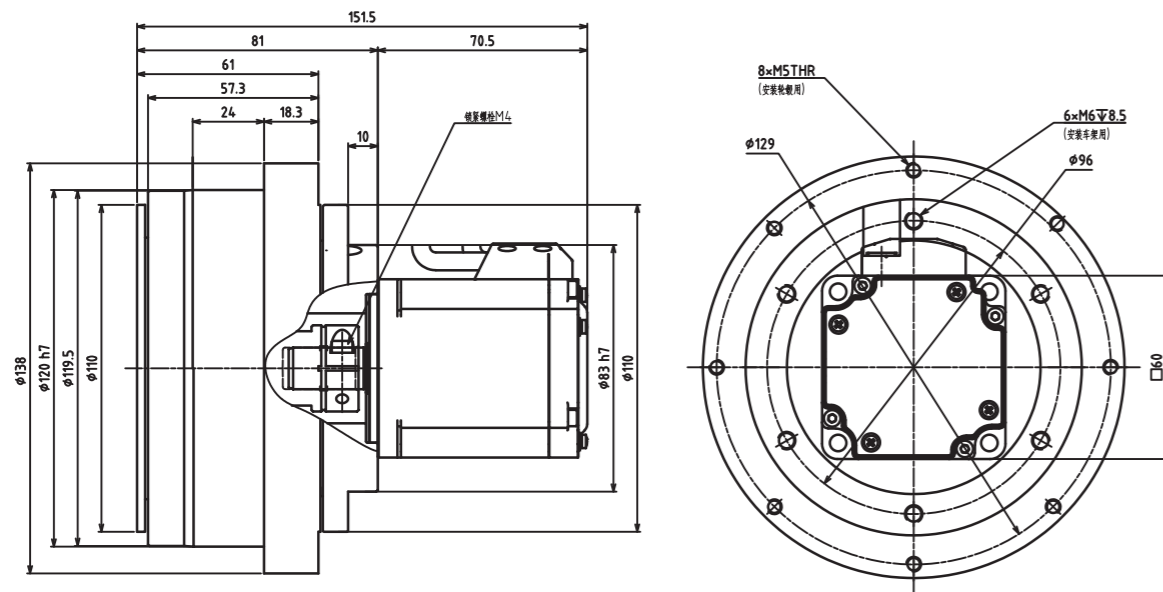


减速比	Ratio	15	21	30
容许平均输出扭矩	Nominal output torque Nm	80	80	80
容许最大输出扭矩	Maximum output torque Nm	160	160	160
平均输入回转速度	Nominal input speed rpm	3000	3000	3000
最高输入回转速度	Maximum input speed rpm	6000	6000	6000
容许径向负载	Permitted radial load N	6200	6900	7800
容许轴向负载	Permitted axial load N	3150	3650	4250

齿圈输出一体机 (Ring Output Integrated)

RCI-120-15/21/30-400

应用 Application --- 600KG

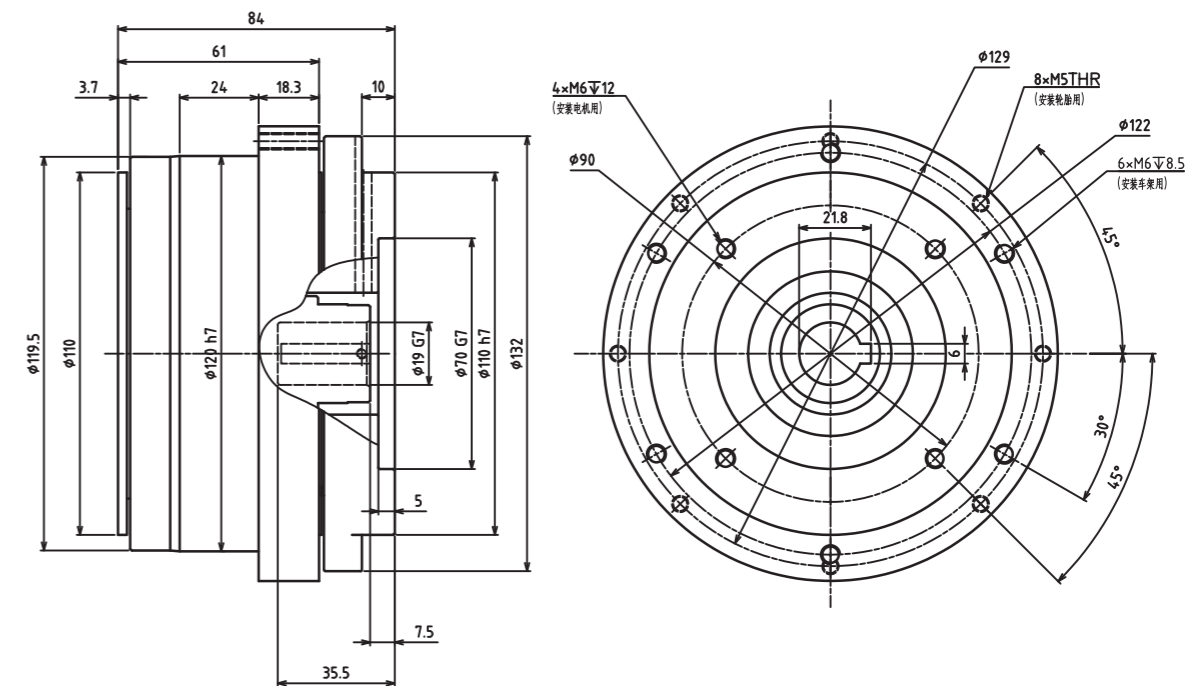


减速比	Ratio	15	21	30
容许平均输出扭矩	Nominal output torque Nm	80	80	80
容许最大输出扭矩	Maximum output torque Nm	160	160	160
平均输入回转速度	Nominal input speed rpm	3000	3000	3000
最高输入回转速度	Maximum input speed rpm	6000	6000	6000
容许径向负载	Permitted radial load N	6200	6900	7800
容许轴向负载	Permitted axial load N	3150	3650	4250

齿圈输出分体机 (Ring Output Reducer)

RCI-120-15/21/30-750

应用 Application --- 1000KG

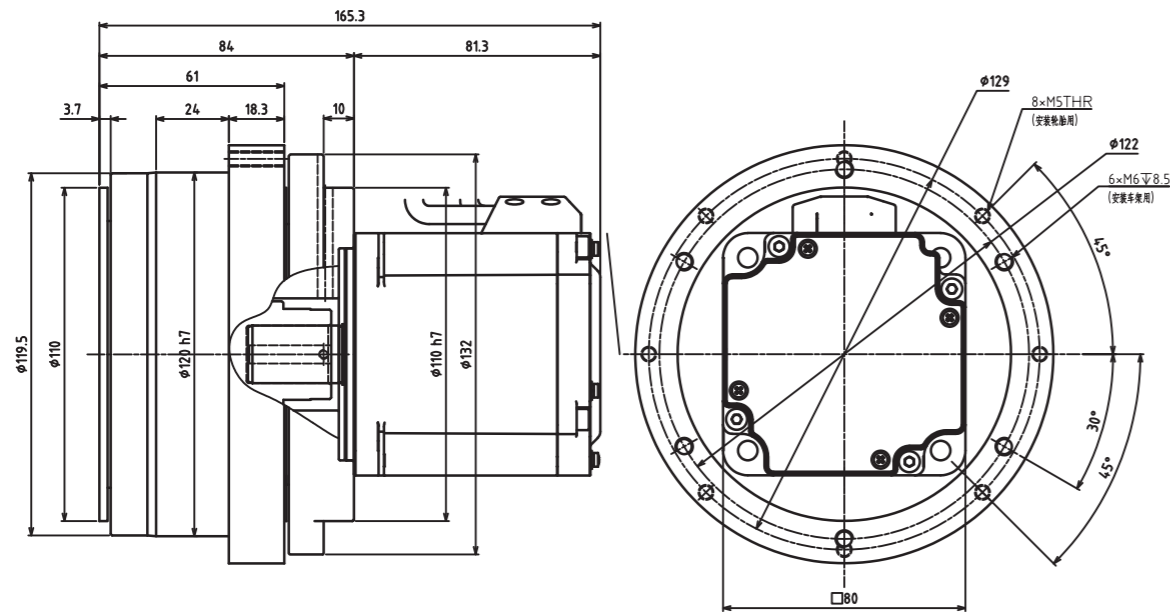


减速比	Ratio	15	21	30
容许平均输出扭矩	Nominal output torque Nm	80	80	80
容许最大输出扭矩	Maximum output torque Nm	160	160	160
平均输入回转速度	Nominal input speed rpm	3000	3000	3000
最高输入回转速度	Maximum input speed rpm	6000	6000	6000
容许径向负载	Permitted radial load N	6200	6900	7800
容许轴向负载	Permitted axial load N	3150	3650	4250

齿圈输出一体机 (Ring Output Integrated)

RCI-120-15/21/30-750

应用 Application --- 1000KG

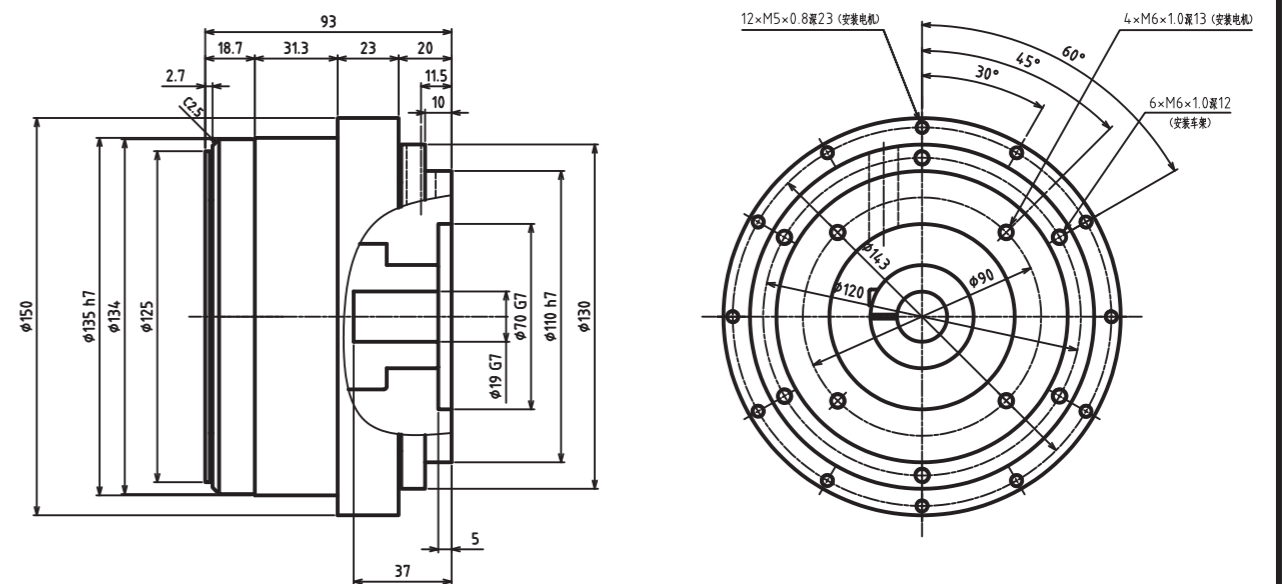


减速比	Ratio	15	21	30
容许平均输出扭矩	Nominal output torque Nm	80	80	80
容许最大输出扭矩	Maximum output torque Nm	160	160	160
平均输入回转速度	Nominal input speed rpm	3000	3000	3000
最高输入回转速度	Maximum input speed rpm	6000	6000	6000
容许径向负载	Permitted radial load N	6200	6900	7800
容许轴向负载	Permitted axial load N	3150	3650	4250

齿圈输出分体机 (Ring Output Reducer)

RCI-135-21-1000

应用 Application --- 1500KG

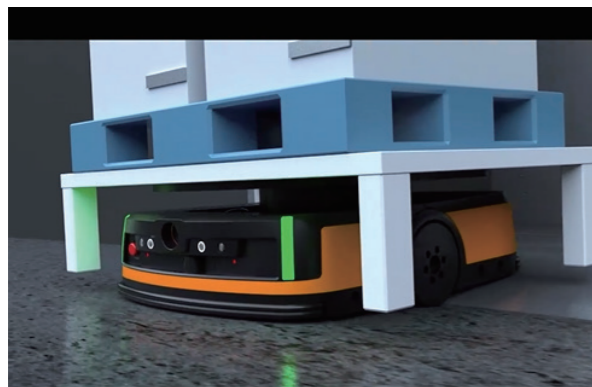


减速比	Ratio	21
容许平均输出扭矩	Nominal output torque Nm	120
容许最大输出扭矩	Maximum output torque Nm	360
平均输入回转速度	Nominal input speed rpm	3000
最高输入回转速度	Maximum input speed rpm	4000
容许径向负载	Permitted radial load N	12000
容许轴向负载	Permitted axial load N	2000

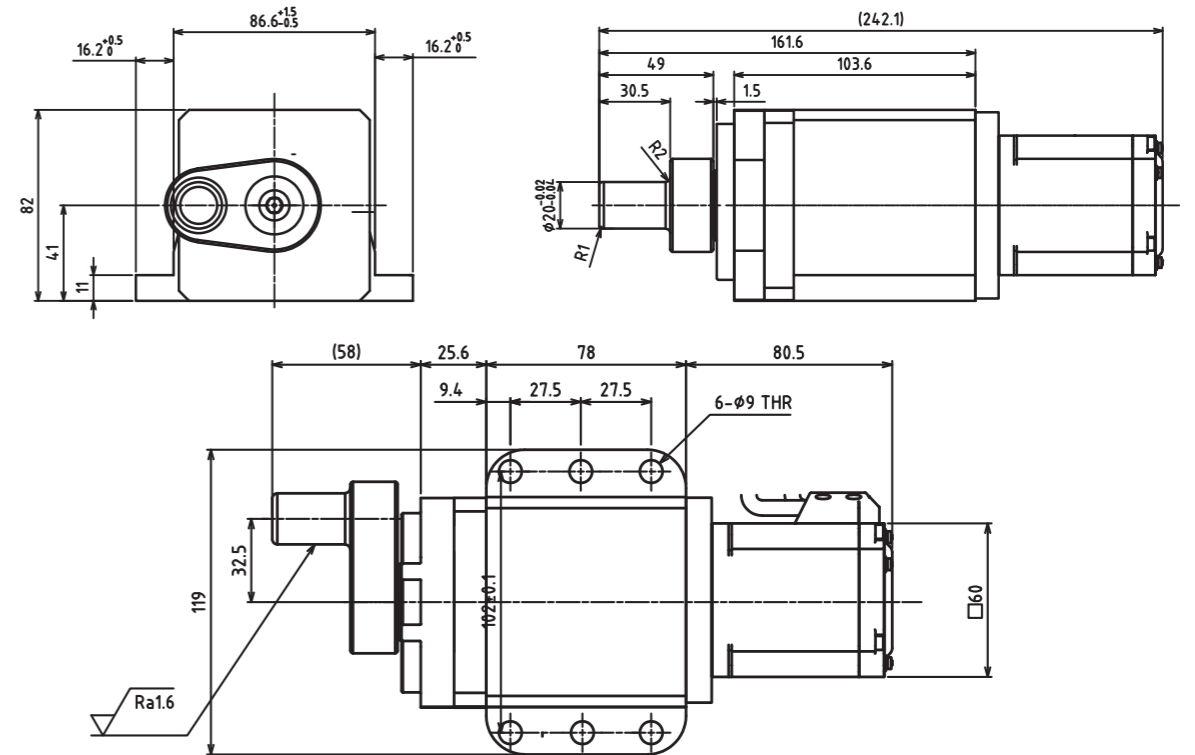
02

顶升系列

LIFTING SERIES



轴输出一体机 (Shaft Output Integrated)
RCS-090-175-400 应用 Application --- 400KG

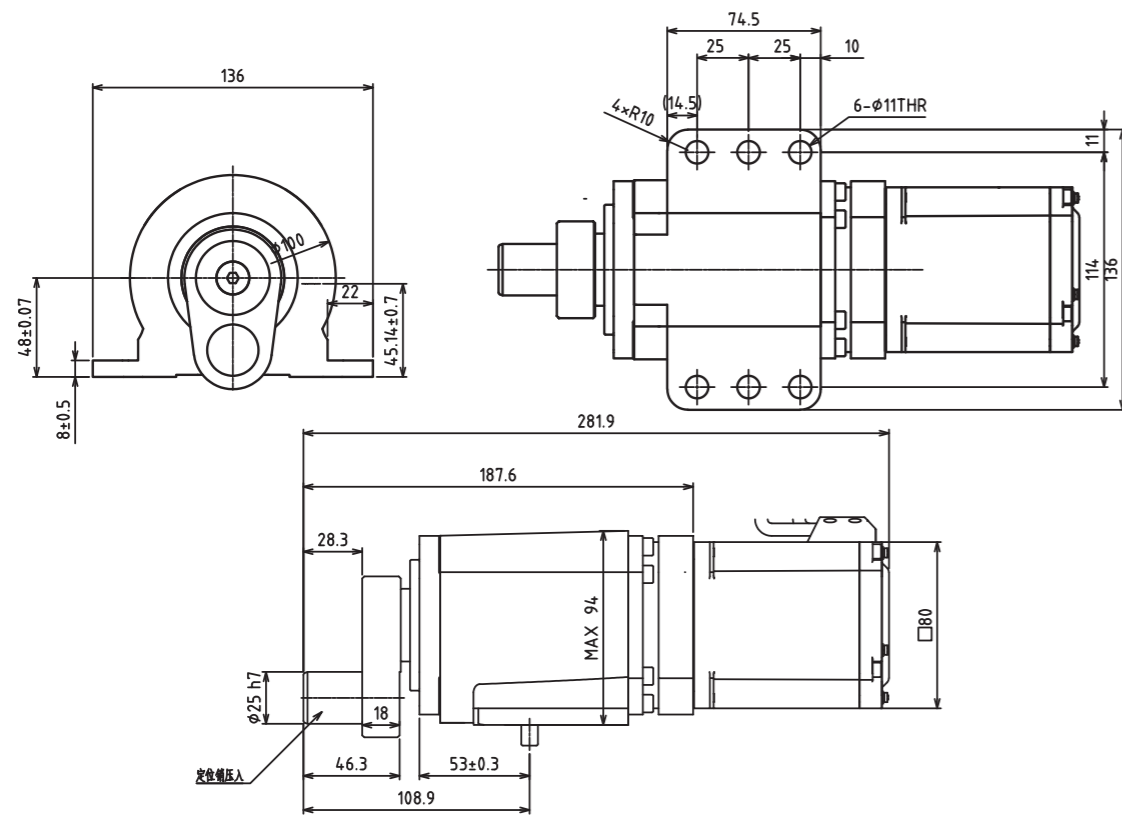


减速比	Ratio	175
容许平均输出扭矩	Nominal output torque Nm	180
容许最大输出扭矩	Maximum output torque Nm	400
输入回转速度	Nominal input speed rpm	1750
容许径向负载	Permitted radial load N	12000
容许轴向负载	Permitted axial load N	1500
背隙	arc-min	15

轴输出一体机 (Shaft Output Integrated)

RCS-110-233-750

应用 Application --- 600KG

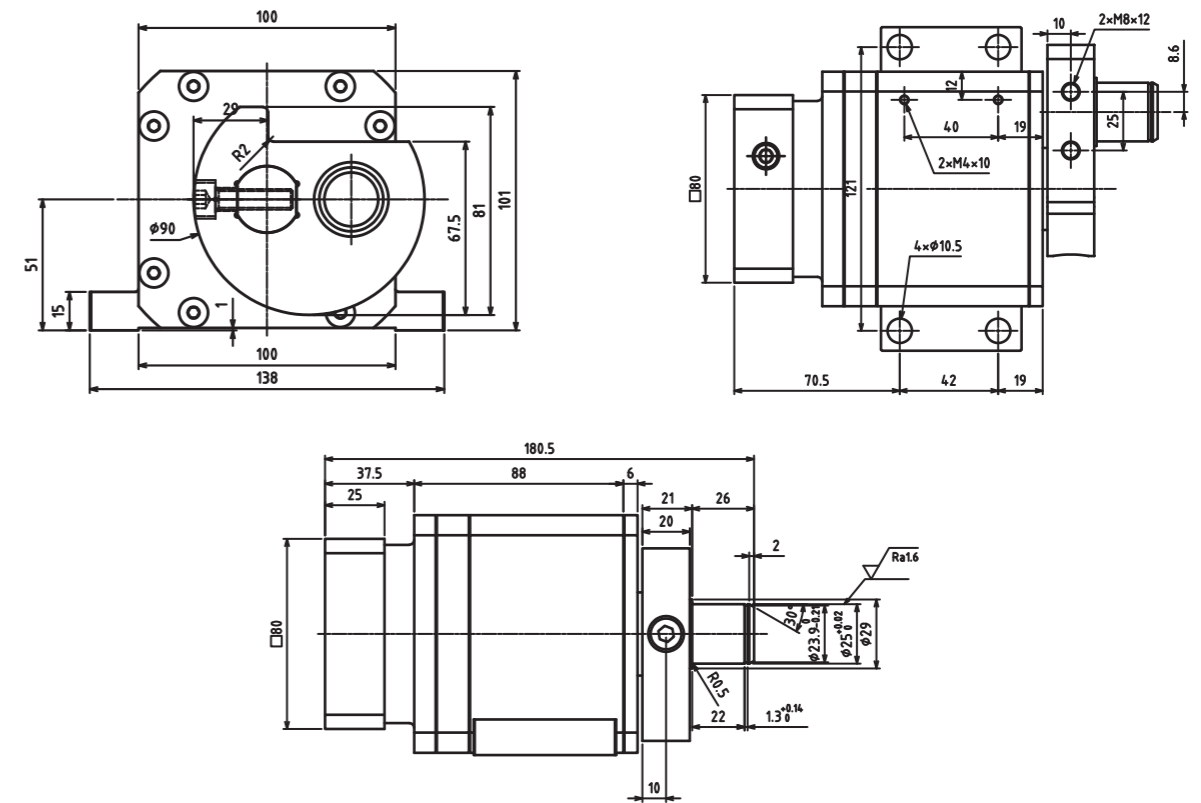


减速比	Ratio		233
容许平均输出扭矩	Nominal output torque	Nm	400
容许最大输出扭矩	Maximum output torque	Nm	600
输入回转速度	Nominal input speed	rpm	2000
容许径向负载	Permitted radial load	N	18000
容许轴向负载	Permitted axial load	N	1500
背隙	arc-min		15

轴输出分体机 (Shaft Output Reducer)

RCS-100-80-19DC19

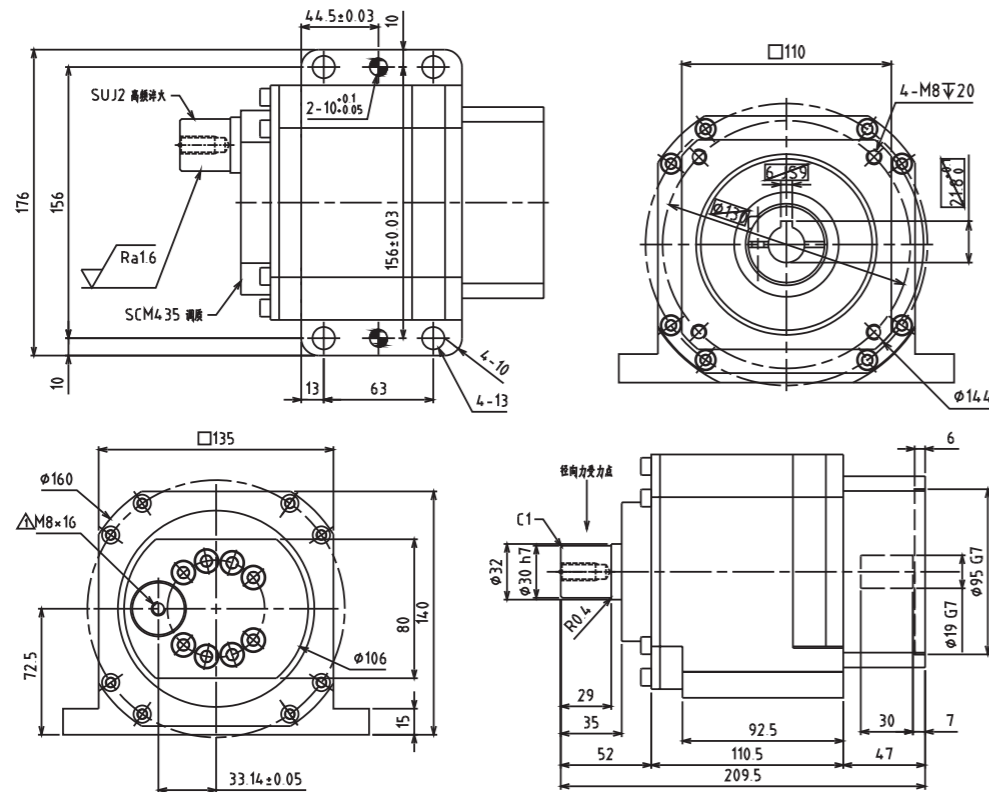
应用 Application --- 1000KG



减速比	Ratio		80
容许平均输出扭矩	Nominal output torque	Nm	190
容许最大输出扭矩	Maximum output torque	Nm	380
平均输入回转速度	Nominal input speed	rpm	3000
最高输入回转速度	Maximum input speed	rpm	6000
容许径向负载	Permitted radial load	N	8000
容许轴向负载	Permitted axial load	N	3300

轴输出分体机 (Shaft Output Reducer)
RCS-140-84-1000

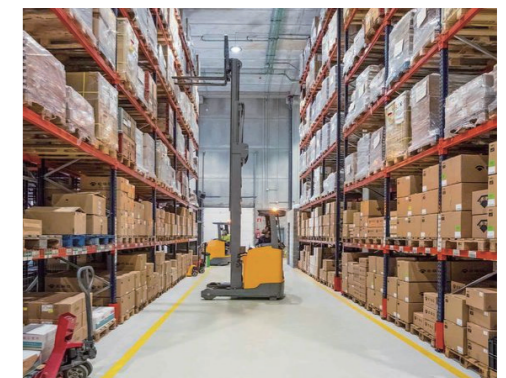
应用 Application --- 1500KG



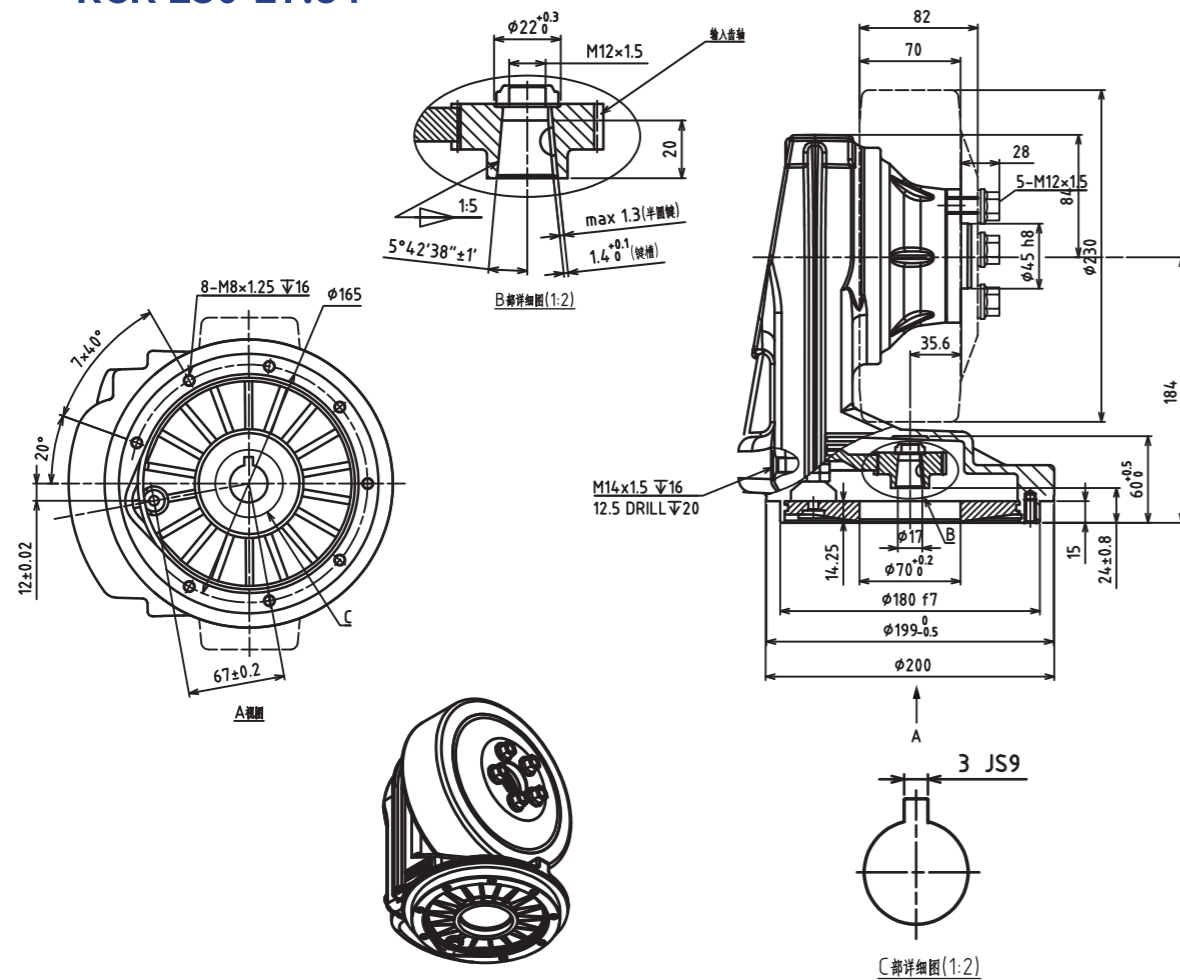
减速比	Ratio		84
容许平均输出扭矩	Nominal output torque	Nm	866
容许最大输出扭矩	Maximum output torque	Nm	1083
平均输入回转速度	Nominal input speed	rpm	3000
最高输入回转速度	Maximum input speed	rpm	4000
容许径向负载	Permitted radial load	N	25000
容许轴向负载	Permitted axial load	N	8200

03

叉车(舵机)系列
FORKLIFT SERIES



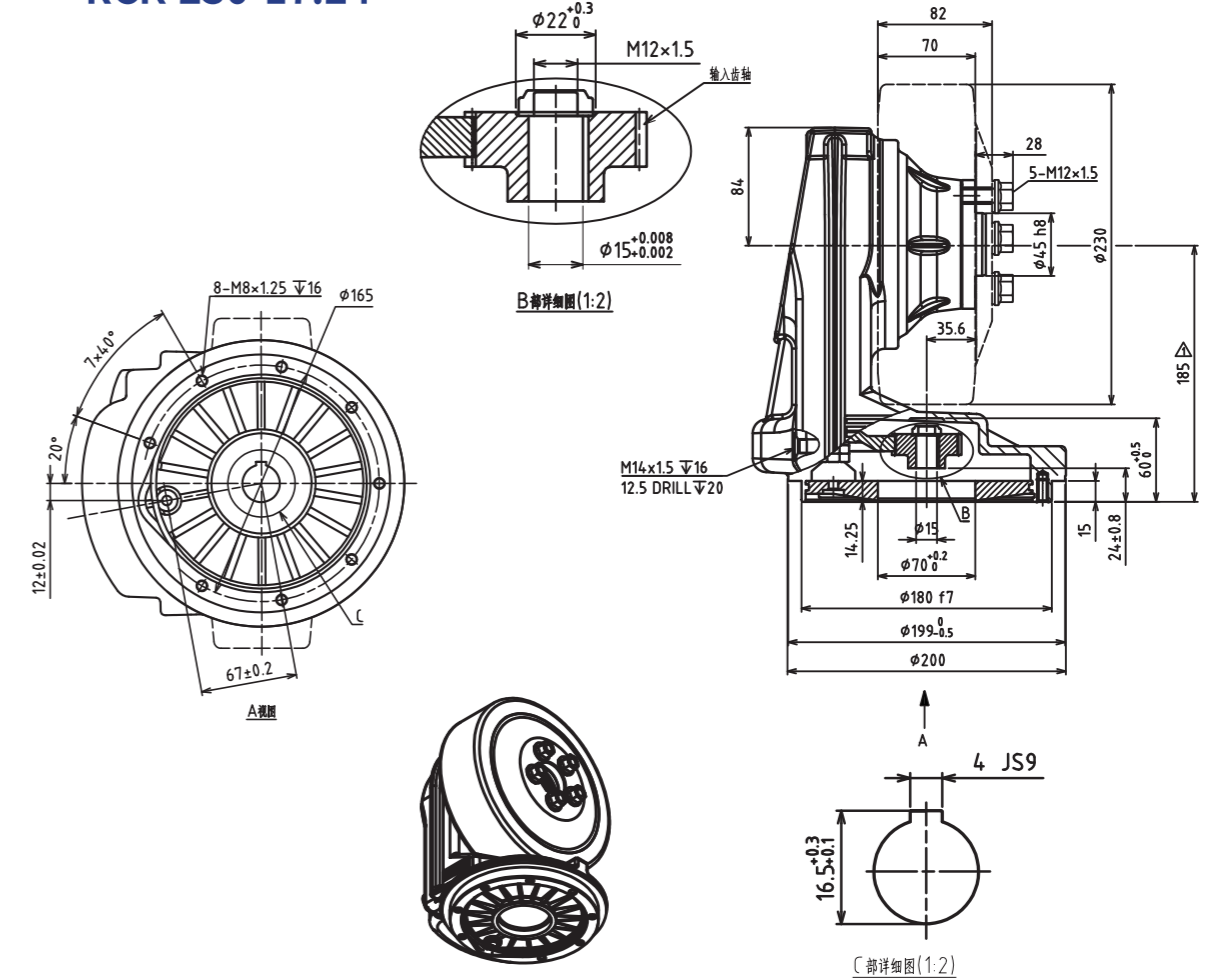
舵轮减速机 (Steering Wheel Reducer)
RCK-230-27.84



	输入齿轮	盘齿轮
模数	1.0	1.0
齿数	26	101
压力角	20°	20°
螺旋角	18°15'	18°15'
旋向	右	左

速比:1:27.84(直交部6/43,平行轴26/101)
 最大径向负载:11000N
 齿轮箱油脂:80W-90
 油量:1.2L
 总重:25kg
 工作环境:-25°C~+45°C
 额定扭矩:160Nm
 最大扭矩:490Nm

舵轮减速机 (Steering Wheel Reducer)
RCK-230-17.24



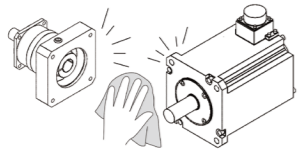
	输入齿轮	盘齿轮
模数	1.0	1.0
齿数	37	89
压力角	20°	20°
螺旋角	18°45'	18°45'
旋向	右	左

速比:1:17.24(直交部6/43,平行轴37/89)
 最大径向负载:11000N
 齿轮箱油脂:80W-90
 油量:1.2L
 总重:25kg
 工作环境:-25°C~+45°C
 额定扭矩:160Nm
 最大扭矩:490Nm

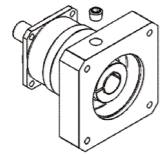
安装步骤 Installation steps

1 马达安装步骤 Mounting procedure to the motor

1 擦拭马达轴上的防锈剂、润滑脂等。
Wipe off anti-rust agent and oil on the motor shaft.

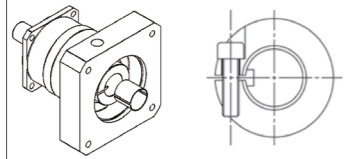


2 取下橡皮栓。
Remove the plug.



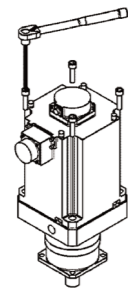
3 旋转输入轴使紧固螺栓的头对准塞孔。此时，请确认紧固螺栓是松动的。
Turn the input shaft until the cap screw is seen. Make sure the cap screw is loosened.

如带有轴套，安装方法如图所示。
In case the bushing has been attached, Please fix it to the reducer as the drawing below.



4 将减速机垂直放置在平坦的地方，使减速机的马达安装面朝上。将马达轴慢慢地插入输入轴，注意避免撞击到输入轴，请确认马达的法兰面紧靠减速机的法兰面。按指定的紧固扭矩拧紧马达安装螺栓。（参考表1）

Please place reducer vertically on the flat surface so the motor mounting part faces up. Carefully insert the motor shaft into the input shaft. (It should be inserted smoothly) Make sure the motor flange is perfectly fit to the reducer's flange. Tighten the motor installing bolts to the proper torque. (See table 1)



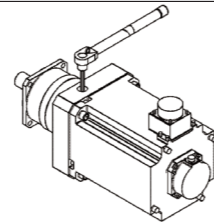
2 减速机的安装

要将减速机安装到设备上时，请先确认安装面平坦且没有毛刺等，然后使用转矩扳手等按照指定的紧固扭矩拧紧螺栓。（参考表2）

Reducer installation

After confirming the installation surface is flat and clean, tighten the bolt using a torque wrench to the proper torque. (See table 2)

5 使用转矩扳手等按照指定的紧固扭矩拧紧紧固螺栓。（参考表1）
Tighten the clamping bolt of the input shaft with torque wrench to the proper torque. (See table 1)



6 安装上橡皮栓，安装完成。
Reinstall the plug. The procedure is done.

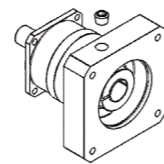


表1 Table 1

螺栓尺寸 Bolt size	马达安装螺栓 Motor installing bolts		紧固螺栓 Clamping bolt	
	Nm	kgfm	Nm	kgfm
M3	1.1	0.11	1.9	0.18
M4	2.5	0.26	4.3	0.44
M5	5.1	0.52	8.7	0.89
M6	8.7	0.89	15	1.5
M8	21	2.1	36	3.7
M10	42	4.3	71	7.2
M12	72	7.3	125	13
M16	134	14	-	-

表2 Table 2

螺栓尺寸 Bolt size	紧固扭矩 Tightening torque	
	Nm	kgfm
M3	1.9	0.18
M4	4.3	0.44
M5	8.7	0.89
M6	15	1.5
M8	36	3.7
M10	71	7.2
M12	125	13
M16	310	32
M20	603	62

※推荐螺栓：强度12.9以上
※Recommended bolt: Strength 12.9

安全注意事项 Security considerations

保管时的注意事项

需要暂时保管本产品时，
请遵照下列要领进行。

- ① 放在清洁干燥的场所进行保管。
- ② 若放在室外或有潮气的场所保管时，应装入箱内并用塑料等严密包裹，以避免受雨淋或外气的侵蚀（采取防结露、生锈措施）。

■ 运行时的注意事项

■ 减速机到厂后…

- 减速机到货后请确认减速机型号是否与订购的型号相同。
- 减速机输出轴、输入轴上涂有防锈剂，请擦拭后使用。
- ※取下输入轴的橡胶栓，擦拭防锈剂。
- ※减速机上已充填完润滑油（油脂）。本机到厂后即可使用。

■ 安装、设置

- 请勿在会直接接触雨或水的场所使用。
- 需要在室外或受粉尘、水滴影响的场所使用时，请先与本公司联系。
- 温度设置为0℃~40℃。
- 如在上述温度范围外使用本机时，必须与本公司联系。
- 将本机设置在不会振动且坚固的安装台上，并用螺栓紧固。
- 设置时应考虑到保养维修的便利性。

■ 运行开始前的注意事项

- 本公司产品出货时已填充了规定量的润滑脂，到货后可直接使用。
- 初次运行时，应先确认输出轴的旋转方向后，再慢慢地增加负荷。

■ 运行中的注意事项

- 请注意不要超负荷。
- 输入转速不得超过规定以上的转速。
- 发生下列情况时，请暂停运行立即进行检查。
- 温度突然上升
- 突然出现很大的异常声
- 转速突然变得不稳定

● 保修规定

- 保修范围只限交付产品单体。
- 以下费用和损害不在保修范围内。
- 1) 本产品的运输费。
- 2) 本产品与其它装置等连接或装入后从该装置等上拆下、安装或其它附带施工的费用。
- 3) 因本产品的故障，发生了使利用者失去使用机会或业务中断等造成的间接损害。
- 4) 其它所有派生的或伴随的损害。

- 如果这些原因是由下列事项造成，应立即采取应对措施或与本公司联系。
- 是否处于超负荷状态？
- 是否润滑油不足、老化或使用不同品种的润滑油？
- 轴承、齿轮、传动面有无损伤？
- 是否与关联机械连接等的条件不良？

■ 分解

- 减速机为不能分解的结构。

■ 保修

- 保修期间为交付产品后起1年。

■ 润滑油管理

- 减速机的全部机种均采用润滑脂润滑密封方式。出厂前已充填了定量的润滑油，到厂后即可使用。
- 不能更换润滑脂。
- 在周围温度常时0℃~40℃以外的环境中使用时，请事先咨询本公司。

■ 每天检查

- 运行中的减速机的外壳温度有无异常增高。（如果周围温度在+50℃以内的话，没有大问题）
- 轴承、齿轮部等有无异常声音。
- 减速机有无异常振动。
- ※如果发生这些现象时，请立即停机并与本公司联系。
- 润滑油有无泄漏。
- ※发生油脂泄漏时，请与本公司联系。

■ 定期检查

- 有无超负荷或异常旋转。
- 滑轮、链轮、减速机安装螺栓等有无松动。
- 电气系统有无异常。
- 主要部件的检查和维修
- ※发生异常现象时，请立即停机并与本公司联系。
- 润滑油的问题
- ※发生油脂泄漏时，请与本公司联系。

■ 废弃方法

- 废弃减速机时，应根据法令和各自自治体的条例等，将部件按材料分类，作为产业废弃物进行处理。
- 部件材料分成以下4种。
- ① 橡胶制部件：油封、密封垫圈、橡胶盖、马达法兰侧的轴承上使用的密封部
 - ② 铝制部件：马达法兰、输出轴座
 - ③ 润滑脂：用于布等擦拭附在部件上的润滑脂，作为油类废弃
 - ④ 铁制部件：上述以外的部件

安全注意事项 Security Considerations

Cautions for storage

Whenever temporarily keeping the product, keep the following directions:

- ① Keep in a clean and dry place.
- ② Whenever storing outdoors or in a humid place, put in a box so that it does not directly contact rain or external air and cover with a vinyl sheet (Take a measure to prevent rust.).

■ Cautions for operation

■ When the reducer is delivered to you . . .

- When the product delivered, please confirm that you received the exact same model you have ordered.
Please wipe out the input and output shaft of the reducer which is covered by anti-corrosive oil.
※ Please remove the rubber cap on the input shaft before you wipe the shafts.
※ Lubricant (grease) is already filled in the reducer.
It is available as it is.

■ Fixation & installation

- Avoid use in a place where rain or water drops directly.
 - In case of use outdoors or in a place where dust and water drops, consult in advance.
- Install at 0°C-40°C of surrounding temperature.
 - In case of use at temperature out of the above-mentioned range, contact the headquarters and consult on this.
- Firmly fix with a bolt onto a solid stand without vibration.
- Install in consideration of convenience in repair and inspection.

■ Cautions prior to starting the operation

- Reducer can be used soon after arrival, since it has already been filled out with lubrication.
- At initial operation, check the rotating direction of the output shaft and then gradually apply load.

■ Cautions during operation

- Avoid overload.
- Ensure that input speed shall not be the number of revolutions beyond the specification.
- In the following cases, stop the operation and check the following points:
 - If temperature sharply increases
 - If an abnormal noise appears sharply
 - If the number of revolutions becomes unstable sharply

- These may be caused by the following matters, so rapidly respond to it or contact us.
 - Is it under overload condition?
 - Is lubricant insufficient or deteriorated, or is lubricant of other type used?
 - Is the axis, gear, and motor side damaged?
 - Is jointing with other machines poor?

■ Disassembly

- REDUCER is designed not to allow disassembly.

■ Warranty

- A warranty period is one year after the product is delivered to you.

■ Lubricant use

- The REDUCER is of grease-seal type in all models.
A specified amount of grease is filled at factory release, so you can use as soon as it is delivered to you.
- It is impossible to exchange grease.
- In case of use at 0°C-40°C of surrounding temperature at usual times, consider this in advance.

■ Daily check points

- Is reducer case temperature excessively high during operation? (Up to + 50°C is not significant.)
- Is there an abnormal noise in the bearing, gear, etc?
- Is there abnormal vibration in the reducer?
 - * Upon an abnormal phenomenon, immediately stop the operation and contact us.
- Is there a lubricant leak?
 - * Upon an oil leak, contact us.

■ Periodic check points

- Are there overload and abnormal rotation?
- Are free, sprocket, and reducer assembling bolts loose?
- Is there an abnormal condition in the electric system?
- Checkup and repair of major parts
 - ※ Upon an abnormal condition, immediately stop the operation and contact us.
- Oil leak
 - ※ Upon an oil leak, contact us.

■ Scrapping

Whenever scrapping the REDUCER, classify the parts by material into industrial wastes as specified in the laws and regulations of self-governing bodies. Material of parts can be divided into four:

- ① Rubber parts : Oil seal, seat packing, rubber cap, seal used for bearing on the motor flange, etc.
- ② Aluminum parts : Motor flange, output shaft holder
- ③ Grease : Wipe off grease attached to parts with dry cloth and scrap into oils.
- ④ Iron parts : Parts other than those mentioned in the above

WARRANTY PROVISION

· Warranty scope is the delivered product only.

■ THE EXPENSES AND LOSSES THAT MENTIONED BELOW ARE NOT INCLUDED IN WARRANTY

- 1) The transport charges for repairing of our products.
- 2) The fee for the removal operation, reinstallation and other related operation in case our product is installed to other machine.
- 3) The loss of the chances of use and indirect damages caused by the interruption of the services caused by our product's defects.
- 4) All other secondary expenses and losses.

MEMO

