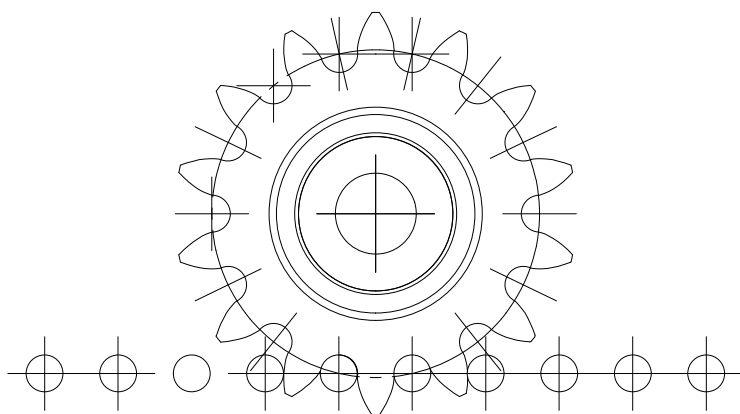




零背隙

齿（滚销）常时2~3处保持接触，正反方向上不会发生齿背间隙。

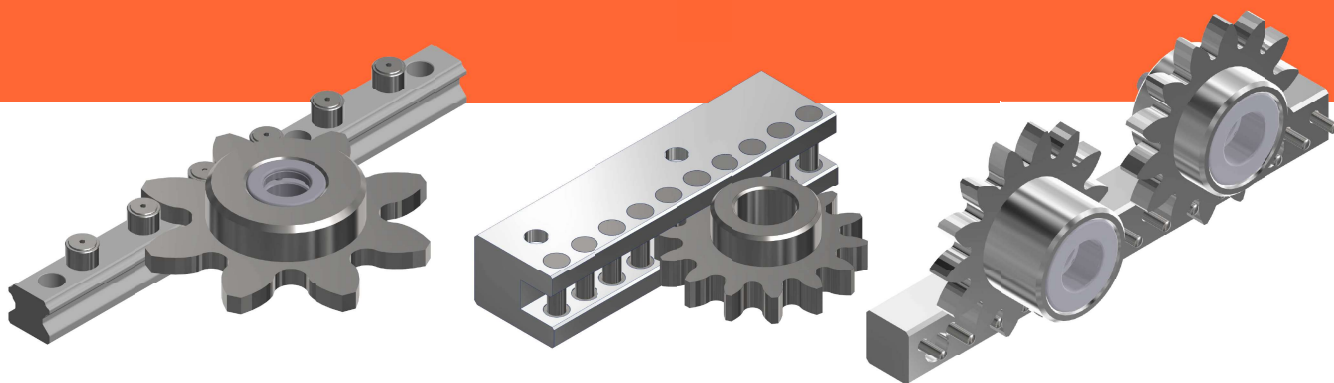
低噪音・低振动

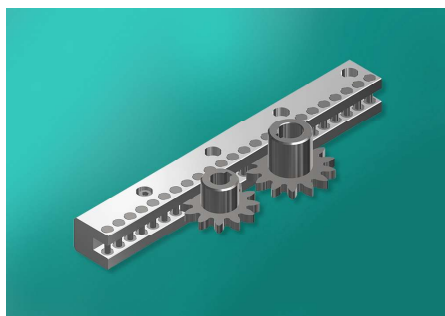
滚针轴承支撑的滚销在次摆线齿面上圆滑滚动。不发生令人不悦的敲齿音和滚动声。

齿轮和齿条

Gear and Rack

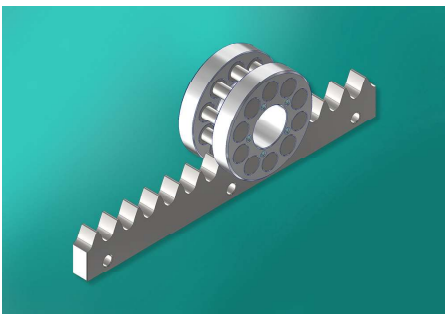
特别设计的发明产品





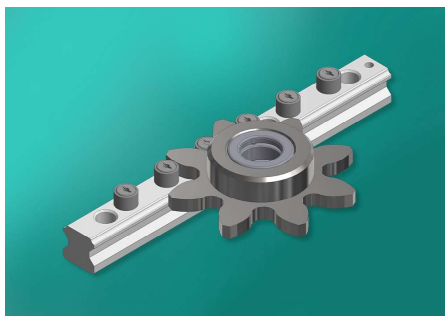
• ACRA 齿条齿轮

亚母斯(AMS)生产的ACRA齿条是专利产品，采用铝合金材质构成，不生锈，可在各种潮湿环境下使用，成本低，精度高，可高速行驶(3M/sec)



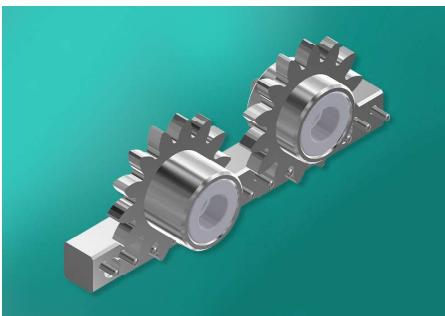
• CRP 齿条齿轮

CRP齿条由S45C钢制成，目前在全世界生产产地屈指可数：韩国2家、日本1家、台湾1家以及中国1家-亚母斯(AMS)生产并销售全世界的产品，环状曲线结构，是具有高精度的产品。



• ACRC 齿条齿轮

亚母斯(AMS)生产的ACRC产品是专利产品，是利用现有的非常精密的直线导轨，在其上端面安装CAM圆柱销结构的齿条齿轮。具有高精度，可高速行驶，在特殊环境下可使用的工程塑料材质的圆柱销，可实现低噪音高速行驶。



• ACRP 齿条齿轮

非常低廉的精密的齿条齿轮产品，齿条由铝合金材质制或一般钢制材质。齿轮采用了环状曲线形状，低廉的成本，重复精度误差在0.05mm以内。



• APDU 齿条齿轮

这是一款可以在灰尘非常多的工厂及室外环境中使用的齿条齿轮。在恶劣天气或脏乱的地方也可以使用，有一般钢材质和不生锈的材质结构可供顾客选择

相关商品发明专利申请中！

AMS® 齿轮和齿条

Rack/Ring & Roller Pinion

零背隙 ACRA齿条/齿圈 & 滚轮

零 背 隙

齿（滚销）常时2-3处保持接触，正反方向上不会发生齿背间隙。

低 价 格

标准型齿条在零背隙(同高精度型)的前提下，实现低价格。

高 精 度

进给精度（回转-直线比）和定位精度逼近精密滚珠丝杆。

低 噪 音 低 振 动

滚针轴承支撑的滚销在次摆线齿面上圆滑滚动。不发生令人不悦的敲齿音和滚动声。同时也减少了振动。

低 发 尘

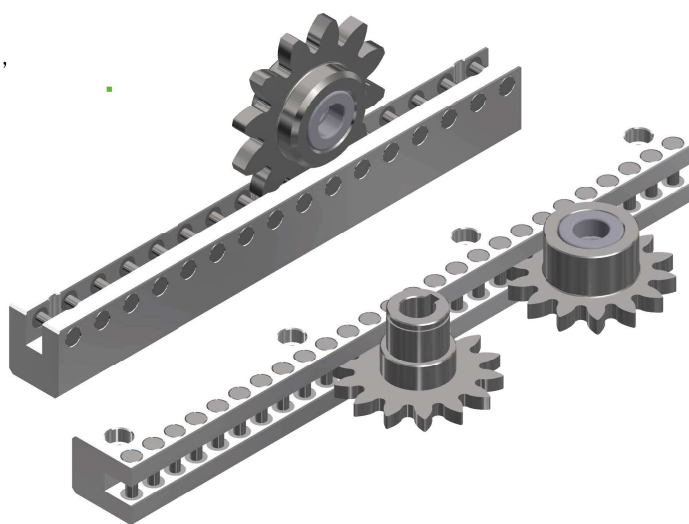
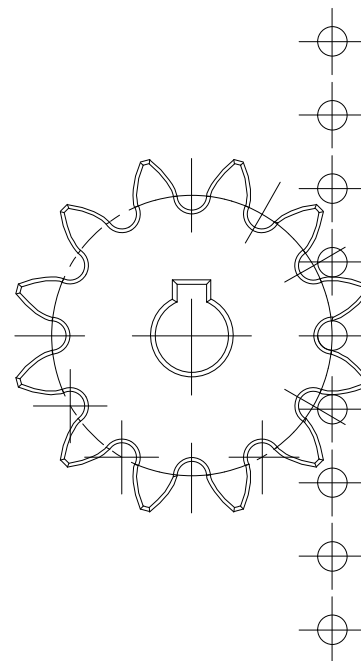
由于是圆滑的滚动接触，同时旋转部分是小径低速，低摩擦只产生微小的发热和发尘。

实现长距离，高速化

使用接续夹具可以实现长距离传动。
可以进行180m/min以上的高速行走。

实现分割·大直径（齿圈）

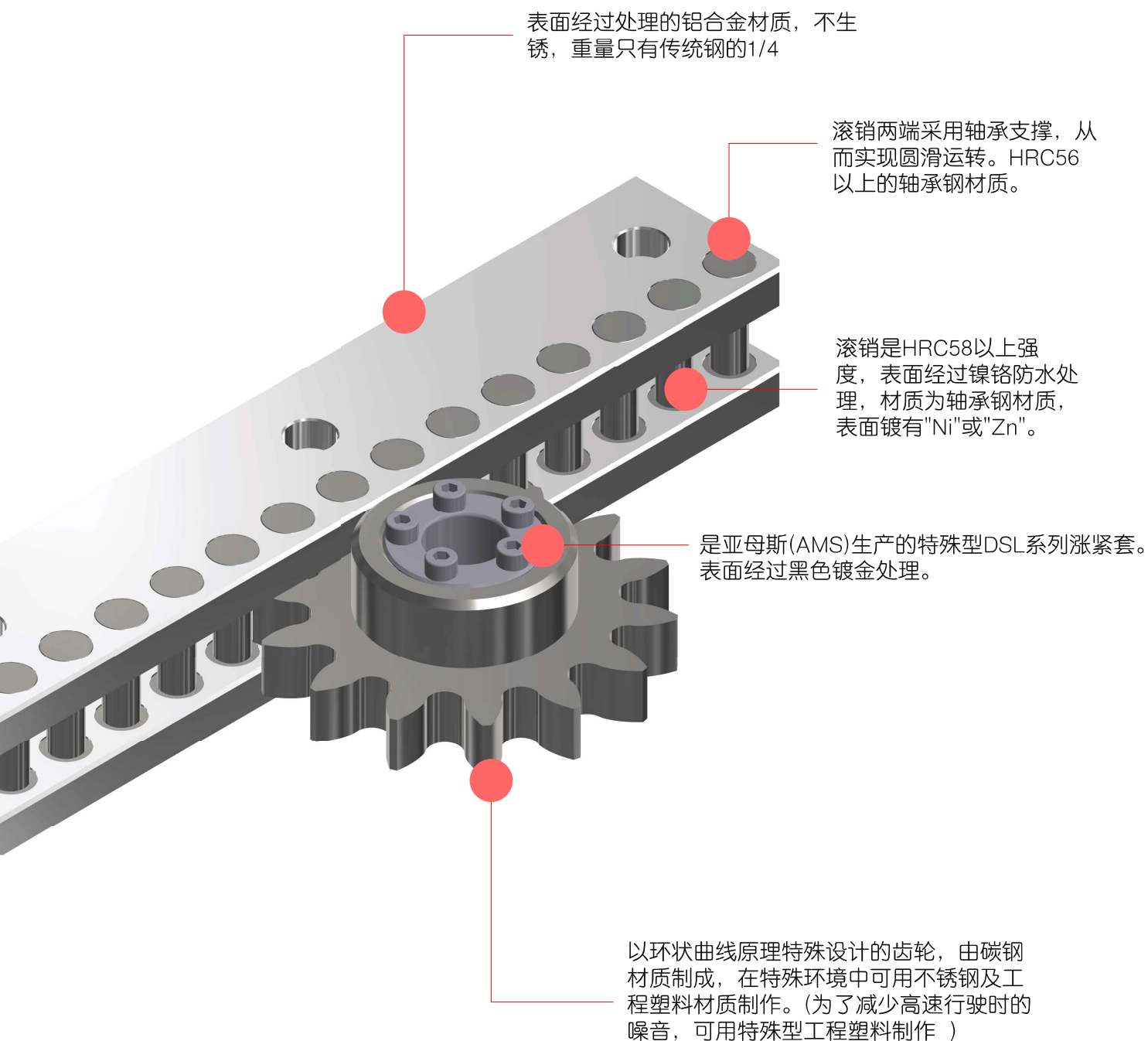
通过加工中心加工，实现分割齿圈。
根据需要使用的度数以及通过组合分割齿圈来实现数十米大直径。



相关商品发明专利申请中！

AMS® 齿轮和齿条

以下产品的材质是G3标准结构。

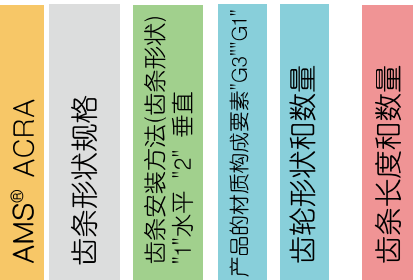


相关商品发明专利申请中！

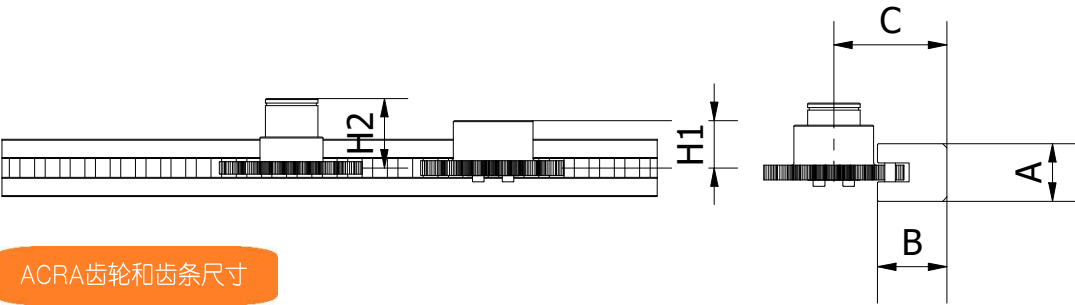
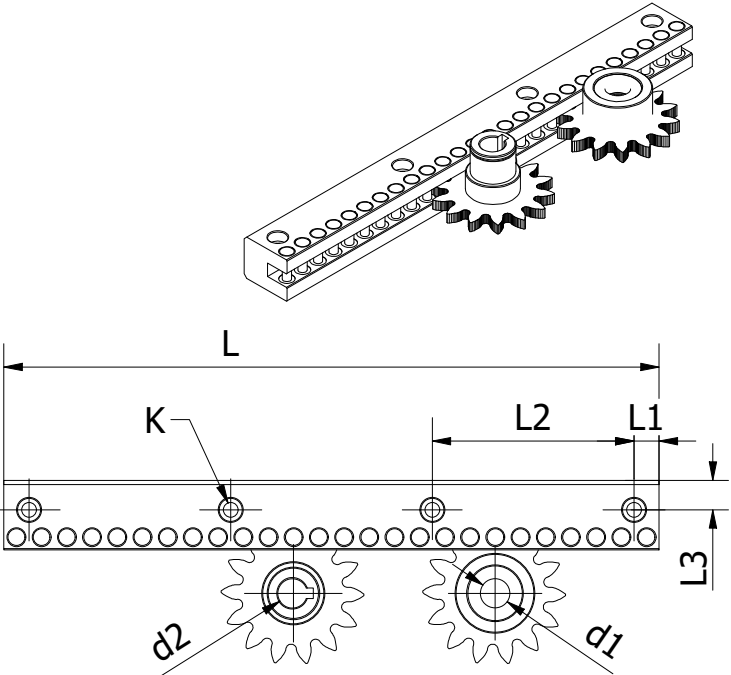
AMS® 齿轮和齿条

公称型号的构成例

ACRA041012(1)-G3-P1(1)-780(1)



参考G3材质构成第4页。
参考G1材质构成第10页。
详细的标准长度参考第9页。



ACRA齿轮和齿条尺寸

单位：mm

公称型号	ACRA齿轮和齿条尺寸											
	Pich	A	B	C	H1	H2	L1	L2	L3	d1	d2	K
ACRA-041214(1)	12	25.7	30	46.75	23	21	10	60	12	13	13	11X6.5X7
ACRA-051214(1)	12	27.4	33	53.75	22.5	33	12	96	14	14	14	11X6.5X7
ACRA-061614(1)	16	32.5	43	71.65	30.5	-	16	96	18.5	22	-	15X9X8.5
ACRA-081814(1)	18	38	47	78.11	30	44.5	18	108	18	22	19	15X9X8.5
ACRA-102014(1)	20	44	58	91.57	30	-	20	120	22	22	-	17X11X11
ACRA-122514(1)	25	49.5	68	110.77	31	-	25	100	34	22	-	17X11X11
ACRA-163214(1)	32	69.5	90	144.35	42.5	-	32	160	38	28	-	20X13X13.5
ACRA-224014(1)	40	98.5	110	177.2	74.5	-	40	160	35	48	-	26X18X17

d1、d2直径可根据顾客要求制作。（请咨询负责人）

1N = 0.102Kg
1N,m = 0.102Kg.m

相关商品发明专利申请中！

AMS® 齿轮和齿条

齿轮和齿条精度规格

单位：mm

精度规格		亚姆斯（AMS）所有齿轮和齿条精密度标准表							
		ACRA-041214(1)		ACRA-051214(1)			ACRA-061614(1)		
		精密级	普通级	精密级	普通级	标准型	精密级	普通级	标准型
标准型 高精度型 通用规格	传动精度[μm]	—	±40	—	±65	±100	—	±65	±100
	单一节距误差[μm]	—	70	—	70	100	—	70	100
	往复定位精度[μm]	—	20	—	20	30	—	20	30
滚 轮	单一节距误差[arcsec]	—	±270	—	±210	±120	—	±140	—
	累计节距误差[arcsec]	—	±410	—	±320	±180	—	±210	—
标准型 高精度型 齿 条	单一节距误差[μm]	—	±20	—	±20	±30	—	±20	±30
	累计节距误差[μm]	—	±50	—	±50	±50	—	±50	±50
	齿顶高误差[μm]	—	30	—	30	60	—	30	60
	齿高方向弯曲度[μm]	—	0.3	—	0.3	—	—	0.3	—
	齿侧方向弯曲度[μm]	—	—	—	—	—	—	0.3	—

注意:arcsec是1度除以3600等分的值

基本的销售产品是标准型和普通型。

以上数值为在弊社推荐的安装精度条件下，并装配温度在20°情况下的数值。

1N = 0.102Kgf

1N,m = 0.102Kgf.m

	精度规格	亚母斯（AMS）所有齿轮和齿条精密度标准表								
		ACRA-081814(1)			ACRA-102014(1)			ACRA-122514(1)		
		精密级	普通级	标准型	精密级	普通级	标准型	精密级	普通级	标准型
标准型	传动精度[μm]	—	±65	±100	—	±65	±100	—	±65	±100
高精度型	单一节距误差[μm]	—	70	100	—	70	100	—	70	100
通用规格	往复定位精度[μm]	—	20	30	—	20	30	—	20	30
滚 轮	单一节距误差[arcsec]	—	±110	—	—	±110	—	—	±90	—
	累计节距误差[arcsec]	—	±170	—	—	±170	—	—	±140	—
标准型 高精度型 齿 条	单一节距误差[μm]	—	±20	±30	—	±20	±30	—	±20	±30
	累计节距误差[μm]	—	±50	±50	—	±50	±50	—	±50	±50
	齿顶高误差[μm]	—	30	60	—	30	60	—	30	60
	齿高方向弯曲度[μm]	—	0.3	—	—	0.3	—	—	0.2	—
	齿侧方向弯曲度[μm]	—	—	—	—	—	—	—	0.3	—

1N = 0.102Kgf

1N,m = 0.102Kgf.m

相关商品发明专利申请中！

AMS® 齿轮和齿条

齿轮和齿条精度规格

精度规格		亚母斯（AMS）所有齿轮和齿条精密密度标准表								
		ACRA-163214(1)			ACRA-224014(1)			ACRA-224014C(1)		
		精密级	普通级	标准型	精密级	普通级	标准型	精密级	普通级	标准型
标准型	传动精度[μm]	—	±65	±100	—	±65	±100	—	±65	±100
高精度型	单一节距误差[μm]	—	70	100	—	70	100	—	70	100
通用规格	往复定位精度[μm]	—	20	30	—	20	30	—	20	30
滚 轮	单一节距误差[arcsec]	—	±60	—	—	±45	—	—	±45	—
	累计节距误差[arcsec]	—	±90	—	—	±70	—	—	±70	—
标准型	单一节距误差[μm]	—	±20	±30	—	±20	±30	—	±20	±30
高精度型	累计节距误差[μm]	—	±50	±50	—	±50	±50	—	±50	±50
齿 条	齿顶高误差[μm]	—	30	60	—	30	60	—	30	—
	齿高方向弯曲度[μm]	—	0.2	—	—	0.15	—	—	0.15	—
	齿侧方向弯曲度[μm]	—	0.3	—	—	0.3	—	—	0.3	—

• 亚母斯(AMS)齿条 & 滚轮安装精度表

- 1.架设加工面希望精度为0.05mm，不得超过0.1mm。
- 2.中心轴摆动在0.03mm以内，不得超过0.05。
- 侧面平面图是使用一个齿条齿轮时0.2mm以内，整体组合时0.6mm
最大使用一个齿条齿轮时，应在0.4mm以内，全组合时应在0.8mm以内。
- 3.不符合这些要求，将出现以下问题。

<注意>

按照2动作允许范围内的组装精度来进行安装的情况下，ACRA齿条的传动精度、背隙、允许负载能力上面都会有所影响。影响的程度估值如下：

对背隙的影响 参考值：[齿顶 平行度 (mm) + 滚轮的轴跳动 (mm)] × 0.8 (mm)

对于允许负载能力的影响，请考虑齿条选型计算的安装精度系数。

但是，上述数值只是ACRA单体的数值，根据设备构成、刚性、安装方法等不同，可能会受到更大的影响。

相关商品发明专利申请中！

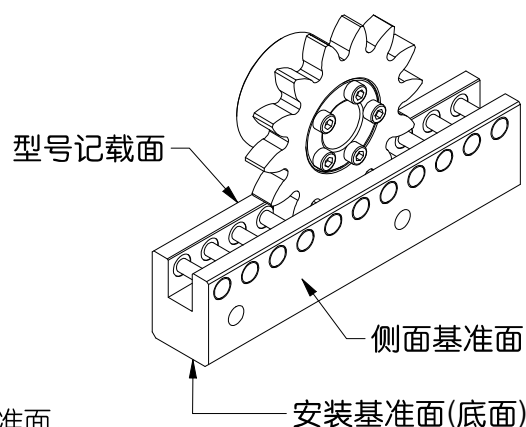
AMS® 齿轮和齿条

ACRA齿条、滚轮安装方法

- 请将齿条贴紧在安装基面上

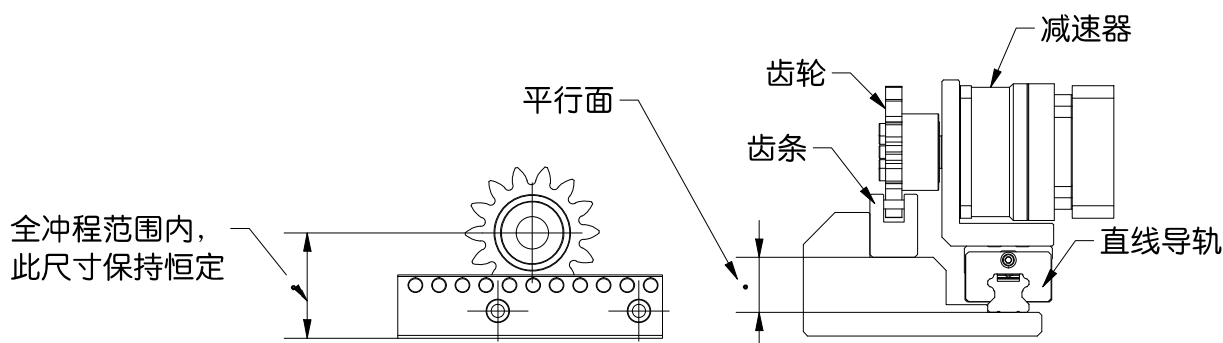
为了校正齿条的弯曲度，请扎实地将齿条固定在非常平直的安装面上。

否则齿面本身的弯曲沉浮会保持原样，会发生停止精度误差以及产生背隙等的原因。型号记载面的反面为侧面基准面。



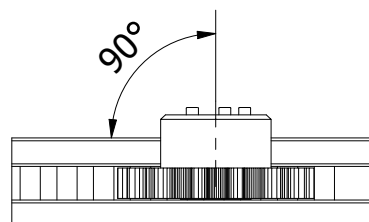
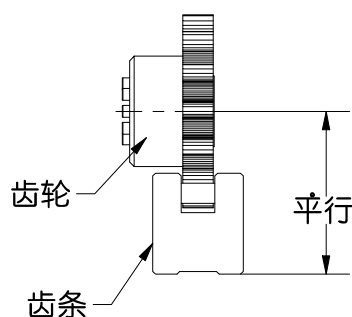
- 直线导轨为必需品

在与齿条安装基准面平行的平面上安装直线导轨



- 滚轮的回转轴保持与齿面平行！与前进方向保持直角！

如果滚轮轴相对于齿条发生倾斜的话，那么滚销和齿面的接触为“单侧接触”，此情况会对精度，噪音，振动，寿命带来负面影响。另外在重载的情况下，滚轮轴会弯曲上浮，所以滚轮轴为两侧支持的结构最为理想。



相关商品发明专利申请中！

AMS® 齿轮和齿条

ACRA齿条、标准长度(L)尺寸

对于长度不规范的，在第5页要注意"L1"尺寸。

单位：mm

商品规格	螺栓孔 pitch	ACRC-齿条(L) 标准长度(最大3000mm)									
ACRA-041214(1)	96	120	216	312	408	504	600	696	792	888	984
ACRA-051214(1)	96	120	216	312	408	504	600	696	792	888	984
ACRA-061614(1)	96	128	224	416	512	608	704	800	896	992	
ACRA-081814(1)	108	144	252	360	468	576	684	792	900		
ACRA-102014(1)	120	160	280	400	520	640	760	880	1000		
ACRA-122514(1)	100	150	250	350	450	550	650	750	850	950	
ACRA-163214(1)	160	224	384	544	704	864					
ACRA-224014(1)	160	240	400	560	720	880					

1N = 0.102Kgf

1N,m = 0.102Kgf.m

ACRA齿条、基本负载表格

单位：N

商品规格	基本动额定负载	最大使用负载	允许静额定负载	基本动额定扭矩(N.m)	最大使用扭矩(N.m)	允许静额定扭矩(N.m)	滚轮回转一圈的移动距离
ACRA-041214(1)	250	250	380	4	4	6	140
ACRA-051214(1)	500	500	750	9.5	9.5	14.3	168
ACRA-061614(1)	1000	1700	2000	25.5	43.3	50.9	224
ACRA-081814(1)	1200	2000	2500	36.5	61.3	576	252
ACRA-102014(1)	1500	2200	3000	47.7	70.1	140.3	280
ACRA-122514(1)	2200	3100	4400	87.5	123.4	175.1	350
ACRA-163214(1)	3600	6600	7200	220	403.3	440	448
ACRA-224014(1)	15000	18000	26000	1146	1375.2	1986.4	560

如果想要以相同规格获得高负荷负载,特殊订购"C"级,就可以在高负荷负载下使用产品。

1N = 0.102Kgf

注1) 基本动额定扭矩（最大使用扭矩、允许静额定扭矩）是指加载在滚轮滚销节圆直径上的基本动额定负载（最大使用负载、允许静额定负载）所产生的扭矩。

注2) 是理论值，并非实际滚销的节圆直径。

用语说明

基本动额定负载：在一定速度连续运转时，满足额定寿命的基本负载。

最大使用负载：在通常运转时候可以使用的负载最大值（包含加减速时峰值负载）。

允许静额定负载：在紧急停止或者受到外力冲击等一些非常情况下负载的最大值。

额定寿命：将基本动额定负载作为负载，以一定的速度连续运转时的寿命称为额定寿命，以滚轮回转次数来表示。

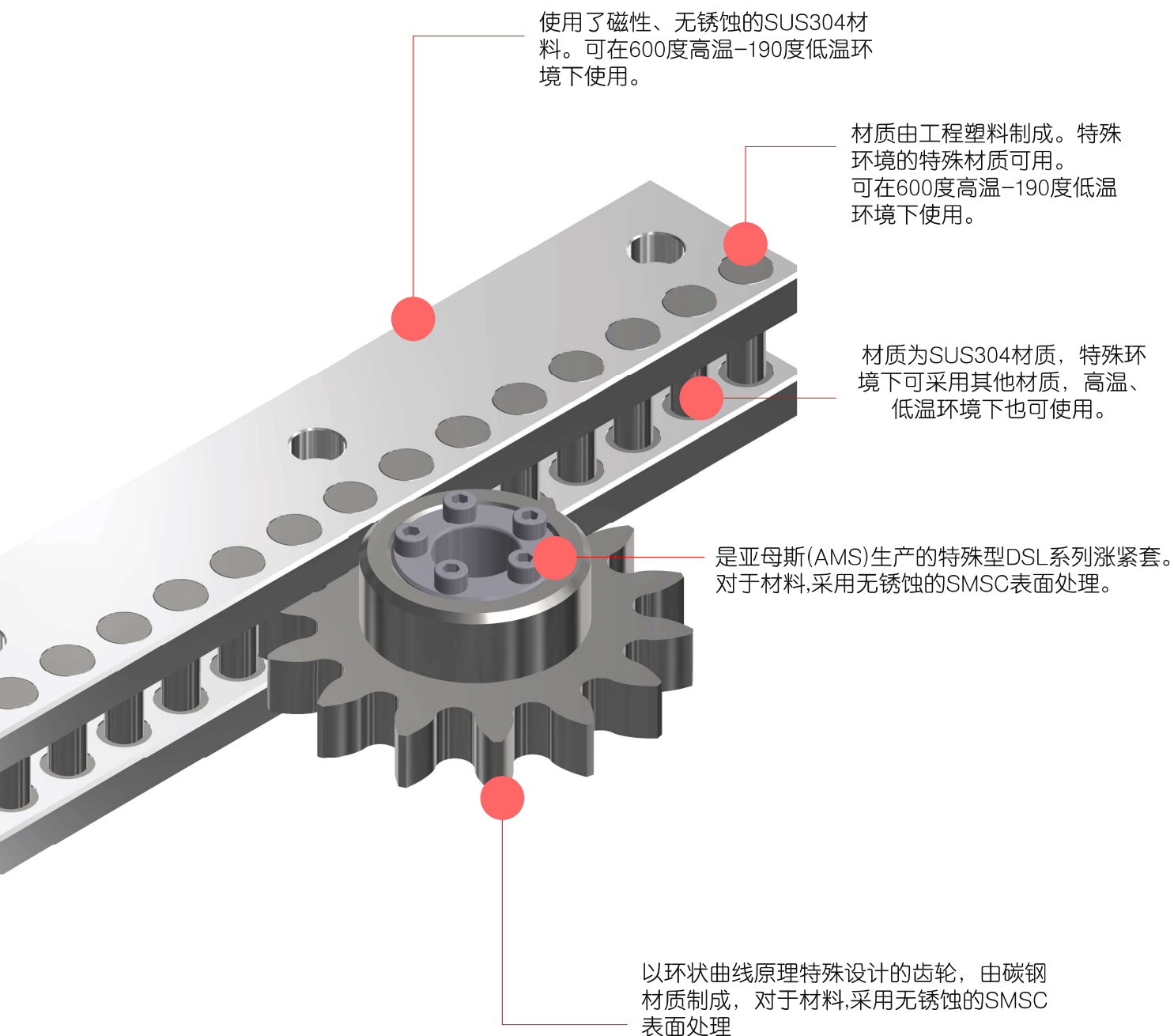
额定寿命：041214型~051214型为2700000000转回滚轮在300RPM滚轮在15000小时

061614型~224014型为60000000转回滚轮在100RPM滚轮在10000小时

相关商品发明专利申请中！

AMS® 齿轮和齿条

以下产品的材质是G1标准结构。



Clean Rack Pinion CRP Series

Clean Performer

- Clean Installation
- Various Selections
- Integer Movement
- Multiple Tooth Contact
- Generated Tooth Profile
- High Acceleration
- High Efficiency
- Extremely Silent
- High Dynamics
- Simple To Use



Non-Backlash New System Rack & Pinion

零背隙 Non-backlash

- 齿 (滚销) 时常有2~3处保持接触, 正反方向都不发生齿背间隙
- Trochoidal profiled tooth enables us to make a plurality of mutual teeth mesh at one time. The teeth always mesh via two or three portions and eliminate backlash when rotated in one or another direction.

高精度 High accuracy

- 进给精度 (回转-直线比) 和定位精度逼近精密滚珠丝杠。
- Instead of gears, a combination of cam and roller makes a positioning accuracy and feeding accuracy (rotation-linearity ratio) as that of the ball-screw structure.

低噪音 · 低振动 Low noise and low vibration

- 轴承支撑的滚销在次摆线齿面上圆滑滚动。不会产生令人不悦的敲齿音和滚动声。同时也减少了振动。
- Rollers smoothly mesh with the optimized trochoidal tooth surface so as to avoid rattling noise, tooth striking noise and rotating noise from being induced together with the least amount of vibration.

低灰尘 Low dust

- 由于是圆滑的滚动接触、同时旋转部分是小径低速, 低摩擦只产生微小的发热和灰尘。
- Due to the smooth rotation, the structure dispenses with a least amount of heat and dust generated and cope with a clean room operation.

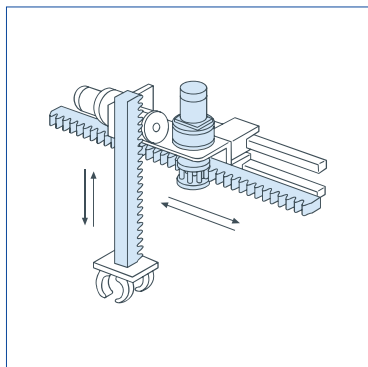
实现长距离 · 高速化 Extended length line and high speed rolling

- 使用接续夹具可以实现长距离传动。另外, 可以进行210m/min以上的高速行走。
- Extendable with use of addition jig. Capable of high speed rolling of 210m/minute or more.

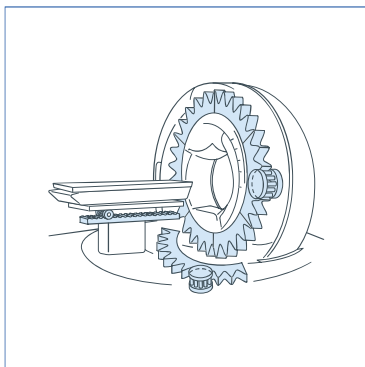
应用案例 Application examples

CR齿条, CP齿轮的使用方法采用图例来进行介绍Application examples of CRP Runner are shown as follows

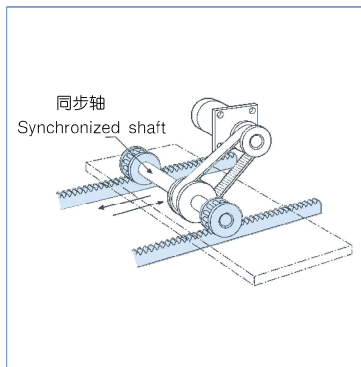
CR齿条 应用例/CR Runner application examples



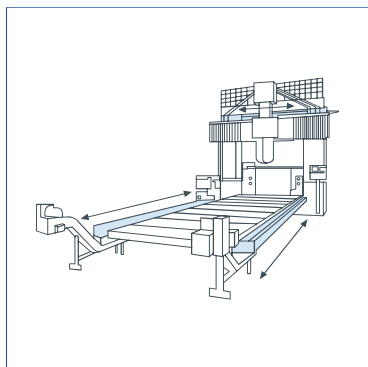
台架 装载机
Gantry loader



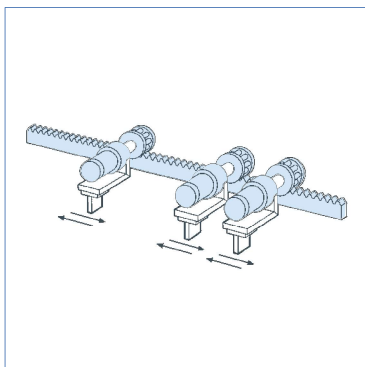
医疗器械
Medical Equipment



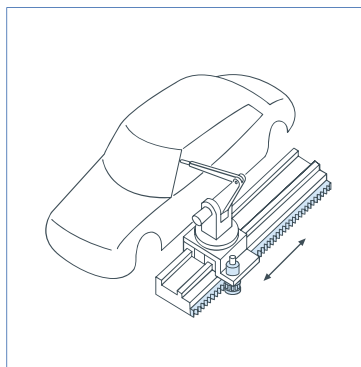
同步轴
Synchronized shaft
同步进给 (防止宽幅传动的间隙)
Synchronized feeding
(Prevent cogging interference with a wide breadth unit)



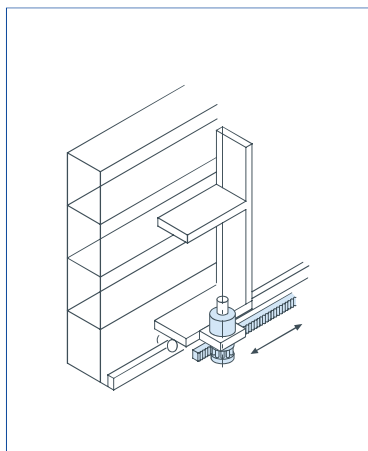
双列加工中心
Double-column Machining centers



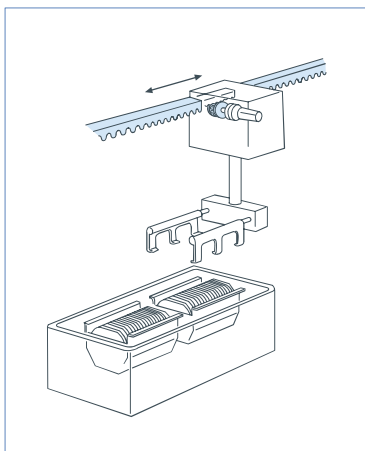
复数滚动头 (例如纵切设备)
A plurality of heads
(Applied to a slitter apparatus)



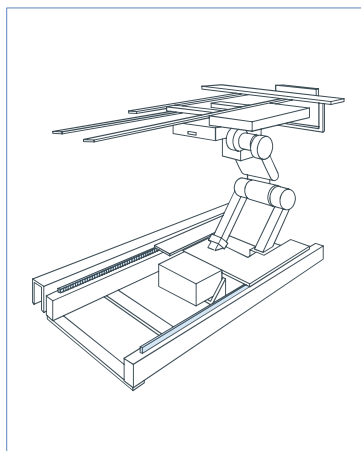
测量装置的进给
Measurement device feeding



库存搬送
Stocker transfer



清洗线的搬送
Transfer to washing bath



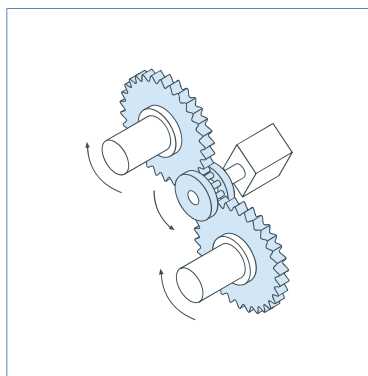
机器人搬运
Robot transfer

Introduction of linear and curvilinear drive system superior to ball-type screw and rack & pinion

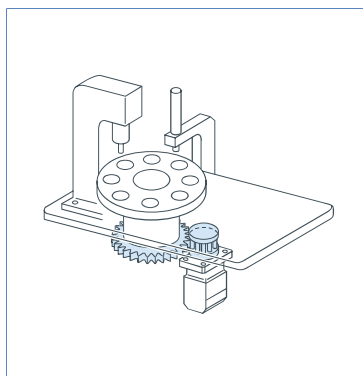
应用案例 Application examples

CR齿条, CP齿轮的使用方法采用图例来进行介绍Application examples of CRP Runner are shown as follows

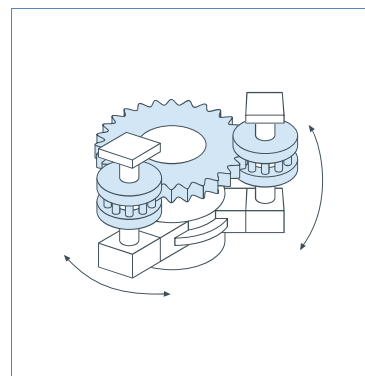
CP齿轮 应用例 / CP Ring application examples



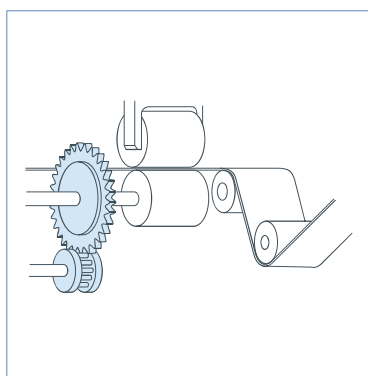
双轴同步驱动
Synchronized dual shaft drive



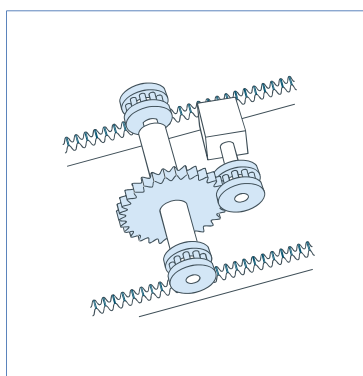
条件设定自由的分度转台
(正/逆转)
Index table usable under flexible
(Normal/reverse notation, Jumping over)



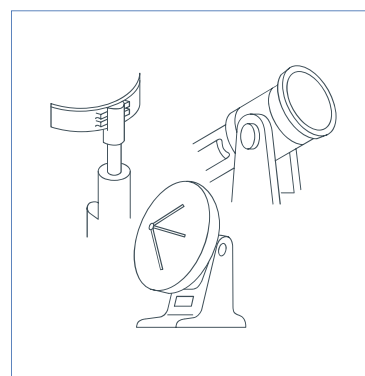
复数转台的驱动
Device for driving a plurality of tables



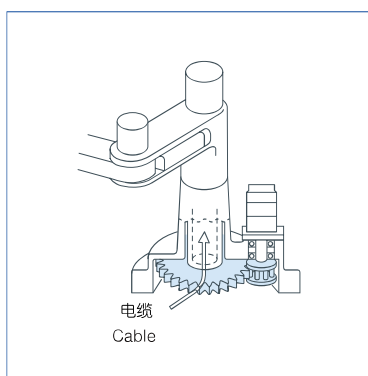
脉动很小的进给, 卷绕
(薄膜, 纸, 薄片和细线)
Winding & feeding device with less
pulsations (Film, Paper, Sheet & Thin wire)



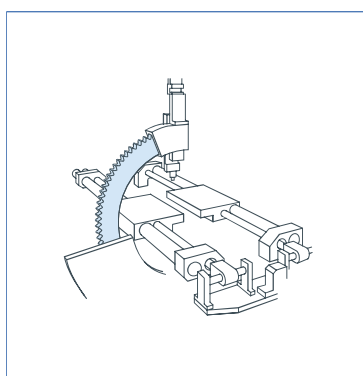
与CRP齿轮&滚轮的组合搭配
Combination with CRP Cam Rack



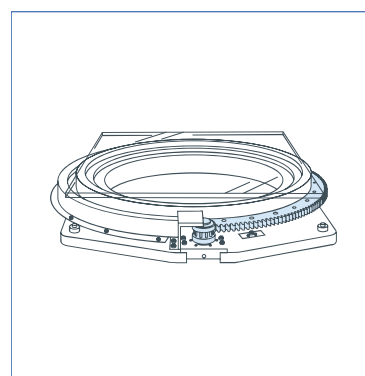
雷达, 天线, 监视摄像机,
观测机械的驱动
Device for driving
radar, antenna, surveillance camera,
observatory equipment



机器人旋转驱动 {中空}
Pivotal drive device for
robot (Hollow)



旋转/定位装置
Circling / Positioning



CP齿轮组件 {大型基板} 反转运置等CP
RingUnit (Large-scale) turn table

AMS® 齿条齿圈 | CRP系列

■ CR齿条式样表 / CR Runner Specification

标准品为下列9种。尺寸记载在后续项目中。

Standard products are summed up for the following nine types. Dimensions are raised on back.

项目 Items		型号 Model	滚 轮 Roller pinion	CP / CR 系列 CP / CR series										ACPC/ACRC系列 ACPC/ACRC series	
				CP / CR series											
			齿 条 Runner	CP1008A	CP1010A	CP1210A	CP1610B	CP2010B	CP2510B	CP3212B	CP4012B	CP4014C	CP4014C		
通用式样 Common spec.	允许动额定负载 Allowable dynamic rated load	N(kgf)		130 (13.3)	250 (25.5)	500 (51.0)	1000 (101.9)	1500 (152.9)	2200 (224.3)	3600 (367.0)	6000 (611.8)	14000 (1427.6)			
	允许静额定负载 Allowable static rated load	N(kgf)		200 (20.4)	380 (38.7)	750 (76.5)	2000 (203.9)	3000 (305.9)	4400 (448.6)	7200 (734.1)	12000 (1223.6)	21000 (2141.4)			
	允许动额定扭矩 (注1) * Allowable dynamic rated torque	N.m(kgf.m)		1.7 (0.17)	4.0 (0.41)	9.5 (0.97)	25.5 (2.60)	47.7 (4.86)	87.5 (8.92)	220 (22.43)	458.4 (46.74)	1247.8 (127.24)			
	允许静额定扭矩 (注1) * Allowable static rated torque	N.m(kgf.m)		2.5 (0.25)	6.0 (0.61)	14.3 (1.46)	50.9 (5.19)	95.5 (9.73)	175.1 (17.85)	440 (44.86)	916.7 (93.47)	1871.6 (190.85)			
	滚轮回转一圈的移动距离 Displacement distance of pinion per rotation	mm/回转 mm/revolution		80	100	120	160	200	250	384	480	560			
	最大压力角 Max pressure angle	°		30.2	31	30.2	30.7	30.1	30.7	30.1	30.0	30			
	模数 (滚子P.C.D/齿数) Module	mm		3	3	3.6	4.75	6	7.5	9.5	12	12			
滚 轮 Roller pinion	齿数 Number of tooth	齿 teeth		8	10	10	10	10	10	12	12	14			
	节圆直径 (注2) * Diameter of pitch circle	mm		25.465	31.831	38.197	50.9	63.7	79.6	122.2	152.8	178.3			
	重量 Mass weight	kg		0.07	0.2	0.31	0.71	1.3	2.1	6.4	12.4	20.9			
	转动惯量 Inertia moment (GD ²)	kg.m ² (kgf.m ²)		0.11X10 ⁻⁴ (0.44X10 ⁻⁴)	0.41X10 ⁻⁴ (1.64X10 ⁻⁴)	0.96X10 ⁻⁴ (3.84X10 ⁻⁴)	3.98X10 ⁻⁴ (15.7X10 ⁻⁴)	10.5X10 ⁻⁴ (42X10 ⁻⁴)	25.5X10 ⁻⁴ (102X10 ⁻⁴)	169X10 ⁻⁴ (676X10 ⁻⁴)	594X10 ⁻⁴ (2376X10 ⁻⁴)	1180X10 ⁻⁴ (4720X10 ⁻⁴)			
齿 条 Runner	节距 Pitch	mm		10	10	12	16	20	25	32	40	40			
	定尺 Predetermined length	mm		480	480	480	512 992	500 1000	500 1000	512 992	520 1000	520 1000			
	齿数 Number of tooth	齿 teeth/length		48	48	40	32 62	25 50	20 40	16 31	13 25	13 25			
	重量 Mass weight	kg		0.6	0.6	0.6	1.1 2.2	2.1 4.2	2.7 5.4	4.2 8.4	6.9 13.8	8.8 17			

注1: 允许动额定扭矩 (允许静额定扭矩) 是指加载在滚轮滚销节圆直径上的允许动额定负载 (允许静额定负载) 所产生的扭矩。

*1 Allowable dynamic rated torque (allowable static rated torque) is value observed when applying allowable dynamic rated load (allowable static rated load) to roller pinion along diameter formed by pitch circle.

注2: 是理论值, 并非实际的滚销的节圆直径。

*1 The indicated pitch circle diameter values are theoretical, not representing the actual pitch circle diameters of the respective roller pinions.

用语说明: Explanation of terms

允许动额定负载 : 以一定速度连续运转时, 能达到额定寿命的条件下, 所能承受的负载的允许值。

Allowable dynamic rated load Allowable value of load applied to rated life span when consecutively operated at fixed speed.

允许静额定负载 : 齿条所能承受的最大负载的允许值。

Allowable static rated load Allowable value of maximum load applied to runner.

注意) 紧急停止或者受到外部冲击等产生的瞬间过大负载不能超过静额定负载。如果在超过以上负载的场合, CR齿条会出现早期破损, 或者实际寿命要比计算寿命短的情况。

Note: Make sure that instantaneous over torque caused by external impact or the like does not exceed static rated load due upon usage. Otherwise, premature breakage may occur on CR runner, or CR runner's defacto life span may be shortened earlier than calculated life span.

额定寿命 : 将允许动额定负载作为负载, 以一定的速度连续运转时的寿命即为额定寿命。以滚轮的回转数来表示额定寿命。

额定寿命: 1008型~1210型为 270,000,000回转 (滚轮300rpm寿命时间为15,000小时)

1610型~4014型为 60,000,000回转 (滚轮100rpm寿命时间为10,000小时)

Rated life span : Life span determined in terms of rotational numbers of roller pinion when consecutively operated with allowable dynamic rated load at fixed speed.

Rated life span : 270,000,000 times of revolution for 1008~1210 (Upon operating roller pinion at 300rpm, serving life time results in 15,000 hours.)

60,000,000 times of revolution for 1610~4014 (Upon operating roller pinion at 100rpm, serving life time results in 10,000 hours.)

亚姆斯 (AMS) 导轨不用加油, 不生锈, 噪音低, 振动小, 重量轻, 高速度, 无磁性, 适用于潮湿、粉尘、木屑等恶劣环境。

AMS
Automatic Motion System

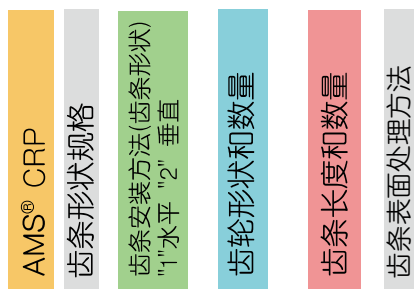
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CP/CR

公称型号的构成例

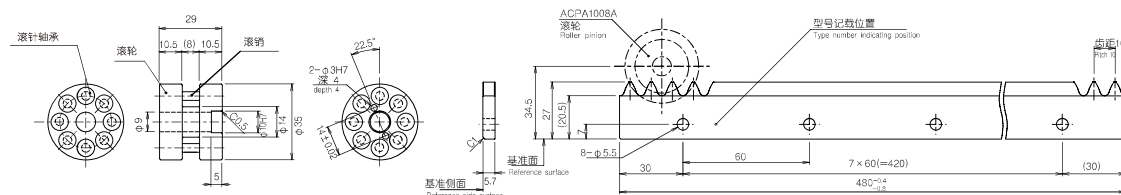
CRP081610(2)-P1(1)-480(1)-S



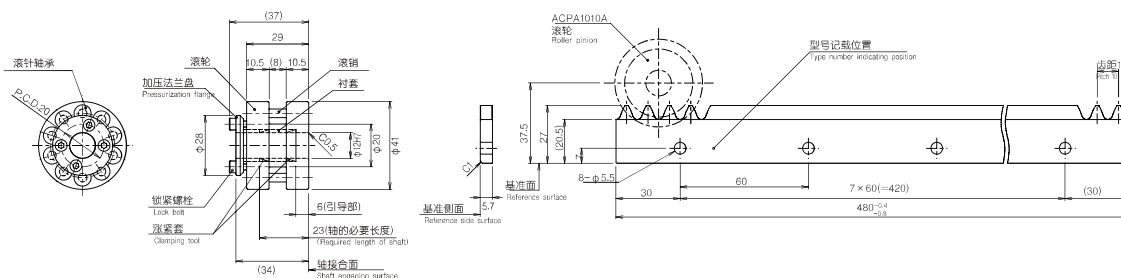
无标志为Zn表面处理,
带有"S"标志为特殊处理。
参考第45页获取详细信息。
参考27页有关连接夹具的内容。

■ 外形尺寸图 / Outer Size Dimensions

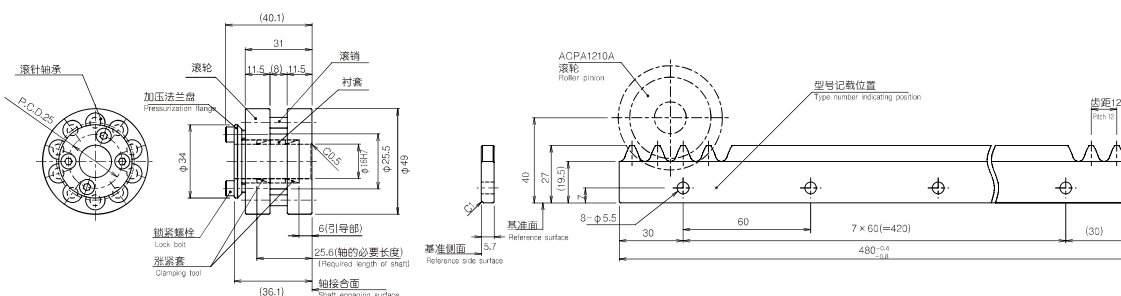
CRP041008-P1(1)-480(1)



CRP041010-P1(1)-480(1)



CRP051210-P1(1)-480(1)



选定产品后相关技术参数请再次咨询亚姆斯 (AMS) 确认,
更多新产品请查阅亚姆斯 (AMS) 官方网站

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M

齿条 · 齿圈

CRP081610-P1(1)-992/512(1)



*1 是理论节圆直径转位后的数值，为产品的实际尺寸。
*1 These are values of the pitch circle diameters shifted from the respective theoretical pitch circle diameters. They represent the actual pitch circle diameters of the respective product models.

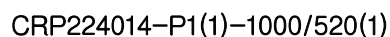
CRP122510-P1(1)-1000/500(1)



*1 是理论节圆直径转位后的数值，为产品的实际尺寸。
*1 These are values of the pitch circle diameters shifted from the respective theoretical pitch circle diameters. They represent the actual pitch circle diameters of the respective product models.

18

CRP224012-P1(1)-1000/520(1)



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■ 齿条的切断尺寸 / Cut Rack Sizes

CR1008A · ACRA1010A			CR1210A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole	齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
480	48	8	480	40	8
420	42	7	420	35	7
360	36	6	360	30	6
300	30	5	300	25	5
240	24	4	240	20	4
180	18	3	180	15	3

CR1610A			CR2010A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole	齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
992	62	11	1000	50	10
896	56	10	900	45	9
800	50	9	800	40	8
704	44	8	700	35	7
608	38	7	600	30	6
512	32	6	500	25	5
416	26	5	400	20	4
320	20	4	300	15	3
224	14	3			

CR2510A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
1000	40	10
900	36	9
800	32	8
700	28	7
600	24	6
500	20	5
400	16	4
300	12	3

CR3212A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
992	31	11
896	28	10
800	25	9
704	22	8
608	19	7
512	16	6
416	13	5
320	10	4
224	7	3

CR4012A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
1000	25	8
880	22	7
760	19	6
640	16	5
520	13	4
400	10	3

CR4014A		
齿条长度(mm) Length of rack	齿数 Number of teeth	横孔数量 Number of side mount hole
1000	25	12
920	23	11
840	21	10
760	19	9
680	17	8
600	15	7
520	13	6

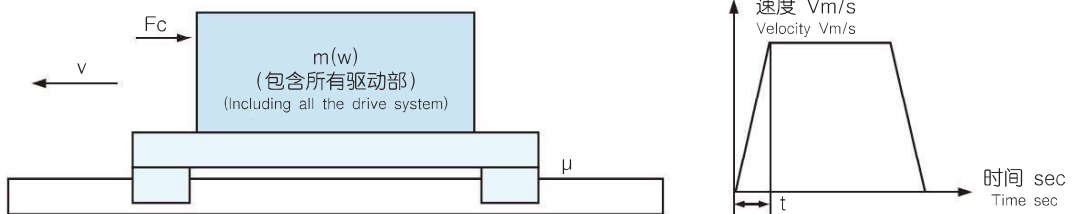
* 关于 4014 型，式样上长度在 520mm 以下的无法切断。

* The short length less than 520mm is not available for 4014.

■ 型号的选定 / Selection of Type Number

请用以下的计算方法计算出负载。 Calculate the load by the method mentioned below.

● 选定例 / Selection Example



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● 式样 / Specification

质 量 Mass : $m = 300\text{kg}$ (重量 Weight : $w=300\text{kgf}$)
速 度 Velocity : $v = 1\text{ m/sec}$
加速时间 Acceleration : $t = 0.4\text{sec}$
外 力 Outer force : $F_c = 100\text{N}$ ($F_c'=10.2\text{kgf}$)
摩擦系数 Coefficient of friction : $\mu = 0.01$ (Table 1)
负载系数 Coefficient of weight : $f_w = 1.5$ (Table 2)
重力加速度 Coefficient of friction : $g = 9.80665\text{m/sec}$

(Table 1) 摩擦系数/Coefficient of friction (μ)

滚动导轨 Rolling guide	0.005~0.02
滑动导轨 Sliding guide	0.1~0.2

(Table 2) 负载系数/Coefficient of weight (f_w)

无冲击的圆滑的运转 Smooth operation with no impact	1.0~1.2
普通的运转 Normal operation without excessive impact	1.2~1.5
有冲击的运转 Operation with impact	1.5~2.5

SI 单位制 SI unit system	重力单位制 Gravitational unit system
1. 负载加速度 /Load acceleration $A_w = \frac{v}{t} = \frac{1}{0.4} = 2.5\text{m/sec}^2$	$A_w' = \frac{v}{g \cdot t} = \frac{1}{9.80665 \times 0.4} = 0.255G$
2. 加速时负载 /Load applied at acceleration $F_a = m \cdot A_w = 300 \times 2.5 = 750\text{N}$	$F_a' = w \cdot A_w = 300 \times 0.255 = 76.5\text{kgf}$
3. 摩擦负载 /Frictional resistance load $F_b = g \cdot m \cdot \mu = 9.80665 \times 300 \times 0.01 = 29.4\text{N}$	$F_b' = w \cdot \mu = 300 \times 0.01 = 3\text{kgf}$
4. 总负载重量 /Total load weight $F = f_w \cdot (F_a + F_b + F_c) = 1.5 \times (750 + 29.4 + 100) = 1.5 \times 879.4 = 1319.1\text{N}$	$F' = f_w' \cdot (F_a' + F_b' + F_c') = 1.5 \times (76.5 + 3 + 10.2) = 1.5 \times 89.7 = 134.6\text{kgf}$

5. 选定 /Selection

按照 $F(F')$ 的结果, 选定齿条【ACPA2010B/A】, 允许动额定负载 $1500\text{N}(152.9\text{kgf})$ 。

From the result of $F(F')$, the rack runner is selected as [ACPA2010B/A] RUNNER, and allowable dynamic rated load as $1500\text{N}(152.9\text{kgf})$.

■ 寿命计算 / Life Calculation

CR齿条, 按照滚轮回转回数来计算寿命时间。

For CR Runner, the life is calculated from the number of revolutions of the roller pinion.

<设定条件>

额定寿命 1008型~1210型 270×10^6 回转 (负载为额定动扭矩) (滚轮300rpm时, 寿命时间为15,000H)

额定寿命 1610型~4014型 60×10^6 回转 (负载为额定动扭矩) (滚轮100rpm时, 寿命时间为10,000H)

<Setting conditions>

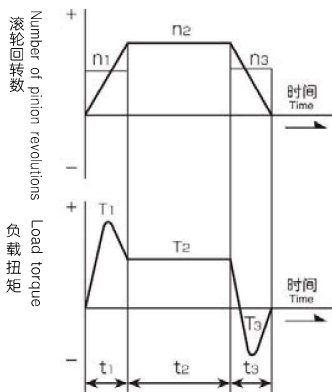
Rated life 1008~1210= 270×10^6 revolutions (under the load of allowable kinetic rated torque)(300rpm of the roller pinion is correspondent to 15,000 hours of life.)

Rated life 1610~4014= 60×10^6 revolutions (under the load of allowable kinetic rated torque)(100rpm of the roller pinion is correspondent to 10,000 hours of life.)

● 运转条件 (参考) / Operating Conditions (Reference)

<速度曲线>

<Velocity pattern>



<负载曲线>

<Load pattern>

单位 Unit	启动时 Starting	稳定时 Steady operation	停止时 Stoppage
负载扭矩 (Nm) Load torque(Nm)	T_1	T_2	T_3
滚轮回转数 (rpm) Number of pinion revolutions(rpm)	n_1 ($=0.5n_2$)	n_2	n_3 ($=0.5n_2$)
时间 (sec) Time(sec)	t_1	t_2	t_3

● 平均负载扭矩 /Average Load Torque T_m (Nm)

$$T_m = \sqrt[10/3]{\frac{n_1 \cdot t_1 \cdot T_1^{10/3} + n_2 \cdot t_2 \cdot T_2^{10/3} + n_3 \cdot t_3 \cdot T_3^{10/3}}{n_1 \cdot t_1 + n_2 \cdot t_2 + n_3 \cdot t_3}}$$

● 平均回转数 /Average Number of Revolutions N_m (rpm)

$$N_m = \frac{n_1 t_1 + n_2 t_2 + n_3 t_3}{t_1 + t_2 + t_3}$$

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● 寿命时间 / Life Length Lh (H)

$$Lh = Lh_0 \times \frac{N_0}{Nm} \times \left(\frac{TO}{fd \cdot fset \cdot Tm} \right)^{10/3}$$
$$= \frac{10^6}{Nm} \times \left(\frac{TO}{fd \cdot fset \cdot Tm} \right)^{10/3}$$

额定寿命时间 Rated life length : Lh₀ (Table 1)

滚轮基本回转数 Basic number of pinion revolutions : N₀ (Table 1)

允许动额定扭矩 Allowable dynamic rated torque : TO (Table 2)

平均负载扭矩 Average load torque : T_m

滚轮平均回转数 (rpm) Average number of pinion revolutions : Nm

负载系数 Coefficient of load : fd (Table 3)

安装精度系数 Coefficient of installation precision : fset (Table 4)

(Table 2) 允许动额定扭矩/Allowable dynamic rated torque (TO)

型号 Model	TO(Nm)
1008	1.7
1010	4.0
1210	9.5
1610	25.5
2010	47.7
2510	87.5
3212	220
4012	458.4
4014	1247.8

(Table 1) 额定寿命/Rated life

型号 Model	Lh ₀ (H)	N ₀ (rpm)
1008~1210	15000	300
1610~4014	10000	100

(Table 3) 负载系数/Coefficient of load (fd)

运转条件 Operating conditions	fd
没有冲击的圆滑的运转 Smooth operation with no impact	1.0~1.2
普通运转 Normal operation without excessive impact	1.2~1.5
有冲击的运转 Operating with impact	1.5~3.0

(Table 4) 安装精度系数/Coefficient of installation precision (fset)

安装精度 Installation precision	fset
推荐安装精度 以内 Recommended installation precision (within)	1.0
动作允许范围 以内 Allowable operation range (within)	1.2

【计算例/Calculation Example】

● 平均负载扭矩 /Average Load Torque T_m (Nm)

$$T_m = \frac{10/3 \sqrt{n_1 \cdot t_1 \cdot T_1^{10/3} + n_2 \cdot t_2 \cdot T_2^{10/3} + n_3 \cdot t_3 \cdot T_3^{10/3}}}{n_1 \cdot t_1 + n_2 \cdot t_2 + n_3 \cdot t_3}$$
$$= \frac{10/3 \sqrt{150 \times 0.2 \times 35^{10/3} + 300 \times 3 \times 20^{10/3} + 150 \times 0.2 \times 35^{10/3}}}{150 \times 0.2 + 300 \times 3 + 150 \times 0.2}$$
$$= 21.8(\text{Nm})$$

单位 Unit	启动时 Starting	稳定时 Steady operation	停止时 Stoppage
负载扭矩 (Nm) Load torque(Nm)	T ₁ =35	T ₂ =20	T ₃ =35
滚轮回转数 (rpm) Number of pinion revolutions(rpm)	n ₁ =150 (=0.5n ₂)	n ₂ =300	n ₃ =150 (=0.5n ₂)
时间 (sec) Time(sec)	t ₁ =0.2	t ₂ =3	t ₃ =0.2

● 平均输入回转数 /Average Number of Revolutions Nm (rpm)

$$Nm = \frac{n_1 t_1 + n_2 t_2 + n_3 t_3}{t_1 + t_2 + t_3} = \frac{150 \times 0.2 + 300 \times 3 + 150 \times 0.2}{0.2 + 3 + 0.2} = 282.4(\text{rpm})$$

● 寿命时间 /Life Length Lh (H)

从启动时扭矩T₁值(使用时最大扭矩)根据(Table2)的TO值来选择滚轮型号(ACPA2010)。

从使用条件选定负载系数fd=1.5(Table3), 安装精度系数选择为fset=1.0(Table4)的话。

Select the pinion model number "ACPA2010" from the TO value (Table2) based on the starting torque T₁(max. working torque). When the coefficient of load fd = 1.5(Table3) and the coefficient of installation precision fset = 1.0(Table3) from the working conditions.

$$Lh = \frac{10^6}{Nm} \times \left(\frac{TO}{fd \cdot fset \cdot Tm} \right)^{10/3} = \frac{10^6}{282.4} \times \left(\frac{47.7}{1.5 \times 1.0 \times 21.8} \right)^{10/3} = 12465(\text{H})$$

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■ 精度规格 / Rated accuracy specification

			1008		1010		1210		1610	
			精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade
共通式样 Common spec.	传动精度 (注1) *	μm	±30	±50	±30	±50	±30	±50	±30	±50
	单一节距齿合误差 (注1) *	μm	20	30	20	30	20	30	20	30
	往复定位精度 (注1) *	μm	10	20	10	20	10	20	10	20
滚 轮 Roller pinion	单一节距误差	arc sec	±180	±270	±140	±210	±120	±180	±90	±140
	累计节距误差	arc sec	±270	±410	±210	±320	±180	±270	±140	±210
齿 条 Runner	单一节距误差	μm	±10	±20	±10	±20	±10	±20	±10	±20
	累计节距误差	μm	±30	±50	±30	±50	±30	±50	±30	±50
	齿顶高误差	μm	20	30	20	30	20	30	20	30
	齿高方向直线度	mm/1根 mm/pc	0.2	0.3	0.2	0.3	0.2	0.3	0.15	0.2
	齿侧方向直线度	mm/1根 mm/pc	—	—	—	—	—	—	0.2	0.3

			2010		2510		3212		4012		4014	
			精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade	精密级 Premium grade	普通级 Standard grade
共通式样 Common spec.	传动精度 (注1) *	μm	±30	±50	±30	±50	±30	±50	±30	±50	±30	±50
	单一节距齿合误差 (注1) *	μm	20	30	20	30	20	30	20	30	20	30
	往复定位精度 (注1) *	μm	10	20	10	20	10	20	10	20	10	20
滚 轮 Roller pinion	单一节距误差	arc sec	±70	±110	±60	±90	±40	±60	±30	±45	±30	±45
	累计节距误差	arc sec	±110	±170	±90	±140	±60	±90	±45	±70	±45	±70
齿 条 Runner	单一节距误差	μm	±10	±20	±10	±20	±10	±20	±10	±20	±10	±20
	累计节距误差	μm	±30	±50	±30	±50	±30	±50	±30	±50	±30	±50
	齿顶高误差	μm	20	30	20	30	20	30	20	30	20	30
	齿高方向直线度	mm/1根 mm/pc	0.15	0.2	0.15	0.2	0.08	0.15	0.08	0.15	0.08	0.15
	齿侧方向直线度	mm/1根 mm/pc	0.2	0.3	0.2	0.3	0.15	0.2	0.15	0.2	0.15	0.2

注1: 我公司推荐的安装精度, 以及条件是指安装、测定温度为20℃的情况下的数值。同时受到机械构成、安装精度以及温度等因素的影响。

*1 Numerical values are at 20 degrees centigrade as measurement temperature upon assemble based on attaching requirement stipulated by our company. Values are subject to fluctuations depending on assembling elements, assembling accuracy and ambient temperature and so on.

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■ 精度表 (摘要) / Precision List (excerpt)

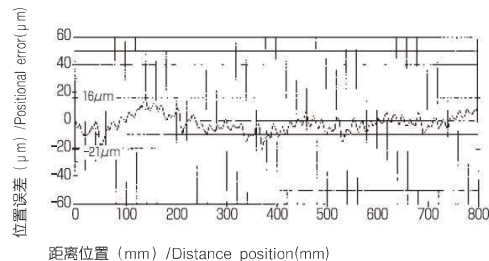
● 回转-直线传动精度/Rotation-to-linearity transmission precision

根据滚轮的回转来测定齿条移动距离误差。
Rack's displacement error is measured against one rotation of the pinion.

测量品: CP1610B-1B/CP1610A-1BF-L992
Measurement specimen: CPA1610B-1B/CPA1610A-1BF-L992.

测量温度: 20°C
Ambient temperature: 20°C.

*建议在我公司推荐的安装精度以及条件内进行组装测试。



图表的看法
How to see
the graph

小波显示的是每个齿的啮合误差。大波显示的是滚轮每次回转的误差, 没有发生累计误差。
Small wave signs indicate meshing error between the teeth. Errors are indicated each time when the pinion rotates. No accumulated errors are measured.

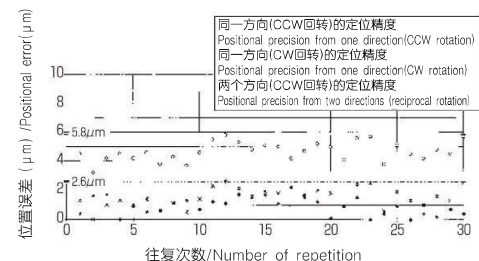
● 往复定位精度/Repetitive halting precision

对任意位置测定其往复定位精度 (位置再现性)。
Repetitive halting precision is measured against an arbitrary position (positional reproduction).

测量品: CP1610B-1B/CP1610A-1BF-L992
Measurement specimen: ACPA1610B-1B/ACPA1610A-1BF-L992.

测量温度: 20°C
Ambient temperature: 20°C.

*建议在我公司推荐的安装精度以及条件内进行组装测试。



图表的看法
How to see
the graph

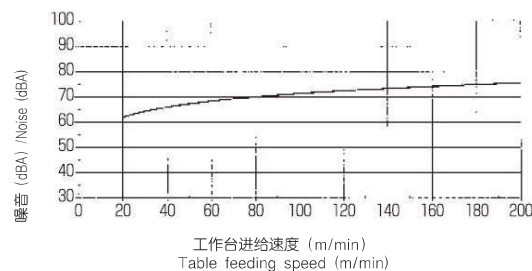
定位精度约为3 μm, 背隙也大概有3 μm, 黑色点群和白色点群中间的差表示背隙。
The halting precision is 3 μm with the backlash assumed as approximately 3 μm. The backlash is represented by a difference between the black dot and the white dot.

● 噪音/Noise

测试各种速度下的滚轮回转噪音。
Noise is measured at each speed when the pinion is driven to rotate.

测量品: CP1610B-1B/CP1610A-1BF-L992
Measurement specimen: CPA1610B-1B/CPA1610A-1BF-L992.

*建议在我公司推荐的安装精度以及条件内进行组装测试。



注: 包括电机、导轨等关联驱动系统的噪音。
Note: including related-noise (e.g., noise caused from motor and guide, etc.).

*以上各测定值是实际测量数据, 与厂家的保证精度不同。
*Each measurement values are based on practical measurement, and differs from precision values that Manufacturer guarantees.

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CRP系列使用要领 / Handling Procedures of CRP Runner

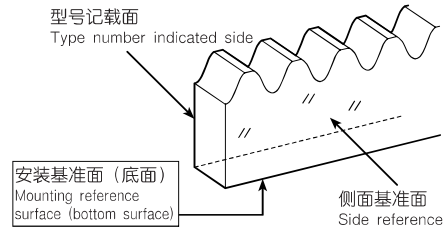
■ 请将齿条贴紧在安装基准面上 / Secure CRP Runner tightly to reference surface.

为了校正齿条的弯曲度, 请扎实地将齿条固定在非常平直的安装面上。
否则齿面本身的弯曲沉浮会保持原样, 会发生停止精度误差以及产生背隙等的原因。

型号记载面的反面为侧面基准面。

In order to correct warp of Rack, firmly secure to straight surface of mounting portion.
Undulation of tooth surface leads to feeding error, reduced cessation precision and appearance of backlash.

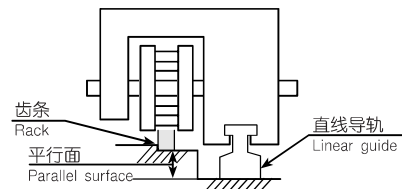
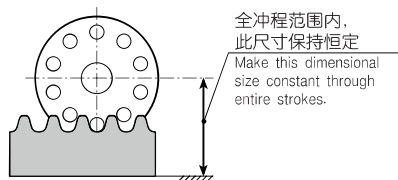
Side reference surface is placed opposite to where type number is depicted.



■ 直线导轨为必需品 / Linear guide is one of necessities.

在与齿条安装基准面平行的平面上安装直线导轨。

Set linear guide to straight surface to be parallel with reference surface where Rack is mounted.

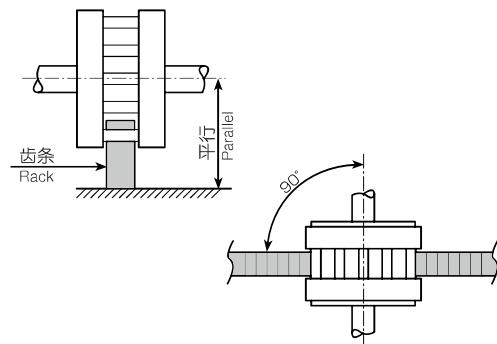


■ 滚轮回转轴保持与齿面平行! 与前进方向保持直角!

Set rotary shaft of pinion in parallel with tooth of Rack to be perpendicular to advancing direction!

如果滚轮轴相对于齿条发生倾斜的话, 那么滚销和齿面的接触为“单侧接触”, 此情况会对精度、噪音、振动、寿命带来负面影响。另外, 在重载的情况下, 滚轮轴会弯曲上浮, 所以滚轮轴为两侧支持的结构最为理想。另外, 滚轮与滚轮驱动轴, 安装时尽可能保证同心。滚轮的偏心回转会产生精度不稳定、背隙等情况。特别需要注意涨紧套的安装。

When shaft of pinion inclines against Rack, partial engagement occurs between teeth to affect on precision, noise, vibration and service life span. As high load would curve shaft to float it upward, it is better to support at both ends of shaft to avoid upward float. Concentrically set pinion with drive shaft of pinion as much as possible. Eccentric rotation may affect on feeding precision and occurrence of backlash. Especially pay attention upon tightening clamping tool.



■ 齿条的切断 / Cutting Rack

在使用短长度的情况下, 请将齿条切断使用。切断请选择在齿底部位进行。(因为齿面有淬火处理, 请注意!)

另外, 切断可以在我公司进行, 费用按照实际发生的金额来进行加算。

Cut rack when used as a short size tool. Out at dedendum (tooth bottom) of tooth. Take care because dedendum is hardened.
Rack may be cut in our company at actual expense.

■ 关于润滑 / Regarding Lubrication

- ◇ 支撑滚轮滚销的轴承中填充了润滑脂, 口部有油封密封。
- ◇ Bearings are filled with grease to support pinion roller and sealed by simple rubber.
- ◇ 请一开始就在齿条的齿面上涂抹润滑脂。
- ◇ First apply grease to tooth surface.

■ 防尘对策 / Measure against Dust and Dirt

- ◇ 如果齿条的齿面上、齿底部附着脏物、异物的话, 可能会引起动作不良。
- ◇ When Rack collects dust or foreign matters on tooth surface or the like, it may cause malfunction.
- ◇ 在恶劣环境中使用的情况下, 请采取全面防尘罩的措施。
- ◇ Set cover on all surface when used under adverse environment.

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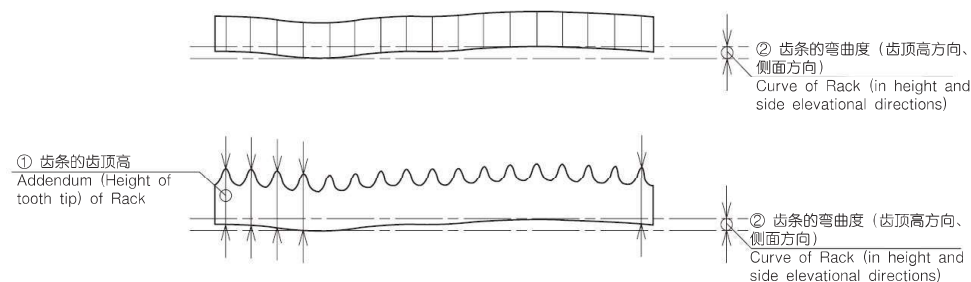
TCG系列使用要领 / Handling Procedures of CRP Runner

■ CR齿条的精度 / Precision of CR Runner

CR齿条单品的精度定义如下:

Followings are definition of precision for single ATCG Runner.

- ① 齿条的齿顶高 / Addendum (Height of tooth tip) of Rack
- ② 齿条的弯曲度 (齿顶高方向、侧面方向) / Curve of Rack (in height and side elevational directions)



■ CR齿条的安装方法 / Assembling Procedures for CR Runner

顺序: Procedures

1. 请将齿条相对于基座基准面, 使用夹紧器或者用齿条底面的螺栓孔, 把齿条牢牢地紧固地贴在基准面上 (参照图1, 用齿条安装螺钉进行假装配。<建议为扭矩的50%, 请参照推荐参考建议扭矩表>)

Set Rack to reference surface of base, and tightly attach Rack to reference surface with use of clamp, base bolt or the like. (Refer to Fig. 1, provisionally tighten mounting bolt for Rack. <approx. 50% of recommended torque refer to list of recommended tightening torque>)

2. 以直线导轨为基准将齿条调节平行 (参照图2)。相对于导轨, 使用百分表确认齿条齿顶的平面度 (或齿底面) 以及侧面的跳动, 请调整到齿条安装的精度值以下。 (参考P21安装精度表)

Check parallelism between linear guide and Rack <refer to Fig. 2>. Confirm shifted width between guide block and tooth tip of Rack (tooth surface) and adjust it below mounting precision of Rack. (refer to list of mounting precision P. 21)

3. 将齿条安装螺栓参考推荐扭矩最终拧紧。 (参考推荐扭矩表)

Finally tighten mounting bolt for Rack with recommended tightening torque (refer to list of recommended tightening torque).

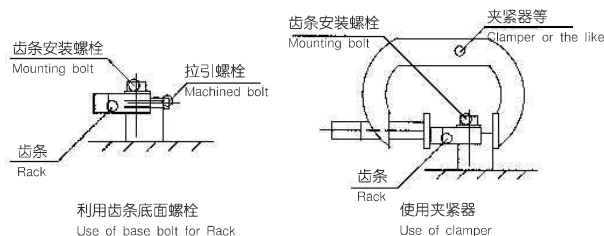


图1 齿条平行的调整方法 / Fig. 1 -Setting procedures for parallelism of Rack-

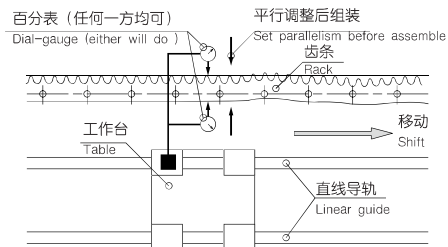


图2 齿条平行的测量方法 / Fig. 2 -Measuring procedures for parallelism of Rack-

■ 推荐扭矩表 / List of recommended tightening torque

- 内六角螺栓 / Bolt with hex hole

螺栓强度区分: 10.9~12.8情况下

Strength division for bolt for 10.9~12.8 (N · cm)

	对方材质 Mated material	拧紧扭矩 Tightening torque		
		钢 Steel	铸件 Cast metal	铝合金 Aluminum
螺栓规格 Nominal designation of bolt	M5	820	540	400
	M6	1400	920	680
	M8	3100	2000	1450
	M10	6800	4500	3300
	M12	12000	7800	5800
	M14	15700	10500	7800
	M16	19600	13100	9800

- 六角螺栓、不锈钢螺栓 / Hex bolt of stainless steel

螺栓强度区分: 6.8~8.8情况下

Strength division for bolt for 6.8~8.8 (N · cm)

	对方材质 Mated material	拧紧扭矩 Tightening torque		
		钢 Steel	铸件 Cast metal	铝合金 Aluminum
螺栓规格 Nominal designation of bolt	M5	500	500	400
	M6	850	850	680
	M8	1900	1900	1450
	M10	4100	4100	3300
	M12	7000	7000	5800
	M14	11000	10500	7800
	M16	13700	13100	9800

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■ 齿条的连接请使用专用靠模 / Use special jig when splicing Rack.

长冲程的情况下需要将齿条进行连接, 请务必确认邻接的节距, 此时请使用专用靠模来确认 (需要购买)。

Upon splicing Rack for an extended stroke, it is necessary to determine neighboring pitch size. We are in supply with jigs. Contact us when you need jig.

1. 以基准侧第1根为原点, 接续第2根、第3根时请使用连接靠模。

Use jig to splice second and third Rack pieces with first one Rack piece in the reference side as an original member.

2. 被切断的短尺寸齿条, 切断面请放置在最末端。

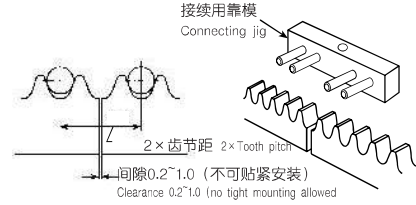
Use severed Rack piece with severed surface as an end portion.

3. 被切断的短尺寸齿条, 原则上不要将其作为第1根或者放在中间位置使用。

Don't set severed Rack piece generally as first or middle Rack piece.

4. 如果必须将切断的尺寸的齿条放在第1根或者中间的话, 需要讨论切断长度公差、切断面。需要进行标准外的加工。(需要进行式样的协商)

When severed Rack piece has to be set as first or middle Rack piece, it is necessary to check severed length allowance and severed surface. It belongs to non-standard assemble, and requires meeting about its design with us in advance.



■ 齿条的连接安装顺序 / Splicing procedures for Rack.

1. 将第1根齿条按照安装顺序 (P.18) 进行安装调整。

Set and adjust first Rack piece of reference side in accordance with assembling procedures (P. 18).

2. 将第2根齿条在基座上与第1根端面对齐。

Abut second Rack piece on first Rack piece on base surface.

3. 把齿条安装螺栓轻轻拧上, 进行假装配。(齿条可以轻轻推动的程度地假装配)

Provisionally tighten mounting bolt for Rack (with Rack kept lightly shiftable).

4. 将靠模按在连接缝的上侧, 用手按住, 或者用螺栓或者夹紧器进行固定。(注意靠模的倾斜以及偏斜)

Push jig on Rack pieces. Hold them by hand, otherwise fix them with bolt, clamp or the like (Be attentive to inclination and shift of jig).

5. 将第2根齿条跟第1跟齿条同样按照安装顺序 (P.18) 进行安装调整。

Set and adjust second Rack piece as done by first Rack piece in accordance with assembling procedures (P. 18).

6. 将齿条的安装螺栓用推荐扭矩的30%左右进行拧紧。(将齿条底面用夹紧器等贴在基准面上进行拧紧。

Tighten mounting bolt for Rack with approx. 30% of recommended tightening torque (with reference surface of Rack tightly placed on base by clamp or the like).

7. 将齿条安装螺栓按照推荐扭矩来进行拧紧 (推荐扭矩表请参照P.18)。

Finally tighten mounting bolt for Rack with recommended tightening torque (refer to list of recommended tightening torque P. 18).

8. 拆卸靠模。

Remove jig.

9. 在齿条上再次用手按住靠模, 确认靠模没有间隙或者晃动。(如果靠模有间隙或者晃动的情况, 意味着齿条的连接节距或者平行度不合格。再次从顺序3开始纠正。

Push jig on Rack by hand again and confirm that Rack has no useless play.

10. 第3根齿条以后采用同样方式进行连接。

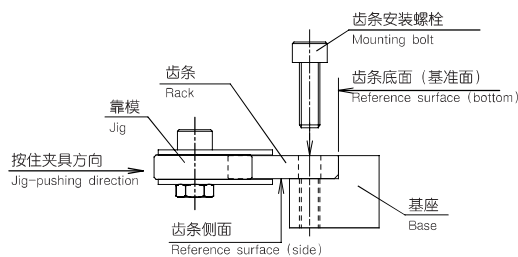
Set and splice third Rack piece as done by second Rack piece.

● 靠模固定螺栓/Fixing bolt for jig (N · cm)

型号 Model	螺栓 规格 Bolt No.	假装配扭矩 Provisionally tightening torque	最终拧紧扭矩 Finally tightening torque
CJ16	M6	100	500
	M8	100	800
CJ20	M8	100	800
	M10	100	1200
CJ25	M10	200	2800
	M12	200	3000
CJ32	M10	200	2800
	M12	200	3000
CJ40	M10	300	3200
	M12	300	3500

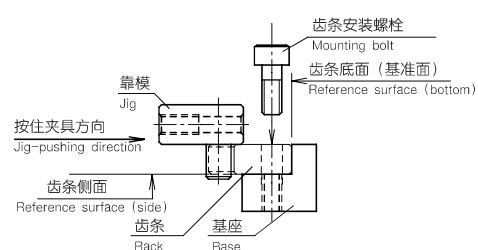
● CR1008A~1210型的情况下

For CR1008A~1210A



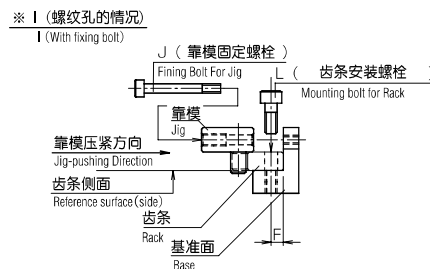
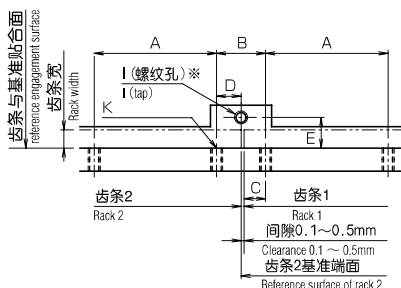
● CR1610A~4012A · CR4014型的情况下

For CR1610A~4012A · CR4014A



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■ 齿条靠模部尺寸图 / Dimensional drawing for splicing portion of Rack.



齿条靠模部尺寸图 16-40用 /Dimensional drawing for splicing portion of Rack.(16~40)

尺寸表 / Dimensions

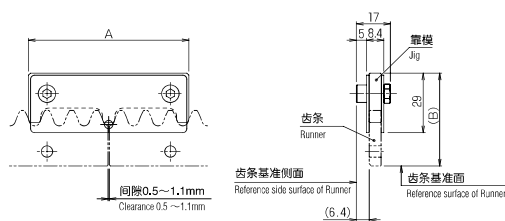
注) *记号的部分由于齿条长度的变化(标准外), 尺寸相应改变。
*Dimensional sizes change depending on length of Rack

齿条型号 Model	A	*B	*C	D	E	F	I	J	K	L
CR1610A— □□F—L512	96	32	16	16	19.5	7	M6 深 12	M6 × 60	M6 深 12	M6
CR1610A— □□F—L992							M6 depth12		M6 depth12	
CR2010A— □□F—L500	100	100	50	50	25.5	10	M8 深 16	M8 × 80	M8 深 16	M8
CR2010A— □□F—L1000							M8 depth16		M8 depth16	
CR2510A— □□F—L500	100	100	50	50	30.5	12	M10 深 20	M10 × 90	M10 深 20	M10
CR2510A— □□F—L1000							M10 depth20		M10 depth20	
CR3212A— □□F—L512	96	32	16	16	36.5	14	M10 深 20	M10 × 100	M12 深 24	M12
CR3212A— □□F—L992							M10 depth20		M12 depth24	
CR4012A— □□F—L520	120	160	80	80	43.5	16	M10 深 20	M10 × 110	M16 深 32	M16
CR4012A— □□F—L1000							M10 depth20		M16 depth32	
CR4014A— □□F—L520	80	120	60	60	54	16	M10 深 20	M10 × 110	M16 深 32	M16
CR4014A— □□F—L1000							M10 depth20		M16 depth32	

■ 齿条靠模尺寸表 / Dimensional sizes of connecting jig.

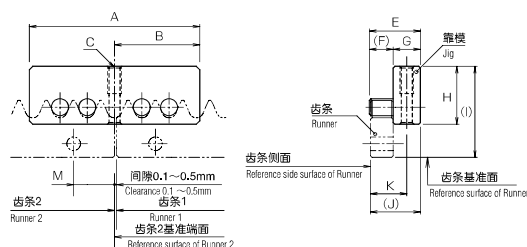
●CJ10A~12A型的情况下

For CJ10A~12A



● CJ16~40型的情况下

For CJ16~40



齿条靠模尺寸表 / Dimensional sizes of connecting

jig CR类型尺寸表 /CR type

靠模型号 Jig model	A	B	C	E	F	G	I	H	J	K	M
CJ10	65	(46.2)	—	—	—	—	—	—	—	—	—
CJ12	78	(45.1)	—	—	—	—	—	—	—	—	—
CJ16	100	50	6.9通孔 /6.9 through hole	30	(14)	16	(50.4)	(34)	(27.5)	19.5	16
CJ20	100	50	8.5通孔 /8.5 through hole	35	(15)	20	(66.7)	(42)	(35.5)	25.5	50
CJ25	130	65	10.5通孔 /10.5 through hole	40	(16)	24	(77)	(55)	(42.5)	30.5	50
CJ32	170	85	10.5通孔 /10.5 through hole	50	(26)	24	(82.9)	(55)	(48.5)	36.5	16
CJ40	210	105	10.5通孔 /10.5 through hole	60	(36)	24	(95.2)	(55)	(55.5)	54	80

CR类型尺寸表 /CR type

靠模型号 Jig model	A	B	C	E	F	G	I	H	J	K	M
C.140	210	105	10.5通孔, /10.5 through hole	60	(36)	24	(95.2)	(55)	(66)	54	60

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■ 安装精度表 / List of Mounting Precision

①推荐安装精度 / Recommended mounting precision

为达到CR齿条的全部样本精度、性能，而必要的安装精度

All catalogue precisions required for CR Runner and mounting precision to which design brochure is referred

(mm)

型号 Model	齿条安装精度 Mounting Precision of rack				滚轮安装精度 Mounting Precision of pinion
	齿顶部(或者齿底部)的平行度 Parallelism of addendum or dedendum	侧面的平行度 Parallelism of side surface			轴跳动 Off-center oscillation
		1根齿条 1pc	全冲程 Whole	连接部高度差 Difference in grade at connector pieces	
CR1008	0.05	0.2	0.6	0.4	0.03
CR1010					
CR1210					
CR1610					
CR2010					
CR2510					
CR3212					
CR4012	0.05	0.2	0.8	0.6	
CR4014					

②动作允许范围 / Allowable range of operation

CR齿条可以使用的安装精度

Mounting precision for CR Runner to be usable

(mm)

型号 Model	齿条安装精度 Mounting Precision of rack				滚轮安装精度 Mounting Precision of pinion
	齿顶部(或者齿底部)的平行度 Parallelism of addendum or dedendum	侧面的平行度 Parallelism of side surface			轴跳动 Off-center oscillation
		1根齿条 1pc	全冲程 Whole	连接部高度差 Difference in grade at connector pieces	
CR1008	0.1	0.4	0.8	0.4	0.05
CR1010					
CR1210					
CR1610					
CR2010					
CR2510					
CR3212					
CR4012	0.1	0.4	1	0.6	
CR4014					

<注意>

按照②动作允许范围内的组装精度来进行安装的情况下，CR齿条的传动精度、背隙、允许负载能力上面都会有所影响。影响的程度估值如下：

对传动精度的影响 估值：【齿顶 平行度(mm)+滚轮轴跳动(mm)】×0.5(mm)

对背隙的影响 估值：【齿顶 平行度(mm)+滚轮轴跳动(mm)】×0.8(mm)

对允许负载能力的影响 请考虑齿条选型计算的安装精度系数。

但是，上述数值只是CR单体的数值，根据设备构成、刚性、安装方法等不同，可能会受到更大的影响。

<Note>

Upon mounting according to assemble precision within (②allowable range of operation,) torque-transmission precision, backlash, and allowable capacity of CR Runner are influenced.

Indications of influences are as follows:

Influence indication of transmitting accuracy :[addendum parallelism(mm)+off-center oscillation of pinion(mm)]×0.5(mm)

Influence indication of backlash :[addendum parallelism(mm)+off-center oscillation of pinion(mm)]×0.8(mm)

Influence indication of allowable capacity :refer to mounting precision coefficient used at Rack selection calculation.

Note that above values are for CR Runner itself, and may be further influenced depending on structure, rigidity and mounting methods.

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■ 滚轮的安装 / Mounting of roller pinion

● CP1008A的情况下 / For CP1008A

1. 请清除在法兰盘、滚轮与法兰相应接触部位附着的锈迹以及脏物等。
Wipe out rust, dirt, etc. from the flange and the flange contact portions of the roller pinion.
2. 在法兰的滚轮安装面上轻轻涂抹润滑油或者润滑脂 (图1)。
Lightly apply oil grease to the roller pinion mounted surface of the flange(Fig. 1).
3. 将滚轮嵌入法兰盘中。
Fit the roller pinion in the flange.
4. 将安装螺栓慢慢地拧紧到规定扭矩。
Fasten the mounting bolts gradually to the specified torque.
5. 按照规定扭矩, 拧紧到螺栓拧不动为止。
Fasten the mounting bolts at the specified torque until they can no longer be fastened.
6. 拧紧结束后, 确认滚轮跳动。请确认滚轮的滚销部位在回转时的跳动量。
After fastening, check the roller pinion for eccentricity. For the eccentricity, check the waggle of the roller pinion during its rotation.

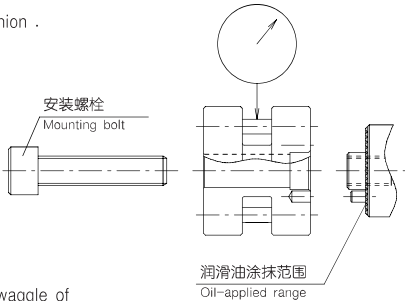


图1 / Fig. 1

● CP1010A · 1210A的情况下 / For CP1010A · 1210A

1. 请清除在轴、滚轮内径、涨紧套上的锈迹以及脏物等。
Wipe out rust, dirt, etc. from the shaft, the inside diameter of the roller pinion and the clamping tools.
2. 在轴的滚轮接触部分以及涨紧套的外径、锥面、锁紧螺栓的螺纹部、头部座面轻轻涂抹润滑油或者润滑脂 (图2)。
Lightly apply oil or grease to the contact pinion of the shaft with the roller pinion, the outside diameter and taper portion of the clamping tools, and the thread portion and head seat of the lock bolt(Fig. 2).
3. 按涨紧套部件A、衬套、涨紧套部件B、加压法兰的顺序安装在滚轮上。请确认涨紧套的朝向是内圈是放在内侧的状态 (图3)。
Install the clamping tool parts in the roller pinion in order of the clamping tool A, the space, the clamping tool B and the pressure flange. At this time, the inner ring of the clamping tool should be on the back side(Fig. 3).
4. 将滚轮插入轴上。
Insert the roller pinion into the shaft.
5. 拧紧锁定螺栓至轴和滚轮有一定面压的程度。
Fasten the lock bolt until slight contact pressure is applied to the shaft and the roller pinion.
6. 确认轴与滚轮的同轴度, 偏心跳动, 调整控制在滚轮安装精度值范围内, 偏心跳动请确认滚轮的滚销部位回转时的跳动量。(参考P.21安装精度表)
Confirm off-center oscillation between roller pinion and shaft during operation(refer to list of mounting precision P.17).
7. 调整后, 将锁紧螺栓按照对角线顺序 (图3) 均等拧紧到各自规定扭矩的大约1/4, 慢慢加大扭矩进行拧紧。
After the adjustment, fasten the lock bolts diagonally(Fig.3) and uniformly starting at 25% or so of recommended tightening torque with gradual increase.
8. 请按照规定扭矩拧紧。
Then, fasten the lock bolts with a torque wrench at the specified tightening torque.
9. 为了确保锁定螺栓按照规定扭矩拧紧, 按照圆周方向的顺序反复数次拧紧。
Fasten the lock bolts one by one in the circumferential direction. Repeat this fastening cycle several times. Then, confirm that the lock bolts have been fastened at the specified tightening torque.
10. 拧紧结束后, 请再次确认轴与滚轮的同轴度和跳动量。
After the fastening, recheck the coaxiality and eccentricity of the shaft and roller pinion.

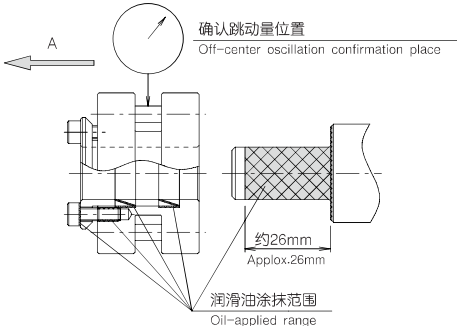


图2 / Fig. 2

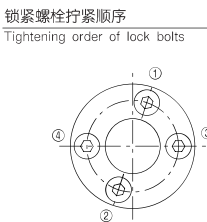


图3 / Fig. 3

● 按照螺栓·涨紧套·锁定螺栓推荐的拧紧扭矩表

Recommended tightening torque table for mounting bolts and clamping tool bolts (N · cm)

滚轮 Pinion	螺栓规格 Bolt No.	数量 Pcs	拧紧扭矩 Torque(N · m)
CP1008	M8	1	28.0
CP1010	M3	4	1.9
CP1210	M4	4	4.1

●CP1610B · 4012B · CP4014B的情况下 /For CP1610B · 4012B · CP4014B

1. 请清除在轴、滚轮内径、涨紧套内外径上附着的锈迹以及脏物等。
Wipe out rust, dirt, etc. from the shaft, the inner surface of the roller pinion and the inner and outer surfaces of the clamping tool.
2. 在轴上和滚轮接触部分以及涨紧套的各锥面、锁紧螺栓的螺纹部·头部座面轻轻涂抹润滑油或者润滑脂 (图4、6)。
Lightly apply oil or grease to the shaft which directly contacts with the roller pinion, tapered area of the clamping tool, screwed area and head seat of lock bolt(Fig. 4 and 6) .
3. 按涨紧套的外圈插入滚轮后, 按照在轴上安装滚轮、涨紧套内圈的顺序进行装配。这时, 请注意让涨紧套内圈和外圈的缺口错开 (图5)。
Insert the outer race of the clamping tool into the roller pinion, and then fit the roller pinion and the inner race of the clamping tool on the shaft in this order. At this time, shift the allocated positions of the inner race and outer race of the clamping tool (Fig. 5) .
4. 拧紧锁定螺栓至轴和涨紧套有少量面压。
Fasten the lock bolt until slight contact pressure is applied to the shaft and the roller pinion.
5. 确认轴与滚轮的同轴度, 偏心跳动, 调整控制在滚轮安装精度值范围内, 偏心跳动请确认滚轮的滚销部位回转时的跳动量。
(参考P.21安装精度表) (CP1610B~2510B→10根、CP3212B~4012B→12根、CP4014B→14根)
Confirm off-center oscillation between roller pinion and shaft during operation(refer to list of mounting precision P.21).
6. 调整后, 将锁紧螺栓按照对角线顺序 (图5、7) 以规定拧紧扭矩的约1/4均等地拧紧, 逐渐增加拧紧扭矩来拧紧螺栓。
After the adjustment, fasten the lock bolts diagonally(Figs.5 and 7) and uniformly starting at 25% or so of recommended tightening torque with gradual increase.
7. 按规定扭矩拧紧。
Then, fasten the lock bolts with a torque wrench at the specified tightening torque.
8. 为了确保锁定螺栓按照规定扭矩拧紧, 按照圆周方向的顺序反复数次拧紧。
Fasten the lock bolts one by one in the circumferential direction. Repeat this fastening cycle several times. Then, confirm that the lock bolts have been fastened at the specified tightening torque.
9. 拧紧结束后, 请再次确认轴与滚轮的同轴度和跳动量。
After the fastening, recheck the coaxiality and eccentricity of the shaft and roller pinion .

● CP1610B~3212B的情况下 /For CPA1610B~3212B

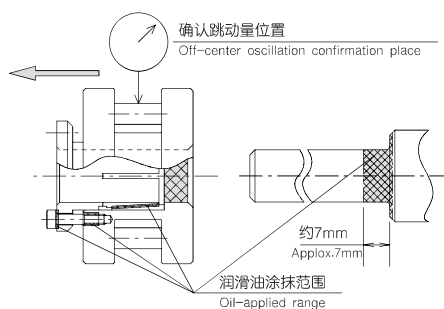


图4 /Fig. 4

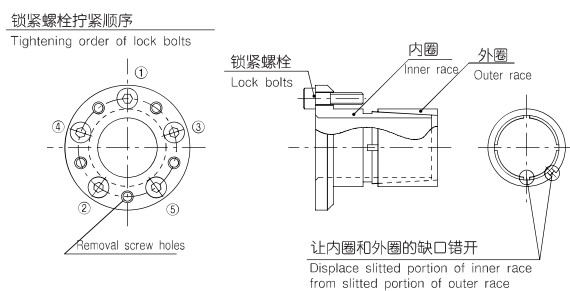


图5 /Fig. 5

●CP4012B · 4014B的情况下 /For CP4012B · 4014B

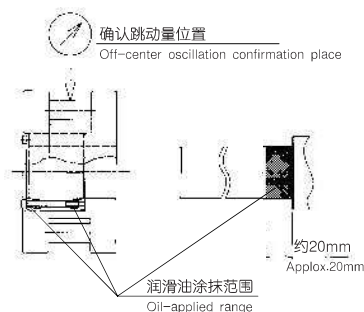


图6 /Fig. 6

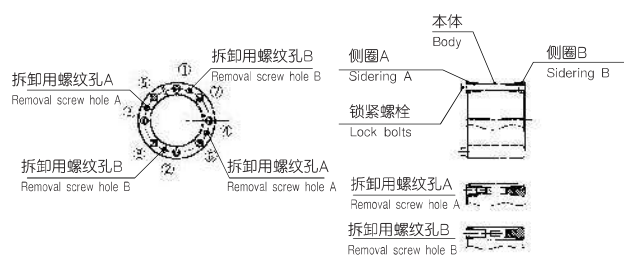


图7 /Fig. 7

●按照螺栓·涨紧套·锁定螺栓推荐的拧紧扭矩表

Recommended tightening torque table for mounting bolts and clamping tool bolts (N · m)

滚轮 Pinion	螺栓规格 Bolt No.	数量 Pcs	拧紧扭矩 Torque(N · m)
CP1610B	M4	5 根	3.5
CP2010B	M5	5 根	7.0
CP2510B	M6	5 根	12.0
CP3212B	M6	6 根	12.0

滚轮 Pinion	螺栓规格 Bolt No.	数量 Pcs	拧紧扭矩 Torque(N · m)
CP4012B	M6	8 根	13.0
CP4014B	M8	8 根	37.3

◇ 为了得到所规定的性能, 建议配合轴的公差为h7级, 表面粗糙度在12S以下。

In order to achieve predetermined performance, h7-class allowance for shaft and surface roughness less than 12S is recommended.

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安装注意事项 /Cautions of assemble

注1. 锁紧螺栓的锁紧一定要使用有调整刻度的扭矩扳手, 按照规定扭矩值进行拧紧。

由于板式指针类型的扭矩扳手很难确认规定扭矩值, 会导致螺栓松动或者变形而引起故障。

Note 1. When fastening the lock bolts, be sure to use a torque wrench with torque adjustment graduations and fasten at the specified tightening torque. If a torque wrench of plate type is used, since it is difficult to confirm the specified torque on the wrench, slip, deformation or other trouble may be caused.

注2. 含钼以及含有极压添加剂的润滑油、润滑脂, 绝对不可以使用。会导致额定力矩大幅度下降, 导致松动。

Note 2. Never use oil or grease of molybdenum series or containing extreme-pressure additive, or the substantial decrease of allowable torque or slip may be caused.

注3. 锁紧螺栓请务必使用配套的锁紧螺栓。

Note 3. Be sure to use the provided lock bolts.

注4. 在拧紧锁定螺栓时, 滚轮会朝着图4箭头A的方向有若干移动。注意与齿条侧面的干涉。(对象为CP16~32型)

Note 4. Since the roller pinion moves slightly in the arrow A direction of Fig.4 when the lock bolts are fastened, watch out the roller pinion for the interference with the ring gear side (for CP16~32 types).

注5. 在轴上有键槽的情况下, 键槽宽如果是JIS规格程度的话可以使用, 但是会减少15%~20%的额定扭矩。请清除了键槽的翻边、毛刺后使用。

Note 5. For shaft with keyway, shaft is usable so long as keyway has JIS-stipulated width although allowable torque drops by 15-20%. Before use, remove burrs from keyway.

注6. 中空轴(管状)的情况下, 由于管壁厚度的关系, 有面压不充分的可能性。

Note 6. For hollowed shaft, it may fail to attain sufficient surface pressure depending on thickness dimension.

■ 滚轮的拆卸 / Dismounting of roller pinion

● CP1008A的情况下 /For CP1008A

1. 切断动力源, 确认滚轮上没有扭矩和轴向力, 并且确认没有掉落危险。

Turn off the power supply, and check the roller pinion to confirm no torque or thrust on it and it is free of falling risk.

2. 慢慢拧松安装螺栓, 从法兰上拆卸下来。

Loosen the mounting bolts, and remove them from the flange.

● CP1010A · 1210A的情况下 /For CP1010A · 1210A

1. 切断动力源, 确认滚轮上没有扭矩和轴向力, 并且确认没有掉落危险。

Turn off the power supply, and check the roller pinion to confirm no torque or thrust on it and it is free of falling risk.

2. 将锁紧螺栓按照顺序, 慢慢地拧松。

Loosen the lock bolts gradually one by one.

3. 如果拧松锁紧螺栓, 涨紧套自身的恢复力起作用的话, 可以从轴上拆卸下来。

When the lock bolts are loosened, the clamping tool regain the self-recovery power, and removal becomes possible starting from the shaft.

4. 即使拧松了所有螺栓还是无法拆卸的情况下, 将周围的脏物以及锈迹等清除, 然后再用锤子轻轻敲打。

If removal is impossible even if all lock bolts are loosened, remove the rust, dirt, etc. from the surrounding and tap the shaft with a hammer or the like.

● CP1610A · 4012A · CP4014A的情况下 /For CP1610A · 4012A · CP4014A

1. 切断动力源, 确认滚轮上没有扭矩和轴向力, 并且确认没有掉落危险。

Turn off the power supply, and check the roller pinion to confirm no torque or thrust on it and it is free of falling risk.

2. 将锁紧螺栓按照顺序, 慢慢地拧松。

Loosen the lock bolts gradually one by one.

3. 将拆卸用螺栓拧入拆卸螺纹孔, 按对角线的顺序逐渐均力拧入, 就可以拆卸下滚轮。(适用于CP16~32型)

Insert the lock bolts into all dismantling screw holes, and fasten them diagonally, uniformly and gradually, and the roller pinion can be dismantled.

4. 将拆卸用螺栓拧入拆卸螺纹孔A, 按对角线的顺序慢慢地均力拧入, 就可以拆卸下侧圈A。(适用于CP40/CP40型) Lock bolts into all removal screw holes A and slowly tighten removal bolts diagonally with uniform force to remove sidering A (for CP40/CP40 types).

5. 接下来在拆卸用的螺纹孔B上拧入锁定螺栓, 按照对角线的顺序慢慢地拧入就可以拆卸下滚轮。(适用于CP40/CP40型) Lock bolts into all removal screw holes B and slowly tighten removal bolts diagonally with uniform force to remove (for CP40/CP40 types).

拆卸注意事项 /Cautions when removing roller pinion

注1. 在拆卸前请先确认安全后再进行作业。

Note 1. Before removal, confirm safety and start operation.

注2. 在锁紧螺栓上涂抹润滑油。

Note 2. Apply oil or grease to lock bolts.

注3. 请把拆卸螺纹孔全数使用(可以防止法兰部变形)。

Note 3. Use all removal screw holes to avoid flange against deformations.

◇ 再次使用的情况时, 请确认了产品各部位没有变形、缺损的情况下再使用。

◇ When in reuse, make sure that there are no defect and deformation on component parts of product.

■ 齿条与滚轮倾斜的确认 / Check inclination of Runner against pinion

-

齿的接触范围, 齿高接触率的参考值:
 推荐安装精度以内: 约80%以上
 允许运转范围以内: 约60%以上

Widths of pressure marks are judged by contact range between teeth.
 Within recommend mounting precision: more than 80%
 Within operational range allowable: more than 60%

选定产品后相关技术参数请再次咨询亚母斯 (AMS) 确认, 更多新产品请查阅亚母斯 (AMS) 官方网站

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■ CP齿圈&滚轮式样表 / CP Ring & Pinion Specification

标准品为以下两种，尺寸在之后的项目中有记载。
Standard products are summed up for the following 2 types. Dimensions are raised on back.

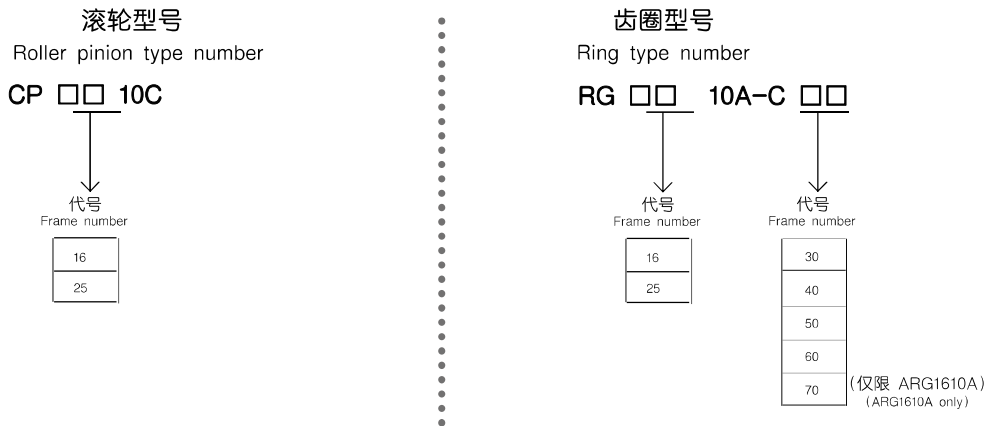
滚轮 Roller pinion	型号 Model	CP1610C					CP2510C			
	模数 Module	4.75					7.5			
	齿数 Number of tooth	10					10			
	滚销节圆直径 Diameter of roller pitch circle	mm 47.5					75			
	重量 Mass weight	kg 0.8					2.2			
	转动惯量 Inertia moment	kg.m² 4.12 × 10 ⁻⁴					26.8 × 10 ⁻⁴			
齿圈 Ring	型号 Model	RG1610 A-C30	RG1610 A-C40	RG1610 A-C50	RG1610 A-C60	RG1610 A-C70	RG2510 A-C30	RG2510 A-C40	RG2510 A-C50	RG2510 A-C60
	齿数 Number of tooth	30	40	50	60	70	30	40	50	60
	节圆直径 Diameter of pitch circle	mm 142.5	190	237.5	285	332.5	225	300	375	450
	重量 Mass weight	kg 1.7	2.4	3.3	4.8	4.6	6.0	9.1	12.2	15.1
	转动惯量 Inertia moment	kg.m² 61.6 × 10 ⁻⁴	168.8 × 10 ⁻⁴	376.3 × 10 ⁻⁴	770.0 × 10 ⁻⁴	1128.4 × 10 ⁻⁴	550.1 × 10 ⁻⁴	1580.0 × 10 ⁻⁴	3390.0 × 10 ⁻⁴	6454.1 × 10 ⁻⁴
式样 Specification	减速比 Reduction ratio	1/3	1/4	1/5	1/6	1/7	1/3	1/4	1/5	1/6
	允许扭矩 Allowable torque	N · m 70	90	110	140	160	240	330	410	490
	中心距 Center-to-center distance	mm 98	122	146	170	193.5	154	193	230	268

注) 记录在本表中的式样、尺寸可能会因为改良而不进行事前通知就进行变更。
Note: Specification and dimensions described in list may be subject to change for improvement without notice.

■ 型号表示 / Model indication

订购时请按照下列型号订货。

Please order us in accordance with the type indicated as follows:

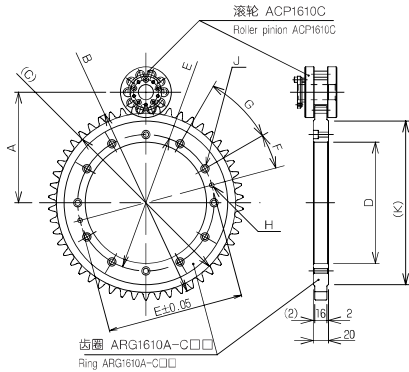


注) TCG齿圈以及滚轮，冷电镀为标准的表面处理式样。
Note: Raydent as surface treatment is standard specification for TCG Ring & Pinion.

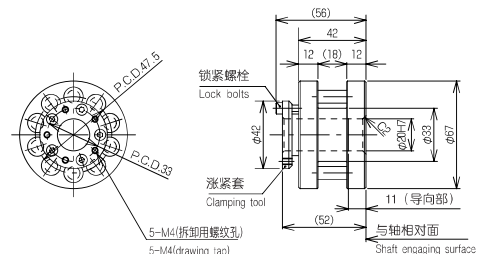
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■ 外形尺寸图 / Outer Size Dimensions

CP1610C/RG1610A-C□□



滚轮部分详细图 Enlarged view of roller pinion CP1610C

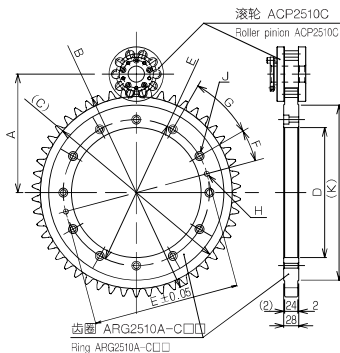


齿圈 / Ring							安装孔 / Mounting hole					(K)
型号 Model	齿数 Number of tooth	A 中心距 Center-to-center distance	节圆直径 Diameter of pitch circle	B 外径 Outer diameter	(C) 齿底径 Diameter of dedendum circle	D 内径 Inner diameter	E P.C.D.	F	G 角度间距 Angular pitch	H 基准孔 Base hole	J 孔尺寸 Hole size	
RG1610A-C30	30	98	142.5	162	140.5	70H7	90	30°	60°	2-φ6H7	6-7钻通 11镗孔 深 6.5 6-7gimlet 11 counter bore, depth 6.5	110
RG1610A-C40	40	122	190	210	188.5	120H7	145	15°	45°	2-φ6H7	8-7钻通 11镗孔 深 6.5 8-7gimlet 11 counter bore, depth 6.5	165
RG1610A-C50	50	146	237.5	257	236.5	160H7	180	15°	30°	2-φ6H7	12-7钻通 11镗孔 深 6.5 12-7gimlet 11 counter bore, depth 6.5	210
RG1610A-C60	60	170	285	305	284.5	190H7	220	15°	30°	2-φ8H7	12-9钻通 14镗孔 深 8.5 12-9gimlet 14 counter bore, depth 8.5	250
RG1610A-C70	70	193.5	332.5	353	331.5	260H7	285	15°	30°	2-φ8H7	12-9钻通 14镗孔 深 8.5 12-9gimlet 14 counter bore, depth 8.5	305

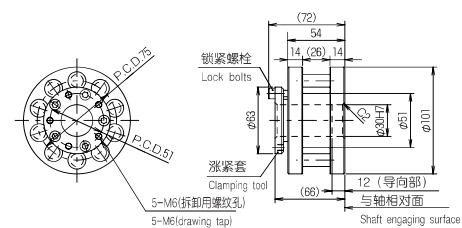
注) 记录在本表中的式样、尺寸可能会因为改良而不进行事前通知就进行变更。

Note: Specification and dimensions described in list may be subject to change for improvement without notice.

CP2510C/RG2510A-C□□



滚轮部分详细图 Enlarged view of roller pinion CP2510C



齿圈 / Ring							安装孔 / Mounting hole					(K)
型号 Model	齿数 Number of tooth	A 中心距 Center-to-center distance	节圆直径 Diameter of pitch circle	B 外径 Outer diameter	(C) 齿底径 Diameter of dedendum circle	D 内径 Inner diameter	E P.C.D.	F	G 角度间距 Angular pitch	H 基准孔 Base hole	J 孔尺寸 Hole size	
RG2510A-C30	30	154	225	254	221	120H7	145	30°	60°	2-φ8H7	6-9钻通 14镗孔 深 8.5 6-9gimlet 14 counter bore, depth 8.5	180
RG2510A-C40	40	193	300	331	299	190H7	220	15°	30°	2-φ8H7	12-9钻通 14镗孔 深 8.5 12-9gimlet 14 counter bore, depth 8.5	250
RG2510A-C50	50	230	375	405	373	260H7	285	15°	30°	2-φ8H7	12-9钻通 14镗孔 深 8.5 12-9gimlet 14 counter bore, depth 8.5	330
RG2510A-C60	60	268	450	481	449	330H7	360	15°	22.5°	2-φ10H7	16-11钻通 18镗孔 深 10.5 16-11gimlet 18 counter bore, depth 10.5	410

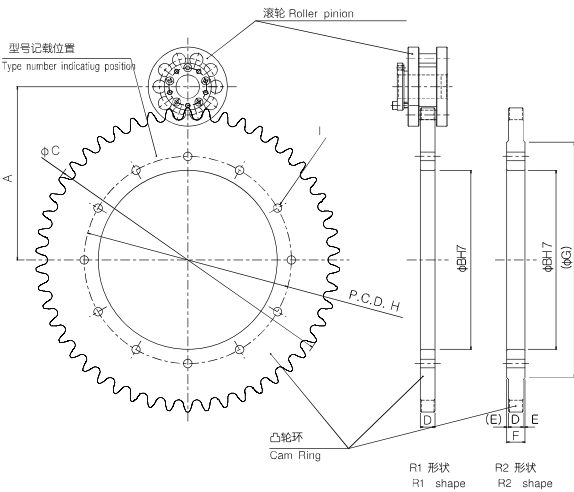
记录在本表中的式样、尺寸可能会因为改良而不进行事前通知就进行变更。

Specification and dimensions described in list may be subject to change for improvement without notice.

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■ 外形尺寸图 / Outside Dimensional Drawing

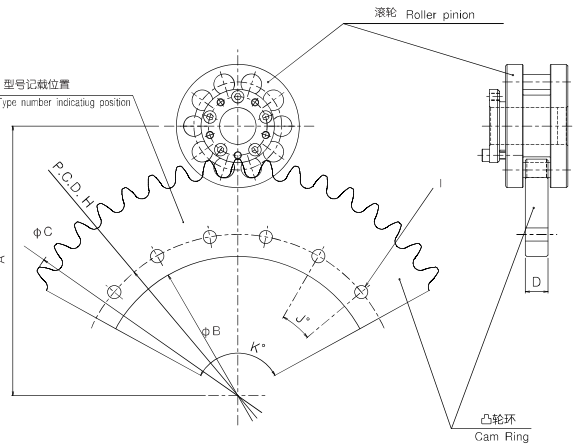
RGF(全环式) Full Ring type



■ 尺寸表 Dimension Table

型号 Model	齿数 Number of tooth	还原率 Reduction ratio	节圆直径 Diameter of pitch circle	
			凸轮环 Cam ring	齿轮 Rooller pinion
RGF1010A	30	3	93.00	31.00
	50	5	155.00	31.00
	70	7	217.00	31.00
	80	8	248.89	31.11
	100	10	310.91	31.09
RGF1210A	30	3	111.00	37.00
	50	5	186.67	37.33
	70	7	260.75	37.25
	80	8	298.67	37.33
	100	10	372.73	37.27
RGF1610A	30	3	147.00	49.00
	40	4	195.20	48.80
	50	5	243.33	48.67
	60	6	291.43	48.57
	70	7	338.63	48.38
	80	8	391.11	48.89
RGF2510A	100	10	487.27	48.73
	30	3	231.00	77.00
	40	4	308.80	77.20
	50	5	383.33	76.67
RGF3212A	60	6	459.43	76.57
	70	7	539.00	77.00
RGF4012A	36	3	352.50	117.50
	48	4	467.20	116.80
	60	5	585.00	117.00
RGF4014A	36	3	445.50	148.50
	48	4	590.40	147.60
	28	2	346.67	173.33
	42	3	519.00	173.00

RGD(开口环式) Split Ring type



■ 尺寸表 Dimension Table

型号 Model	齿数*1 Number of tooth	还原率 Reduction ratio	节圆直径 Diameter of pitch circle	
			凸轮环 Cam ring	齿轮 Rooller pinion
RGD1610A	140	14	690.67	49.33
	200	20	971.43	48.57
	240	24	1163.52	48.48
	300	30	1455.48	48.52
	400	40	1941.46	48.54
RGD2510A	90	9	694.80	77.20
	125	12.5	959.26	76.74
	150	15	1153.13	76.88
	190	19	1459.20	76.80
	250	25	1923.08	76.92
RGD3212A	75	6.25	732.76	117.24
	100	25/3	973.21	116.79
	120	10	1172.73	117.27
	150	12.5	1462.96	117.04
	200	50/3	1954.72	117.28
RGD4012A	60	5	736.67	147.33
	80	20/3	987.83	148.17
	96	8	1182.22	147.78
	120	10	1476.36	147.64
	160	40/3	1962.79	147.21
RGD4014A	60	30/7	737.84	172.16
	80	40/7	987.23	172.77
	96	48/7	1178.18	171.82
	120	60/7	1472.24	171.76
	160	80/7	1967.82	172.18

※1 这是作为一个完整环使用时的齿数。
This is number of teeth in case with used as a full Ring.

※2 惯性矩和重量的数量为一个ARGD
The number of inertia moment and mass weight are for a piece of ARGD

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■ RGF · RGD 尺寸表 / RGF · RGD Dimentions

型号 Model	齿数 Number of tooth	A	B	C	D	E	F	G	H	I	形象 Sharp	允许动态额定扭矩 Allowable dynamic rated torque N·m	最大工作扭矩 Maximum working torque N·m	允许静态额定扭矩 Allowable static rated torque N·m	惯性力矩 Inertia moment X10 ⁻⁴ kg·m ²	重量 Mass weight kg
RGF1010A	30	62	50	103	6	—	—	—	65	6-φ 5.5 通孔 6-φ 5.5 Thru	R1	11	11	16	3.67	0.25
	50	93	100	165	6	—	—	—	120	8-φ 5.5 通孔 8-φ 5.5 Thru	R1	19	19	28	24.3	0.55
	70	124	160	227	6	—	—	—	175	8-φ 5.5 通孔 8-φ 5.5 Thru	R1	27	27	40	78.2	0.84
	80	140	190	259	6	—	—	—	205	12-φ 5.5 通孔 12-φ 5.5 Thru	R1	31	31	46	126	1
	100	171	230	321	6	—	—	—	245	12-φ 5.5 通孔 12-φ 5.5 Thru	R1	38	38	57	320	1.7
RGF1210A	30	74	65	122	6	—	—	—	80	6-φ 5.5 通孔 6-φ 5.5 Thru	R1	27	27	40	7.07	0.32
	50	112	120	196	6	—	—	—	135	8-φ 5.5 通孔 8-φ 5.5 Thru	R1	46	46	69	50.7	0.8
	70	149	190	272	6	—	—	—	205	12-φ 5.5 通孔 12-φ 5.5 Thru	R1	65	65	97	164	1.2
	80	168	230	310	6	—	—	—	245	12-φ 5.5 通孔 12-φ 5.5 Thru	R1	74	74	111	255	1.4
	100	205	280	384	6	—	—	—	295	12-φ 5.5 通孔 12-φ 5.5 Thru	R1	93	93	139	639	2.3
RGF1610A	30	98	70	161	11.5	—	—	—	90	6-φ 7 通孔 6-φ 7 Thru	R1	73	120	146	41.7	1.2
	40	122	120	209	11.5	—	—	—	145	8-φ 7 通孔 8-φ 7 Thru	R1	97	165	194	115	1.7
	50	146	160	257	11.5	—	—	—	180	12-φ 7 通孔 12-φ 7 Thru	R1	120	200	240	261	2.4
	60	170	190	305	11.5	—	—	—	220	12-φ 9 通孔 12-φ 9 Thru	R1	145	245	290	538	3.5
	70	193.5	260	352	11.5	—	—	—	285	12-φ 9 通孔 12-φ 9 Thru	R1	165	285	330	780	3.4
	80	220	280	405	11.5	—	—	—	305	12-φ 9 通孔 12-φ 9 Thru	R1	195	330	390	1564	5.4
	100	268	360	501	11.5	2	15.5	450	390	12-φ 9 通孔 12-φ 9 Thru	R2	240	410	480	3568	7.7
RGF2510A	30	154	120	254	18.5	—	—	—	145	6-φ 9 通孔 φ14 沉孔, 深度 8.5 6-φ 9 Thru φ14counter bore depth 8.5	R1	250	360	500	407	4.6
	40	193	190	331	18.5	—	—	—	220	12-φ 9 通孔 φ14 沉孔, 深度 8.5 12-φ 9 Thru φ14counter bore depth 8.5	R1	335	485	670	1182	7
	50	230	260	404	18.5	—	—	—	285	12-φ 9 通孔 φ14 沉孔, 深度 8.5 12-φ 9 Thru φ14counter bore depth 8.5	R1	420	600	840	2543	9.3
	60	268	330	480	18.5	—	—	—	360	16-φ 11 通孔 φ18 沉孔, 深度 10.5 16-φ 11 Thru φ18counter bore depth 10.5	R1	505	720	1010	4852	12
	70	308	400	560	18.5	2	22.5	490	430	16-φ 11 通孔 φ18 沉孔, 深度 10.5 16-φ 11 Thru φ18counter bore depth 10.5	R2	590	845	1180	8709	15.3
RGF3212A	36	235	220	380	24.5	—	—	—	250	12-φ 11 通孔 φ18 沉孔, 深度 10.5 12-φ 11 Thru φ18counter bore depth 10.5	R1	630	1160	1260	2628	11.9
	48	292	330	493	24.5	—	—	—	360	16-φ 11 通孔 φ18 沉孔, 深度 10.5 16-φ 11 Thru φ18counter bore depth 10.5	R1	840	1540	1680	7054	17
	60	351	400	610	24.5	2	28.5	490	430	16-φ 11 通孔 φ18 沉孔, 深度 10.5 16-φ 11 Thru φ18counter bore depth 10.5	R2	1050	1930	2100	17821	28
RGF4012A	36	297	320	480	31.5	—	—	—	360	8-φ 18 通孔 φ26 沉孔, 深度 17.5 8-φ 18 Thru φ26counter bore depth 17.5	R1	1330	1330	2660	7267	19
	48	369	390	622	31.5	2	35.5	490	430	12-φ 18 通孔 φ26 沉孔, 深度 17.5 12-φ 18 Thru φ26counter bore depth 17.5	R2	1770	1770	3540	24220	38.3
RGF4014A	28	260	220	381	42	—	—	—	260	8-φ 18 通孔 φ26 沉孔, 深度 17.5 8-φ 18 Thru φ26counter bore depth 17.5	R1	2420	2420	3630	4120	19
	42	346	390	551	42	2	46	464	430	12-φ 18 通孔 φ26 沉孔, 深度 17.5 12-φ 18 Thru φ26counter bore depth 17.5	R2	3620	3620	5430	16550	31

注) 有关基本动态额定扭矩、最大工作扭矩和允许静态额定扭矩的术语, 请参考ATCG凸轮齿条和小齿轮术语。

Note) For the terms of basic dynamic rated torque, maximum working torque and allowable static rated torque, refer to the terminology of ATCG Cam Rack and Pinion .

型号 Model	齿数 Number of tooth	A	B	C	D	H	I		J	K		允许动态额定扭矩 Allowable dynamic rated torque N·m	最大工作扭矩 Maximum working torque N·m	允许静态额定扭矩 Allowable static rated torque N·m	惯性力矩 Inertia moment X10 ⁻⁴ kg·m ²		重量 Mass weight kg	
							K1	K2		K1	K2				K1	K2	K1	K2
RGD1610A	140	370	610	705	11.5	640	6-φ 11 通孔 6-φ 11 Thru	3-φ 11 通孔 3-φ 11 Thru	12	72	36	345	585	690	1625	813	1.5	0.75
	200	510	860	984	11.5	900	6-φ 11 通孔 6-φ 11 Thru	3-φ 11 通孔 3-φ 11 Thru	12	72	36	485	825	970	6160	3080	2.9	1.5
	240	606	1050	1176	11.5	1090	6-φ 11 通孔 6-φ 11 Thru	3-φ 11 通孔 3-φ 11 Thru	10	60	30	580	990	1160	9209	4605	3	1.5
	300	752	1340	1468	11.5	1380	6-φ 11 通孔 6-φ 11 Thru	3-φ 11 通孔 3-φ 11 Thru	6	36	18	725	1230	1450	11310	5655	2.3	1.2
	400	995	1820	1954	11.5	1860	6-φ 11 通孔 6-φ 11 Thru	3-φ 11 通孔 3-φ 11 Thru	6	36	18	970	1650	1940	28920	14460	3.3	1.7
RGD2510A	90	386	610	716	18.5	640	6-φ 11 通孔 φ18 沉孔, 深度 10.5 6-φ 11 Thru φ18counter bore depth 10.5	3-φ 11 通孔 φ18 沉孔, 深度 10.5 3-φ 11 Thru φ18counter bore depth 10.5	12	72	36	760	1080	1520	2846	1423	2.6	1.3
	125	518	860	980	18.5	900	6-φ 11 通孔 φ18 沉孔, 深度 10.5 6-φ 11 Thru φ18counter bore depth 10.5	3-φ 11 通孔 φ18 沉孔, 深度 10.5 3-φ 11 Thru φ18counter bore depth 10.5	12	72	37.4	1050	1510	2100	8893	4624	4.3	2.2
	150	615	1050	1174	18.5	1090	6-φ 11 通孔 φ18 沉孔, 深度 10.5 6-φ 11 Thru φ18counter bore depth 10.5	3-φ 11 通孔 φ18 沉孔, 深度 10.5 3-φ 11 Thru φ18counter bore depth 10.5	10	60	31.2	1260	1810	2520	13640	7092	4.5	2.3
	190	768	1340	1480	18.5	1380	6-φ 11 通孔 φ18 沉孔, 深度 10.5 6-φ 11 Thru φ18counter bore depth 10.5	3-φ 11 通孔 φ18 沉孔, 深度 10.5 3-φ 11 Thru φ18counter bore depth 10.5	6	36	18.9	1600	2280	3200	19260	10137	3.9	2.1
	250	1000	1820	1944	18.5	1860	6-φ 11 通孔 φ18 沉孔, 深度 10.5 6-φ 11 Thru φ18counter bore depth 10.5	3-φ 11 通孔 φ18 沉孔, 深度 10.5 3-φ 11 Thru φ18counter bore depth 10.5	6	36	18.7	2110	3020	4220	39965	20782	4.5	2.4
RGD3212A	75	425	610	758	24.5	640	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	12	72	38.4	1310	2410	2620	5886	3139	5.1	2.7
	100	545	860	998	24.5	900	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	12	72	36	1750	3200	3500	13700	6850	6.5	3.2
	120	645	1050	1198	24.5	1090	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	10	60	30	2110	4870	4220	22030	11015	7.1	3.5
	150	790	1340	1487	24.5	1380	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	6	36	19.2	2630	4810	5260	36390	14074	5.3	2.8
	200	1036	1820	1979	24.5	1860	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	6	36	18	3510	6430	7020	70380	35190	7.9	3.9
RGD4012A	60	442	610	768	31.5	640	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	12	72	36	2210	—	4420	7701	3851	6.7	3.3
	80	568	860	1020	31.5	900	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	12	72	36	2960	—	5920	20070	10035	9.3	4.6
	96	665	1050	1214	31.5	1090	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	10	60	30	3540	—	7080	30320	15160	9.7	4.8
	120	812	1340	1507	31.5	1380	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	6	36	18	4420	—	8840	37496	18748	7.5	3.8
	160	1055	1820	1992	31.5	1860	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	3-φ 18 通孔 φ26 沉孔, 深度 17.5 3-φ 18 Thru φ26counter bore depth 17.5	6	36	18	5880	—	11760	94530	47265	10.5	5.3
RGD4014A	60	455	610	768	42	640	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	—	12	72	—	5160	—	7740	10440	—	9	—
	80	580	860	1018	42	900	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	—	12	72	—	6900	—	10350	26687	—	12.4	—
	96	675	1050	1207	42	1090	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	—	10	60	—	8240	—	12360	38880	—	12.4	—
	120	822	1340	1500	42	1380	6-φ 18 通孔 φ26 沉孔, 深度 17.5 6-φ 18 Thru φ26counter bore depth 17.5	—	6	36	—	10300	—	15450	48160	—	9.7	—

注) 有关基本动态额定扭矩、最大工作扭矩和允许静态额定扭矩的术语, 请参考ATCG凸轮齿条和小齿轮术语。

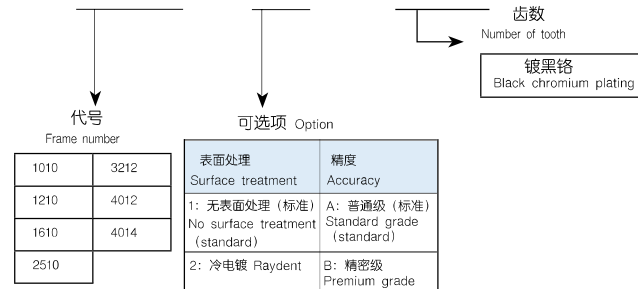
Note) For the terms of basic dynamic rated torque, maximum working torque and allowable static rated torque, refer to the terminology of ATCG Cam Rack and Pinion .

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■ 型号表示 / Model indication

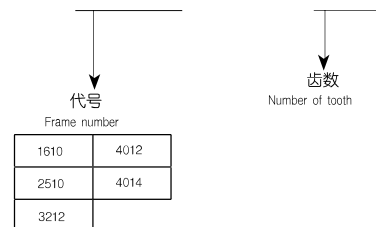
● 全环式类型编码 Full Ring type number

RGF □□□□ A - □□ - C - □□□



● 连接夹具类型编码 Connection Jig type number

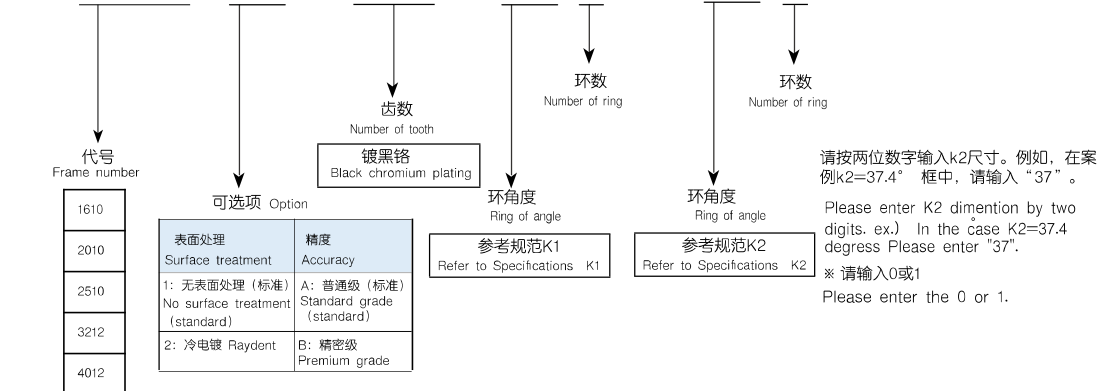
RJ □□□□ B - C - □□□



※ 内六角头螺栓，塑料垫圈和紧定螺钉连接到附加夹具上。
Hex socket head cap bolt, plastic washer and setscrew are attached to adding jig.

● 开口环式类型编码 Split Ring type number

RGD □□□□ A-□□ - C □□□ - A □□×□ + - A □□×□



※ 不要在每个有不同齿数的开口环上添加。

Don't add to split rings each having different number of teeth.

※ 添加到开口环时使用指定的工具ARJ

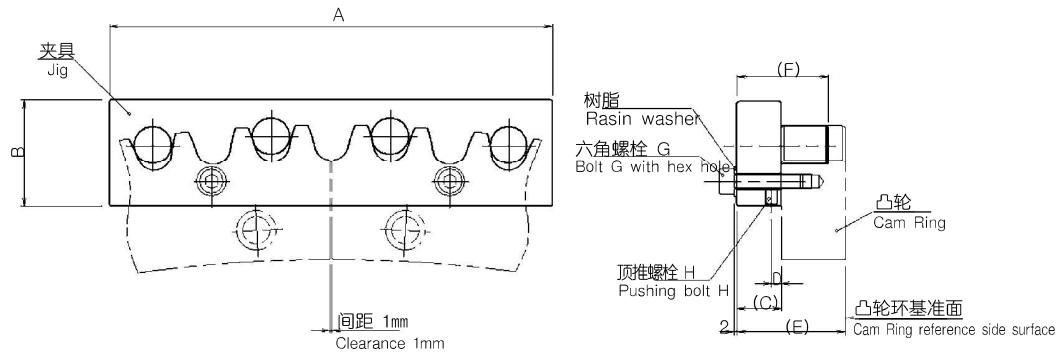
Use a specified tool ARJ when adding to split rings.

※ 当开口环未在整个圆周上使用时，可通过在一端侧（两端侧的两个齿）排除开口环的单个单齿来获得有效角度。

Available angle is obtained by excluding a single one tooth of split ring at one end side (two tooth at both end sides) when split rings are not used in full circumference.

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■ 连接夹具尺寸图 / Dimensional drawing of connecting jig



夹具型号 Jig model	A	B	C	D	E	F	G	H
RJ1610B	120 (90)	31.5	12	3.5	23.5	20	M6	M4
RJ2510B	180	43	16	5	34.5	30	M8	M6
RJ3212B	230	58	25	6.5	49.5	45	M10	M8
RJ4012B	280	73.6	32	6.5	63.5	58	M10	M8
RJ4014B	280	73.6	32	6.5	74	58	M10	M8

※ 安装夹具螺栓、塑料垫圈和固定螺钉附在附加夹具上。 Mounting jig bolt, plastic washer and setscrew are attached to adding jig.

※ RJ1610B的A尺寸有两种, 一种 (C140300) 指90, 另一种指120。

A-dimension of RJ1610B has two kinds, one (C140,300) is referred to 90 and the other referred to 120.

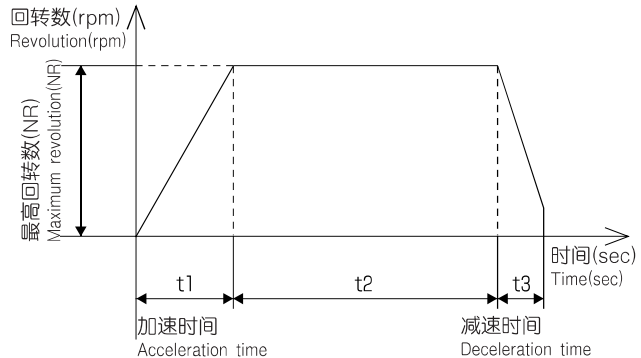
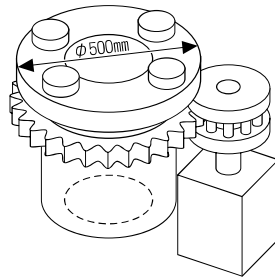
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■ 型号选定 / Selection of Type Number

● 型号选定例 / Selection Example

让 $\phi 500$ 20kg的圆盘回转的情况下
Upon rotating a disk ($\phi 500\text{mm}$, 20kg)

质量 Mass weight: 20kg
总转动惯量 Moment of inertia: 0.9kgm^2



● 负载条件 / Load Condition

质量 Mass weight : $m = 20\text{kg}$
转动惯量 Moment of inertia : $J = 0.9\text{kgm}^2$
最高回转数 Maximum revolution : $\text{NR} = 100(\text{rpm})$
加速时间 Acceleration time : $t_1 = 0.1(\text{sec})$
外力 Outer force torque : $T_c = 30(\text{Nm})$
(包含摩擦扭矩 including frictional torque)
负载系数 Coefficient of load : $f_w = 1.5$

没有冲击的圆滑的运转 Smooth operation with no impact	1.0~1.2
普通运转 Normal operation without excessive impact	1.2~1.5
有冲击的运转 Operating with impact	1.5~3.0

● 选型计算 / Calculation

角速度 Angular velocity : $\omega = \text{NR} \times 2 \cdot \pi / 60$
 $= 100 \times 2 \times 3.14 / 60$
 $= 10.48 \text{ (rad/sec)}$
角加速度 Angular accelerative : $\dot{\omega} = \omega / t_1$
 $= 10.48 / 0.1$
 $= 104.8 \text{ (rad/sec}^2\text{)}$
加速扭矩 Accelerative torque : $T_a = \dot{\omega} \times J$
 $= 104.8 \times 0.9$
 $= 94.4 \text{ (Nm)}$
最大负载扭矩 Maximum load torque : $T_{\text{max}} = f_w \times (T_a + T_c)$
 $= 1.5 \times (94.4 + 30)$
 $= 186.6 \text{ (Nm)}$

● 选定假定齿圈 / Provisional Ring Selection

从规格表中按照允许扭矩选择假定齿圈RG2510-C30
根据RG2510-C30规格表

RG2510 is provisionally selected from the allowable torque in the specification(RG2510A-C30)

允许扭矩 Allowable torque	240(Nm)
齿圈的转动惯量 Moment of inertia	$550.1 \times 10^{-4}(\text{kgm}^2)$

● 再次计算 / Calculation

考虑包含齿圈部位进行再次计算 Re-calculation upon considering the ring portion

加速扭矩 Accelerative torque : $T_a' = \dot{\omega} \times (J + J_g)$
 $= 104.8 \times (0.9 + 550.1 \times 10^{-4})$
 $= 100.1 \text{ (Nm)}$
最大负载扭矩 Maximum load torque : $T_{\text{max}}' = f_w \times (T_a' + T_c)$
 $= 1.5 \times (100.1 + 30)$
 $= 195.2 \text{ (Nm)}$

RG2510A-C30的允许扭矩 Allowable torque of ARG2510A-C30 : 240(Nm)

因此 OK

This re-calculation shows that type of RG2510A-C30 is appropriate.

● 选定 / Selection

通过以上, 选择RG2510-C30 RG2510-C30 is selected.

CP齿圈 安装·使用要领 / Mounting and Instruction Manual for ATCG Ring

■ 安装精度 / Mounting precision

滚轮与齿圈进行组装时, 请注意各部位的安装精度

When mounting the roller pinion and the ring gear on each other, be sure to satisfy the following precision requirements:

● 推荐安装精度/Recommended mounting precision

2轴的平行度 倾斜	在齿圈齿宽范围内, 在0.02mm以下
Parallelism and inclination between the 2 shafts	0.02mm or less referring to the ring gear tooth width
轴的偏心跳动	φ 0.02mm以下
Eccentricity of the shaft	φ 0.02mm or less
轴与滚轮, 齿圈的同轴度	φ 0.02mm以下
Coaxiality the shaft and pinion and the shaft and ring gear	φ 0.02mm or less

上述安装精度如果不理想的话, 可能会引起齿的单侧啮合、预压变动等情况产生, 容易对精度、噪音、振动、寿命带来负面影响。
If the above precision requirements are not satisfied, one-sided contact or preload instability may be caused, degrading the precision, increasing the noise and the vibration, and shortening the life.

■ 一体式齿圈的安装 / Mounting one piece ring gear

1. 请清除在轴以及在齿圈内径上附着的锈迹以及脏物等。
Wipe out rust, dirt, etc. from the shaft and the inner surface of the ring gear.
2. 把齿圈安装在轴上, 请对准基准孔、安装孔位置。
Fix the ring gear on the shaft, and match the reference hole and mounting hole of the ring gear with those of the shaft.
3. 轻轻地拧紧安装螺栓, 把齿圈轻轻地固定在轴上。
Ifasten the ring gear fixing bolt until the ring gear is fixed lightly to the shaft.
4. 确认并调整轴与齿圈的同轴度、跳动量。
请确认齿顶部或者齿圈内径在轴旋转情况下的跳动量。
Check and adjust the coaxiality and eccentricity of the shaft and ring gear.
Also, check the eccentricity amount of the ring gear tooth end or inner surface of the ring gear when the shaft is rotated.
5. 将齿圈的安装螺栓按照对角线顺序, 逐渐 (按照推荐扭矩的20%左右) 均等地增加扭矩拧紧。
Fasten the ring gear fixing bolts diagonally, uniformly, and gradually starting at 20% or so of recommended tightening torque with gradual increase.
6. 最后以齿圈安装螺栓推荐扭矩来拧紧螺栓。
Lastly, fasten the ring gear fixing bolts at the recommended tightening torque.
7. 拧紧结束后, 请再次确认轴与齿圈之间的同轴度和跳动量。
After the fastening, recheck the coaxiality and eccentricity of the shaft with the ring gear.
8. 以齿圈上的基准孔为基准在安装凸缘处钻孔, 压入平行销。
Make a hole in the boss by referring to the base hole of the ring gear, and press-fit a parallel pin into the hole.

■ 推荐扭矩表 / Recommended tightening torque table

轴材质: 钢 螺栓强度: 12.9
Shaft material: Steel Bolt strength level: 12.9

● 齿圈安装螺栓推荐的拧紧扭矩表

Recommended tightening torque table for ring gear fixing bolt (N · m)

螺栓规格 Bolt No.	拧紧扭矩 Torque(N · m)
M6	14
M8	31
M10	68

■ 关于预压 /Preload

TCG齿轮通过齿间的常时接触, 间隙被控制为零。因此, 对于齿面有必要实施适当的预压。预压不足时, 会导致间隙发生, 过度的预压也会影响到精度, 声音, 振动以及寿命。

TCG齿轮如果按照样式表中的中心距 (允许误差0.01mm, 周围温度在20℃) 的情况下进行组装的话, 设计上可以满足有适当预压的要求。为了施加适当的预压, 推荐使用如下调整:

ATCG Ring eliminates the backlash by realizing perpetual tooth-to-tooth contact. For this purpose, the application of an appropriate amount of preload against the tooth faces is require.

This insufficient amount of preload will cause backlash, and the excessive amount of preload will degrade the precision, increase the noise and the vibration, and shorten the life.

ATCG Ring is designed so that when it is mounted with the center-to-center distance given in the specifications(tolerance:0.01mm, ambient temperature :20℃),the appropriate amount of preload can be obtained.

In order to obtain the appropriate amount of preload it is recommended that the adjusting mechanism as follows should be used.

适当的预压力 (需要零间隙的情况下)

预压力 (压在滚轮上的力) 5Kfg以下 (摩擦力除外)

中心距调整量0~ -0.01mm

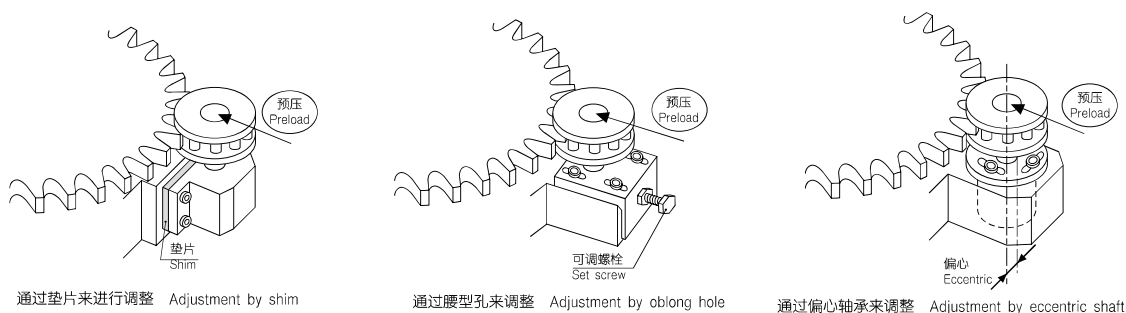
(允许量为-0.02到0.1mm, 但在中心距增加的方向上进行组装时, 会产生中心距离开量 × 0.8mm的间隙)

Appropriate amount of preload (when no backlash is required)

Preload amount(required for pressing the roller pinion) : 5kgf or less(on condition of no friction or other factors)

Center-to-center distance adjustment amount : 0 to -0.01mm

(Tolerance: -0.02 to 0.1mm.However, if the ring gear is mounted in the plus direction, backlash equal to " Center-to-center distance × 0.8mm" is caused.)



■ 关于润滑/Lubrication

滚轮部的支撑滚销的轴承中加入了润滑脂, 用橡胶密封圈封住。

Grease is filled in the bearings supporting the roller of the roller pinion, and sealed off with a simplified rubber seal.

如果在齿面涂抹润滑脂的话, 齿合会变得更加顺畅, 提高耐久性。

When grease is applied to the ring gear tooth surfaces, smoother gear mesh can be obtained. This will increase the durability.

■ 防尘对策/Dust prevention

如果齿面有脏物或者异物附着的话, 会导致运转不良。

If the ring gear tooth surface is contaminated with dirt or foreign objects, malfunction is caused.

如果在恶劣环境下使用的话, 建议使用防尘罩。

When ATCG Ring has to be used in a hostile environment, protect it with a cover or the like.

■ 滚轮的安装/Mounting the roller pinion

1. 请清洗除轴以及滚轮内径, 涨紧套内外径上附着的锈迹以及脏物。

Wipe out rust, dirt, etc. from the shaft, the inner surface of the roller pinion and the inner and outer surfaces of the clamping tool.

2. 在轴与滚轮直接接触的部位以及涨紧套各个锥面接触部, 锁紧螺栓的螺纹部分, 螺栓头部座面轻轻地涂抹上润滑油或润滑脂。但是, 涨紧套内径部, 外径部不要沾上油。(图1)

Apply a thin film of oil or grease to the shaft portion in direct contact with the roller pinion, each taper contact portion of the clamping tool, and the threaded portion and head seat of the lock bolt (Fig.1).

3. 把涨紧套的外圈插入滚轮后, 按照先在轴上安装滚轮, 然后安装涨紧套内圈的顺序进行装配。这时, 请注意让涨紧套内圈和外圈的缺口错开。(图2)

Insert the outer race of the clamping tool into the roller pinion, and then fit the roller pinion and the clamping tool on the shaft in this order. At this time, shift the allocated positions of the inner race and outer race of the clamping tool (Fig.1).

4. 拧紧锁紧螺栓, 让轴和滚轮稍有面压。

Fasten the lock bolt until slight contact pressure is applied to the shaft and the roller pinion.

5. 请确认并调整轴和滚轮的同轴度和跳动量。请确认滚轮的滚销部分 (10根 (CPA1610C, CPA2510C)) 在轴回转的时候的跳动量。

Check and adjust the coaxiality and eccentricity of the shaft and roller pinion. Check the eccentricity of the roller pinion $<10\text{pcs (CPA1610C, CPA2510C)}>$ when the shaft is rotated.

6. 调整后, 按照对角线的顺序 (参照图2), 以规定拧紧扭矩的大约1/4均等的拧紧, 逐渐增加拧紧扭矩来拧紧螺栓。

After the adjustment, fasten the lock bolts diagonally (Fig.2) and uniformly starting at 25% or so of the recommended tightening torque with gradual increase.

7. 然后, 使用扭矩扳手按照规定扭矩拧紧螺栓。

Then, fasten the lock bolts with a torque wrench at the specified tightening torque.

8. 按照圆周方向的顺序拧紧, 并重复数回, 确认锁紧螺栓按照规定扭矩都拧紧了。

Fasten the lock bolts one by one in the circumferential direction. Repeat this fastening cycle several times the specified tightening torque.

9. 拧紧完毕后, 再一次确认轴与滚轮之间的同轴度, 跳动量。

After the fastening, recheck the coaxiality and eccentricity of the shaft and roller pinion.

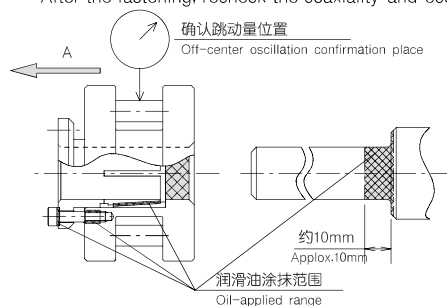


图1 / Fig. 1

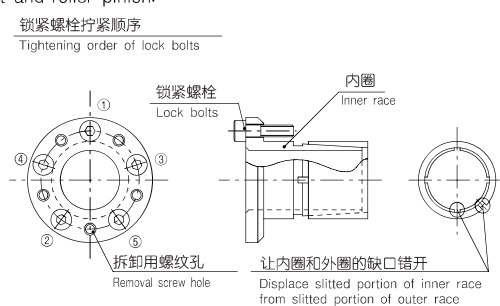


图2 / Fig. 2

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安装时注意事项 / Precautions for mounting

注1. 锁紧螺栓的锁紧一定要使用有调整刻度的扭矩扳手, 按照规定扭矩值进行拧紧。由于 板式指针类型的扭矩扳手很难确认规定扭矩值, 会导致螺栓松动或变形而引发故障。

Note1. when fastening the lock bolts, be sure to use torque wrench with torque adjustment graduations and fasten at the specified tightening torque, if a of plate type is used, since it is difficult to confirm the torque wrench specified torque on the wrench, slip, deformation or other trouble may be caused.

注2. 含钼以及含有极压添加剂的润滑油, 润滑脂, 绝对不可以使用, 会导致额定力矩大幅度下降, 导致松动

Note2. Never use oil or grease of molybdenum series or containing extreme pressure additive, or the substantial decrease of allowable torque or slip may be caused.

注3. 锁紧螺栓请务必使用配套的锁紧螺栓

Note3. Be sure to use the provided lock bolts.

注4. 在拧紧锁定螺栓时, 滚轮会朝着图1箭头A的方向有若干移动, 注意与齿轮侧面的干涉。

Note4. Since the roller pinion moves slightly in the arrow A direction of Fig 1 when the lock bolts are fastened, watch out the roller pinion for the interference with the ring gear side

■ 推荐扭矩表 / Recommended tightening torque table

● 按照螺栓 · 涨紧套 · 锁定螺栓推荐的拧紧扭矩表

Recommended tightening torque table for mounting bolts and clamping tool bolts (N · m)

滚轮 Roller pinion	螺栓规格 Nominal diameter	拧紧扭矩 Tightening torque
CP1610C	M4	3.5
CP2510C	M6	12

为了得到所规定的性能, 建议对方轴公差为h7级, 表面粗糙度为12S以下

In order to obtain the design performance, it is recommended that the tolerance of the mating shaft should be of Class h7 and the surface roughness should be of 12S or less

■ 滚轮的拆卸 / Dismounting the roller pinion

1. 切断动力源, 确认滚轮上没有外力矩, 轴向力, 并且确认没有掉落的风险。

Turn off the power, and confirm that the roller pinion is free from torque, thrust and possible falling.

2. 按顺序慢慢的拧松锁紧螺栓。

Loosen the lock bolts gradually one by one.

3. 将拆卸用螺栓拧入所有的拆卸螺纹孔, 按对角线的顺序均力慢慢拧入, 就可以拆卸下滚轮。

Insert the lock bolts into all dismantling screw holes, and fasten them diagonally, uniformly and gradually, and the roller pinion can be dismantled.

拆卸时注意事项/Precautions for dismantling

注1. 在拆卸前请确认安全后再进行作业

Note1. Before starting the dismantling work, confirm the safety

注2. 在锁紧螺栓上涂油

Note2. Apply oil to the lock bolts

注3. 请把拆卸用螺纹孔全部用上 (可以防止法兰部的变形)

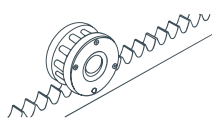
Note3. Use all dismantling screw holes (to prevent the deformation of the flange portion)

再次使用时, 请再确认产品各零部件没有变形, 破损之后, 再进行使用

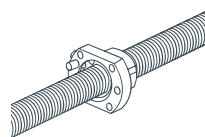
When reusing the roller pinion, confirm no deformation or missing of each component.

CPR系列使用的优点 / Available merits attained by CPR series

■ 零齿隙长距离进给 / Extended feeding with Non-backlash

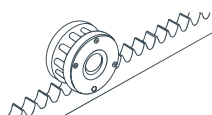


CR齿条/CR Runner

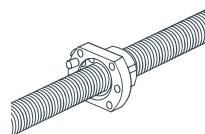


滚珠丝杠 / Ball-type screw

■ 高速进给 / High speed feeding

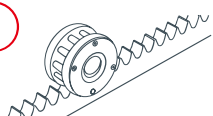


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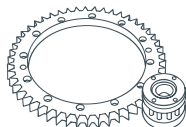


滚珠丝杠/Ball-type screw

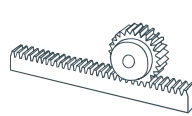
■ 低噪音运行 / Low noise operation



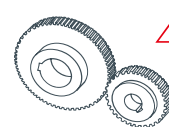
CR齿条/CR Runner



CP齿轮/CP Ring

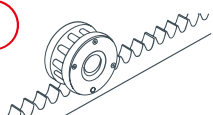


齿轮&齿条/Rack&Pinion

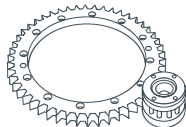


直齿轮/Spur gear

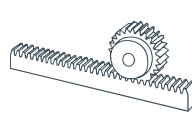
■ 低粉尘生产 / Low dust production



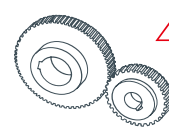
CR齿条/CR Runner



CP齿轮/CP Ring

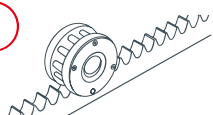


齿轮&齿条/Rack&Pinion

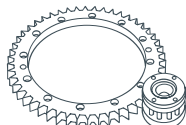


直齿轮/Spur gear

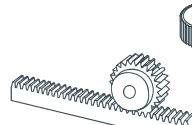
■ 高精度&往复定位/High accuracy & repeatability



CR齿条/CR Runner



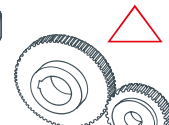
CP齿轮/CP Ring



齿轮&齿条/Rack&Pinion

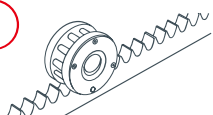


皮带&链条
Belt&Chain

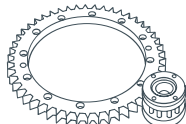


直齿轮/Spur gear

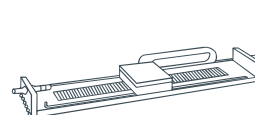
■ 成本 / Cost performance



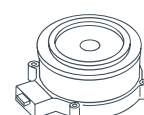
CR齿条/CR Runner



CP齿轮/CP Ring

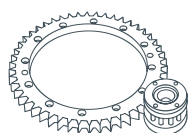


直线电机/Linear motor

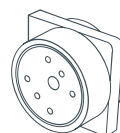


DD马达/DD motor

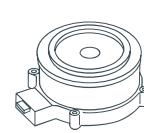
■ 中空结构 / Hollow unity structure



CP齿轮/CP Ring



减速机/Reducer



DD马达/DD motor

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技術手冊

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