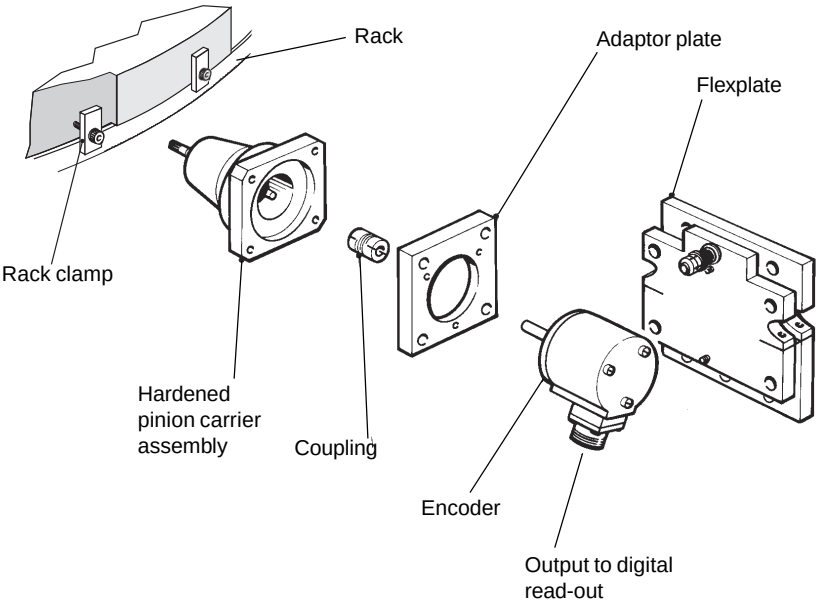
Angular Measuring Rack

All dimensions in mm
General tolerances +/- 0.13mm
20° pressure angle

Standard bi-directional transmission error of 10 arc seconds.

Diameters from 570mm to infinity.

Helicoidal rack provides correct gear action.



Angular measuring system components			
System items	**Part numbers**	**Quantity**	**Dimensions**
Racks	**R71X - xxx - G4** or **R81X - xxx - G4**	page 14-3	page 14-4
Rack clamps	**A830-279**	page 14-3	page 14-4
Rack clamp screws	**S-M3.5-16-HT**	as clamp above	-
Hardened pinion carrier	**HPC1MX21- xxx**	1	page 14-4
Coupling	**RCL20C-6-0.250**	1	page 8-4
Adaptor Plate (inc fixings)	**B697-548-21**	1	page 14-13
Encoder	**ROD426E- xxx**	1	page 14-8
Flexplate	**FP21**	1	page 14-11

Note - Part numbers containing **xxx** require additional parameters, see page referenced

Angular Measuring Rack

METRIC

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Standard systems								
Rack seating details			Rack details					
Nominal diameter mm	Diameter tolerance mm	Diameter TIR mm	No. of racks reqd.	Length L mm	Width F mm	No. of Clamps per rack	No. of pinion teeth	Angle per pinion revolution
570.958	±0.050	0.025	12	150	2.0	3	**20**	4°
685.549	±0.065	0.030	12	180	2.0	3	**24**	4°
800.141	±0.075	0.040	12	210	2.0	3	**28**	4°
914.232	±0.090	0.040	12	240	2.5	4	**32**	4°
1028.824	±0.100	0.050	12	270	2.5	4	**36**	4°
1200.711	±0.110	0.060	12	315	2.5	4	**21**	2°
1429.894	±0.130	0.070	12	375	2.5	4	**25**	2°
1601.782	±0.150	0.080	12	420	2.5	5	**28**	2°
1830.965	±0.170	0.090	12	480	2.5	5	**32**	2°
2002.852	±0.180	0.090	12	525	2.5	5	**35**	2°
2518.514	±0.400	0.220	24	330	2.5	4	**22**	1°
2976.881	±0.500	0.280	24	390	2.5	5	**26**	1°
3435.247	±0.600	0.320	24	450	2.5	5	**30**	1°
4008.204	±0.700	0.360	24	525	2.5	5	**35**	1°
4581.162	±0.800	0.400	24	600	2.5	5	**40**	1°

With the seating tolerances above a total transmission error of +/-10 arc seconds can be expected.
TIR = Total Indicator Reading i.e. twice eccentricity.

- The major source of error is the size tolerance and eccentricity of the seating diameter.

  For increased accuracy seating diameters should be held to tighter tolerances than shown above.

  In very high accuracy applications the width of the rack can be modified to cater for small positive diametral seating diameter errors.
- The racks in the rack circle are positioned with their midpoints at exact angular locations (30° or 15°) with the racks adjusted so the errors do not accumulate from rack to rack.
- For applications where continuous rotation is required to save unnecessary wear, it is recommended that the pinion is disengaged from the rack.
- For diameters other than those listed please consult our Technical Sales.
- In a typical application the encoder and pinion assembly can be removed without dismantling the table.
- Rack with helicoidal tooth form resists contamination.

Angular Measuring Rack

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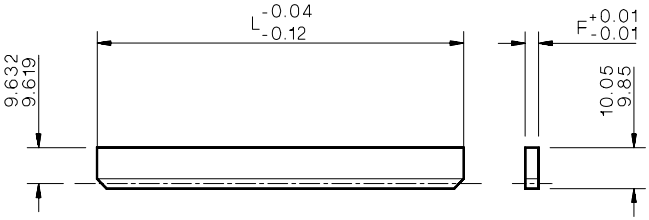
20° pressure angle

Associated Products
Reli-a-Flex™ couplings : page 8-2
Adaptor plates : page 14-13
Flexplates : page 14-11
Encoders : page 14-8

RACK

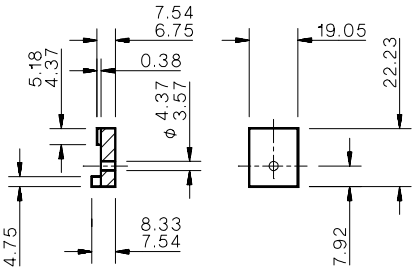


Rack part number selection						
Example part no. R71X – 375 – G4						
Basic part number	Rack length Min	Rack length Max	Accuracy (Grade 4)	Face width F	Pitch	Material
R71X R81X	150	600	G4	2.0 mm 2.5 mm	1mm	Stainless steel (416) hardened to 35–40 Rc

CLAMP

Part no. **A830-279**

Material : Stainless steel



HARDENED PINION CARRIER

Pinion carrier part number selection			
Example part no. – HPC1MX21– 30 AQ12			
Basic part number	No. of teeth Min	No. of teeth Max	Quality
HPC1MX21–	20	40	AQ12

- HPC series pinion carrier dimensions identical to PC series on page 14-10.
- Pinions are surface hardened (Tuftrided) to improve wear resistance.

Angular Measuring Rack

METRIC

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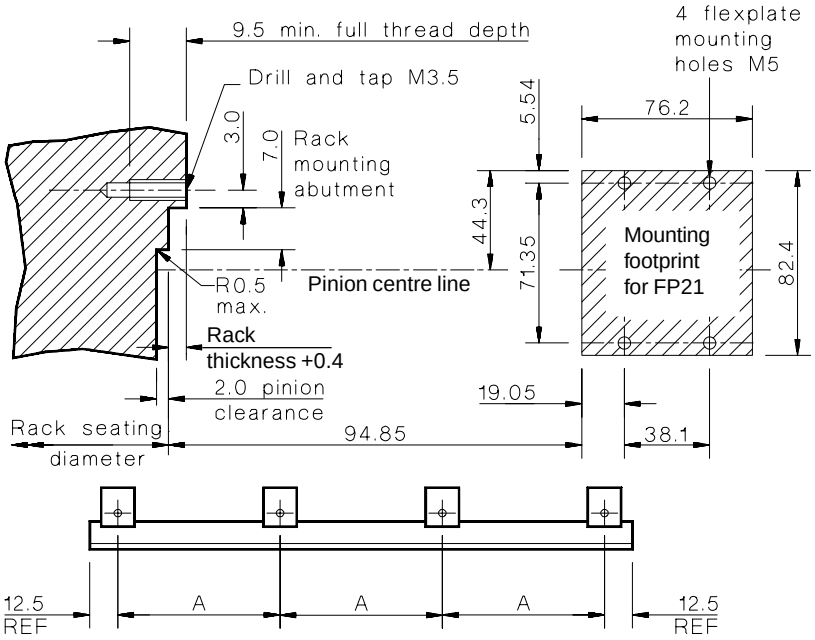
MACHINING DETAILS



$$A = \frac{\text{Rack Length} - 25}{(N-1)}$$

Where N = No. of Clamps (from the table on page 14-3)

Installation

Holes must not be drilled in the racks as this would prevent them from exactly conforming to the seat diameter. The clamp fixing holes should be positioned such that when the table is at its datum (zero) position the pinion will mesh at the midpoint of one of the racks.

Adjustment

Access must be provided for a wedge or drift to be used in the gap between the racks to nudge them into position.

Procedure

Fully tighten the clamps on the datum rack only. All other racks should be held in position with only moderate pressure.
Use a high accuracy optical encoder or an optical polygon and autocollimator as a reference. Set the reference zero at the datum position of the table and zero the display. Move to 30^0 or 15^0 on the display (the next rack mid position).
Read the error from the reference.
Nudge the rack in contact with the pinion until the display agrees with the reference.
Tighten the rack clamps and repeat this procedure for the remaining racks.

For an explanation of the error compensation see the technical section page T14-1