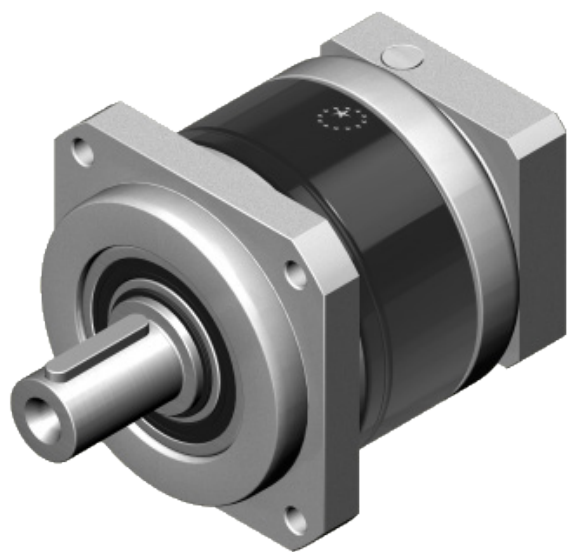


PAII – Planetary Series

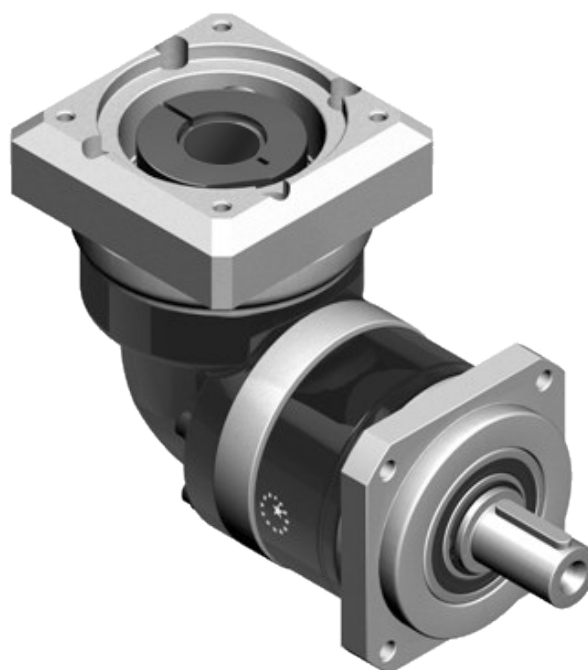
Economy Range – Steel



**Economy steel
version of precision
AB range**

Second generation

PA



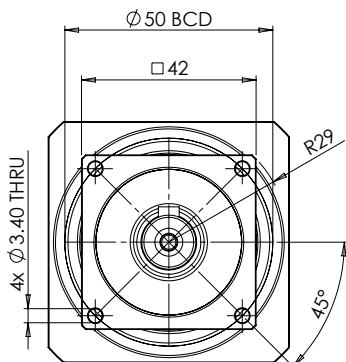
- **Steel & aluminium construction**
- **Square B5 style output flange**
- **5 frame sizes from 042 up to 142**
- **17 reduction ratios from 3:1 up to 100:1**
- **Nominal output torque up to 450 Nm**
- **Backlash from as low as ≤ 6 arcmin**
- **Efficiency of up to ≥ 97 %**
- **Operating noise levels as low as 60 dB**

The **Apex PAII & PAIIR** series are an economy flanged output precision planetary gearbox with accuracy down to less than 6 arc minutes. The **PAII** series features lower inertia, lower size and weight, quieter operation, reduced backlash, increased efficiency and greater mounting versatility.

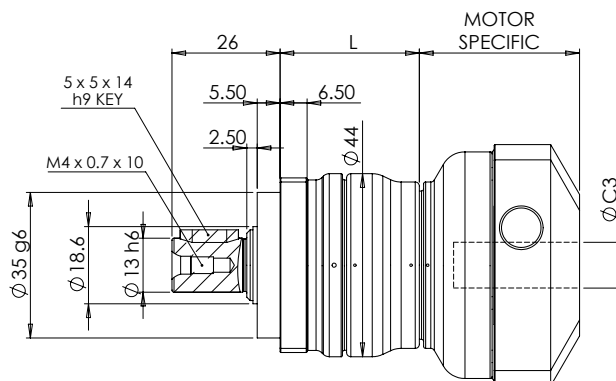
The **Apex PAII & PAIIR** series feature chemically blacked carbon steel and aluminium construction utilising precision bonded housings for greater accuracy and faster, more precise assembly. Laser welded pinions provide the highest concentricity two part assemblies and when combined with low profile planetary gearing and precision ground spiral bevel gears provide smooth, quiet and accurate operation.

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D
SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAII042 – In-line Economy Range – Steel



For precision stainless steel dimensional equivalent see AB042



NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 33.5 mm
DIM L Double Stage = 48.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	16	28.8	48
4:1	16	28.8	48
5:1	15	27.0	45
7:1	12	21.6	36
9:1	8	14.4	24
10:1	10	18.0	30
~ DOUBLE STAGE ~			
15:1	15	27.0	45
16:1	16	28.8	48
20:1	16	28.8	48
25:1	15	27.0	45
30:1	15	27.0	45
35:1	12	21.6	36
40:1	16	28.8	48
50:1	15	27.0	45
70:1	12	21.6	36
81:1	8	14.4	24
100:1	10	18.0	30

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4500
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	0.9
Max. Radial Load on Output (N)*	810
Max. Axial Load on Output (N)*	405
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	0.6 / 0.8
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 60
No Load Torque (1 / 2 STG) (N) **	0.05 / 0.05

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

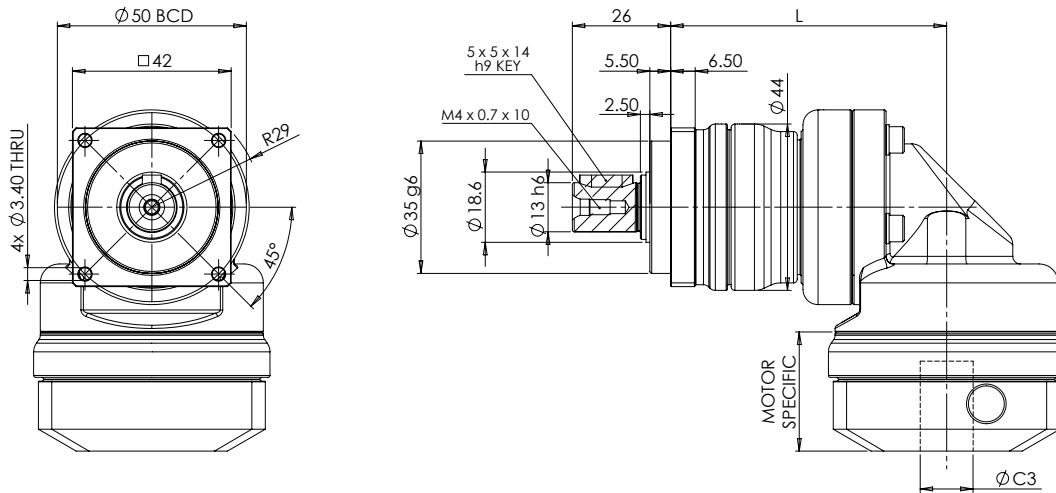
Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 10 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
8	0.10	0.10
11	0.16	0.16
14	0.20	0.20

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAIR042 – Right Angle Economy Range – Steel



For precision stainless steel dimensional equivalent see ABR042

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 73.0 mm
DIM L Double Stage = 88.0 mm

PA

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	16	28.8	48
4:1	16	28.8	48
5:1	15	27.0	45
7:1	12	21.6	36
9:1	8	14.4	24
10:1	10	18.0	30
~ DOUBLE STAGE ~			
15:1	15	27.0	45
16:1	16	28.8	48
20:1	16	28.8	48
25:1	15	27.0	45
30:1	15	27.0	45
35:1	12	21.6	36
40:1	16	28.8	48
50:1	15	27.0	45
70:1	12	21.6	36
81:1	8	14.4	24
100:1	10	18.0	30

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4500
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	0.9
Max. Radial Load on Output (N)*	810
Max. Axial Load on Output (N)*	405
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	0.9 / 1.2
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 70
No Load Torque (1 / 2 STG) (N) **	0.10 / 0.10

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

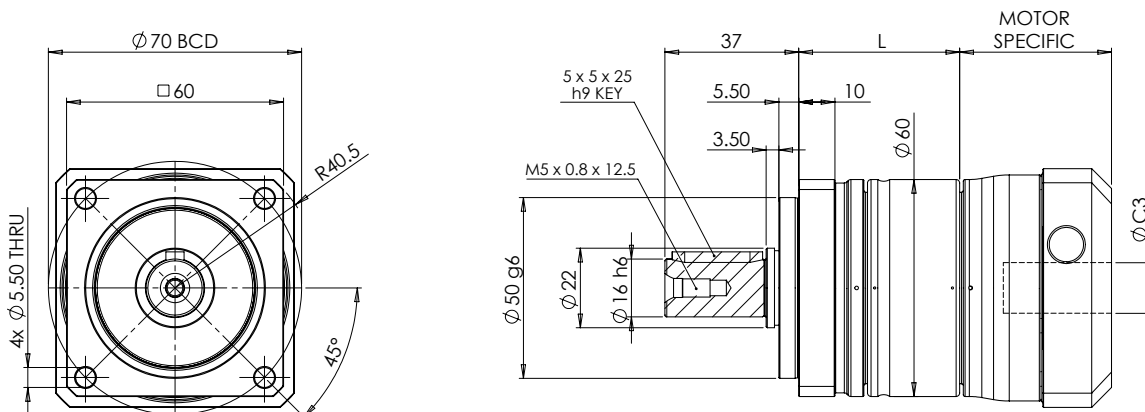
Backlash
~ SINGLE STAGE ~
≤ 12 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
8	0.18	0.18
11	0.20	0.20
14	0.24	0.24

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAII060 – In-line Economy Range – Steel



For precision stainless steel dimensional equivalent see AB060

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 44.5 mm
DIM L Double Stage = 64.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	42	75.6	126
4:1	42	75.6	126
5:1	40	72.0	120
7:1	35	63.0	105
9:1	24	43.2	72
10:1	27	48.6	81
~ DOUBLE STAGE ~			
15:1	40	72.0	120
16:1	42	75.6	126
20:1	42	75.6	126
25:1	40	72.0	120
30:1	40	72.0	120
35:1	35	63.0	105
40:1	43	77.4	129
50:1	40	72.0	120
70:1	35	63.0	105
81:1	24	43.2	72
100:1	27	48.6	81

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	2.2
Max. Radial Load on Output (N)*	1150
Max. Axial Load on Output (N)*	575
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	1.3 / 1.5
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 62
No Load Torque (1 / 2 STG) (N) **	0.10 / 0.10

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

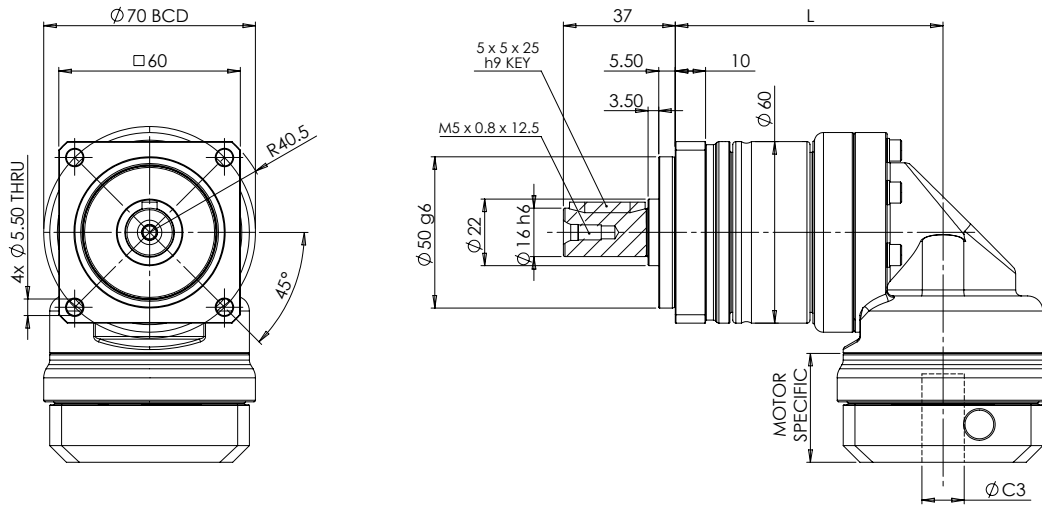
Backlash
~ SINGLE STAGE ~
≤ 7 arcmin
~ DOUBLE STAGE ~
≤ 9 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
8	0.12	0.10
11	0.19	0.16
14	0.22	0.20
19	1.53	1.51

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAIR060 – Right Angle Economy Range – Steel



For precision stainless steel dimensional equivalent see ABR060

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 88.5 mm
DIM L Double Stage = 108.5 mm

PA

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	42	75.6	126
4:1	42	75.6	126
5:1	40	72.0	120
7:1	35	63.0	105
9:1	24	43.2	72
10:1	27	48.6	81
~ DOUBLE STAGE ~			
15:1	40	72.0	120
16:1	42	75.6	126
20:1	42	75.6	126
25:1	40	72.0	120
30:1	40	72.0	120
35:1	35	63.0	105
40:1	43	77.4	129
50:1	40	72.0	120
70:1	35	63.0	105
81:1	24	43.2	72
100:1	27	48.6	81

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	2.2
Max. Radial Load on Output (N)*	1150
Max. Axial Load on Output (N)*	575
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	2.1 / 3.3
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 72
No Load Torque (1 / 2 STG) (N) **	0.15 / 0.15

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

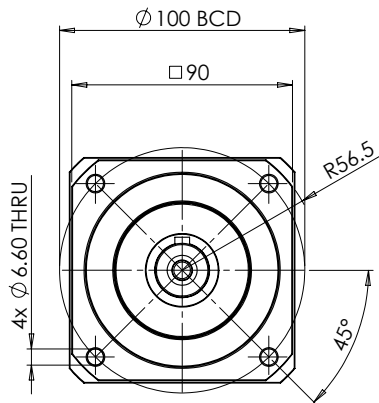
Backlash
~ SINGLE STAGE ~
≤ 11 arcmin
~ DOUBLE STAGE ~
≤ 13 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

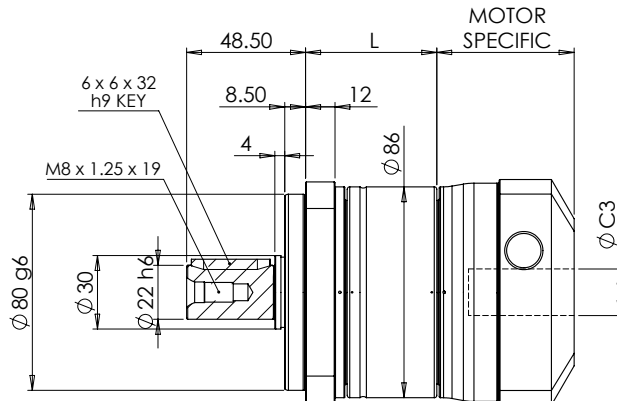
Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
8	0.36	0.36
11	0.39	0.39
14	0.43	0.43
19	1.24	1.24

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAII090 – In-line Economy Range – Steel



For precision stainless steel dimensional equivalent see AB090



NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 53.5 mm
DIM L Double Stage = 80.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	110	198.0	330
4:1	113	203.4	339
5:1	118	212.4	354
7:1	96	172.8	288
9:1	60	108.0	180
10:1	68	122.4	204
~ DOUBLE STAGE ~			
15:1	109	196.2	327
16:1	116	208.8	348
20:1	116	208.8	348
25:1	123	221.4	369
30:1	108	194.4	324
35:1	100	180.0	300
40:1	117	210.6	351
50:1	123	221.4	369
70:1	100	180.0	300
81:1	59	106.2	177
100:1	70	126.0	210

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	8
Max. Radial Load on Output (N)*	1530
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	3.7 / 4.1
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 64
No Load Torque (1 / 2 STG) (N) **	0.40 / 0.30

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

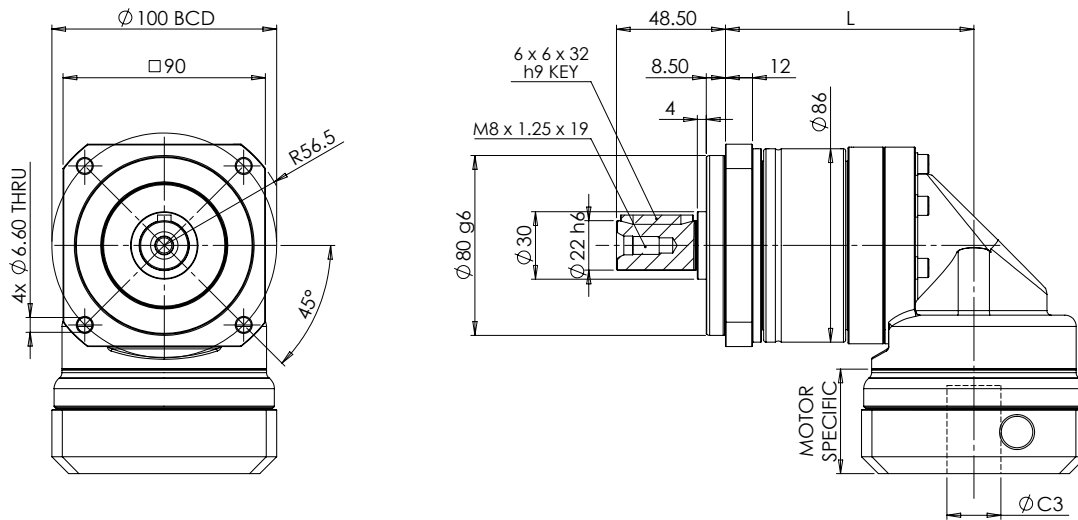
Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
14	0.36	0.24
19	1.70	1.58
24	2.24	2.12
28	2.68	2.55

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAIR090 – Right Angle Economy Range – Steel



For precision stainless steel dimensional equivalent see ABR090

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 110.5 mm
DIM L Double Stage = 137.0 mm

PA

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	110	198.0	330
4:1	113	203.4	339
5:1	118	212.4	354
7:1	96	172.8	288
9:1	60	108.0	180
10:1	68	122.4	204
~ DOUBLE STAGE ~			
15:1	109	196.2	327
16:1	116	208.8	348
20:1	116	208.8	348
25:1	123	221.4	369
30:1	108	194.4	324
35:1	100	180.0	300
40:1	117	210.6	351
50:1	123	221.4	369
70:1	100	180.0	300
81:1	59	106.2	177
100:1	70	126.0	210

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	8
Max. Radial Load on Output (N)*	1530
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	6.4 / 7.8
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 74
No Load Torque (1 / 2 STG) (N) **	0.45 / 0.35

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

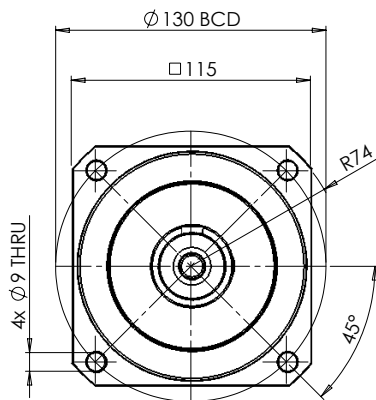
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

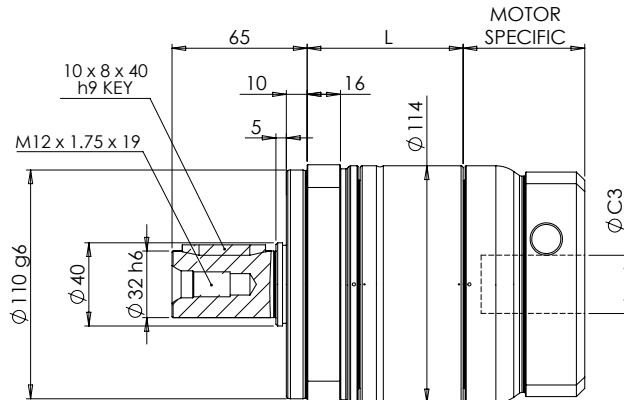
Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
14	1.87	1.87
19	2.67	2.67
24	2.97	2.97
28	3.47	3.47

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PA1115 – In-line Economy Range – Steel



For precision stainless steel dimensional equivalent see AB115



NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 75.0 mm
DIM L Double Stage = 111.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	217	390.6	651
4:1	223	401.4	669
5:1	220	396.0	660
7:1	198	356.4	594
9:1	125	225.0	375
10:1	155	279.0	465
~ DOUBLE STAGE ~			
15:1	213	383.4	639
16:1	228	410.4	684
20:1	230	414.0	690
25:1	228	410.4	684
30:1	212	381.6	636
35:1	206	370.8	618
40:1	232	417.6	696
50:1	228	410.4	684
70:1	206	370.8	618
81:1	131	235.8	393
100:1	162	291.6	486

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	4800
Torsional Rigidity (Nm/arcmin)	12
Max. Radial Load on Output (N)*	3470
Max. Axial Load on Output (N)*	1735
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	7.8 / 9.0
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 66
No Load Torque (1 / 2 STG) (N) **	0.80 / 0.40

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

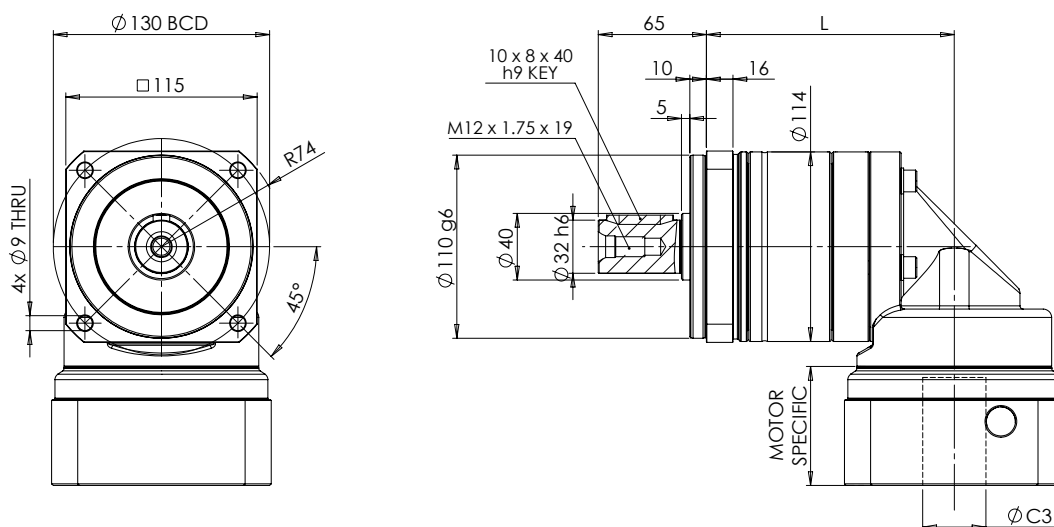
Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
19	2.20	1.73
24	2.74	2.27
28	3.17	2.70
32	7.77	7.30
35	10.80	10.30
38	14.00	13.50

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAIR115 – Right Angle Economy Range – Steel



For precision stainless steel dimensional equivalent see ABR115

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 149.0 mm
DIM L Double Stage = 185.0 mm

PA

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	217	390.6	651
4:1	223	401.4	669
5:1	220	396.0	660
7:1	198	356.4	594
9:1	125	225.0	375
10:1	155	279.0	465
~ DOUBLE STAGE ~			
15:1	213	383.4	639
16:1	228	410.4	684
20:1	230	414.0	690
25:1	228	410.4	684
30:1	212	381.6	636
35:1	206	370.8	618
40:1	232	417.6	696
50:1	228	410.4	684
70:1	206	370.8	618
81:1	131	235.8	393
100:1	162	291.6	486

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	4800
Torsional Rigidity (Nm/arcmin)	12
Max. Radial Load on Output (N)*	3470
Max. Axial Load on Output (N)*	1735
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	13.2 / 14.2
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 75
No Load Torque (1 / 2 STG) (N) **	0.85 / 0.45

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

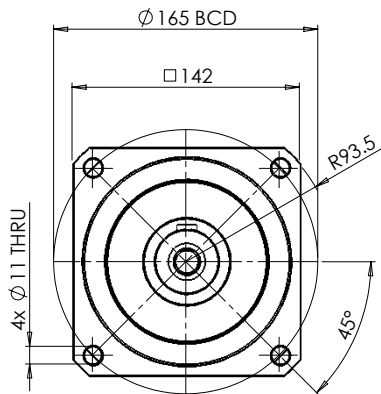
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

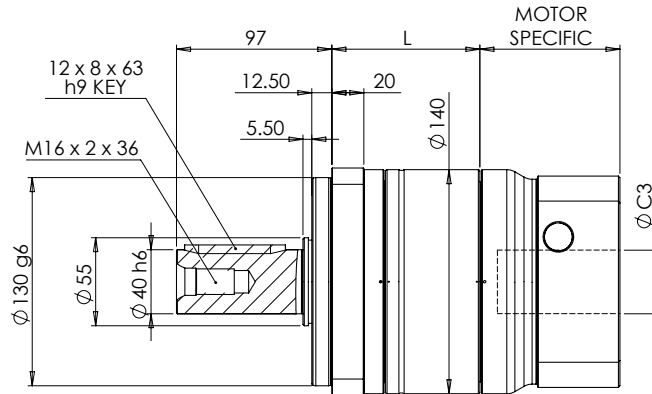
Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
19	6.80	6.80
24	7.10	7.10
28	7.59	7.59
32	10.56	10.56
35	11.97	11.97
38	13.95	13.95

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAII142 – In-line Economy Range – Steel



For precision stainless steel dimensional equivalent see AB142



NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 92.5 mm
DIM L Double Stage = 140.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	430	774.0	1290
4:1	440	792.0	1320
5:1	435	783.0	1305
7:1	366	658.8	1098
9:1	273	491.4	819
10:1	295	531.0	885
~ DOUBLE STAGE ~			
15:1	424	763.2	1272
16:1	452	813.6	1356
20:1	454	817.2	1362
25:1	450	810.0	1350
30:1	422	759.6	1266
35:1	382	687.6	1146
40:1	459	826.2	1377
50:1	450	810.0	1350
70:1	382	687.6	1146
81:1	285	513.0	855
100:1	308	554.4	924

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	2500
Max. Input Speed (rpm)	3600
Torsional Rigidity (Nm/arcmin)	16
Max. Radial Load on Output (N)*	4640
Max. Axial Load on Output (N)*	2320
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	7.8 / 9.0
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 68
No Load Torque (1 / 2 STG) (N) **	2.50 / 0.80

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

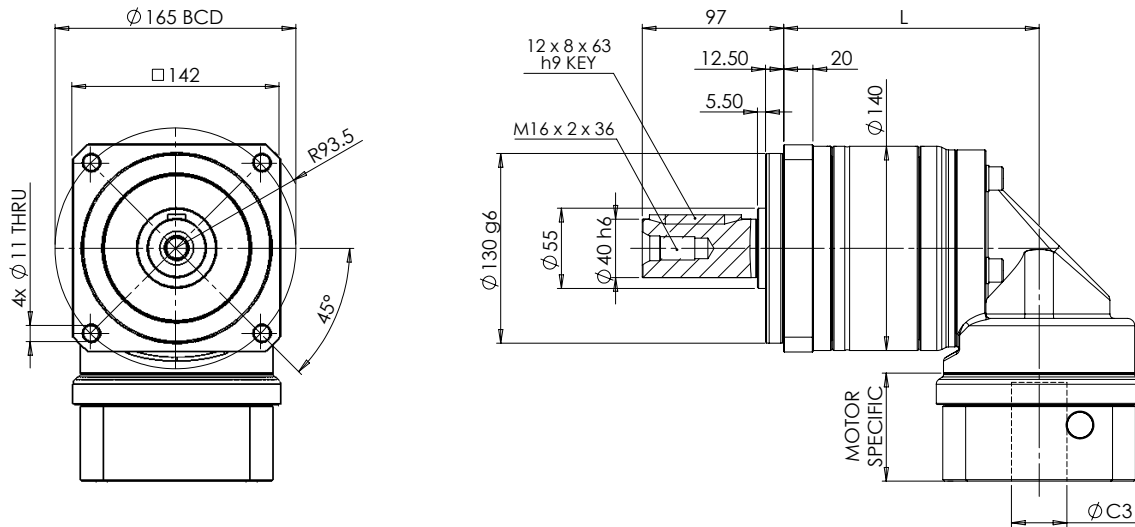
Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
19	-	2.18
24	4.52	2.73
28	4.94	3.15
32	9.70	7.91
35	12.80	11.00
38	16.00	14.20
42	24.50	-

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAIR142 – Right Angle Economy Range – Steel



For precision stainless steel dimensional equivalent see ABR142

NOTE: Example gearbox shown with S2 shaft option

DIM L Single Stage = 175.0 mm
DIM L Double Stage = 222.5 mm

PA

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	430	774.0	1290
4:1	440	792.0	1320
5:1	435	783.0	1305
7:1	366	658.8	1098
9:1	273	491.4	819
10:1	295	531.0	885
~ DOUBLE STAGE ~			
15:1	424	763.2	1272
16:1	452	813.6	1356
20:1	454	817.2	1362
25:1	450	810.0	1350
30:1	422	759.6	1266
35:1	382	687.6	1146
40:1	459	826.2	1377
50:1	450	810.0	1350
70:1	382	687.6	1146
81:1	285	513.0	855
100:1	308	554.4	924

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	2500
Max. Input Speed (rpm)	3600
Torsional Rigidity (Nm/arcmin)	16
Max. Radial Load on Output (N)*	4640
Max. Axial Load on Output (N)*	2320
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	24.5 / 27.5
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 77
No Load Torque (1 / 2 STG) (N) **	2.55 / 0.85

* Applied at centre of output shaft (Length/2).
For more information, see page 107

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

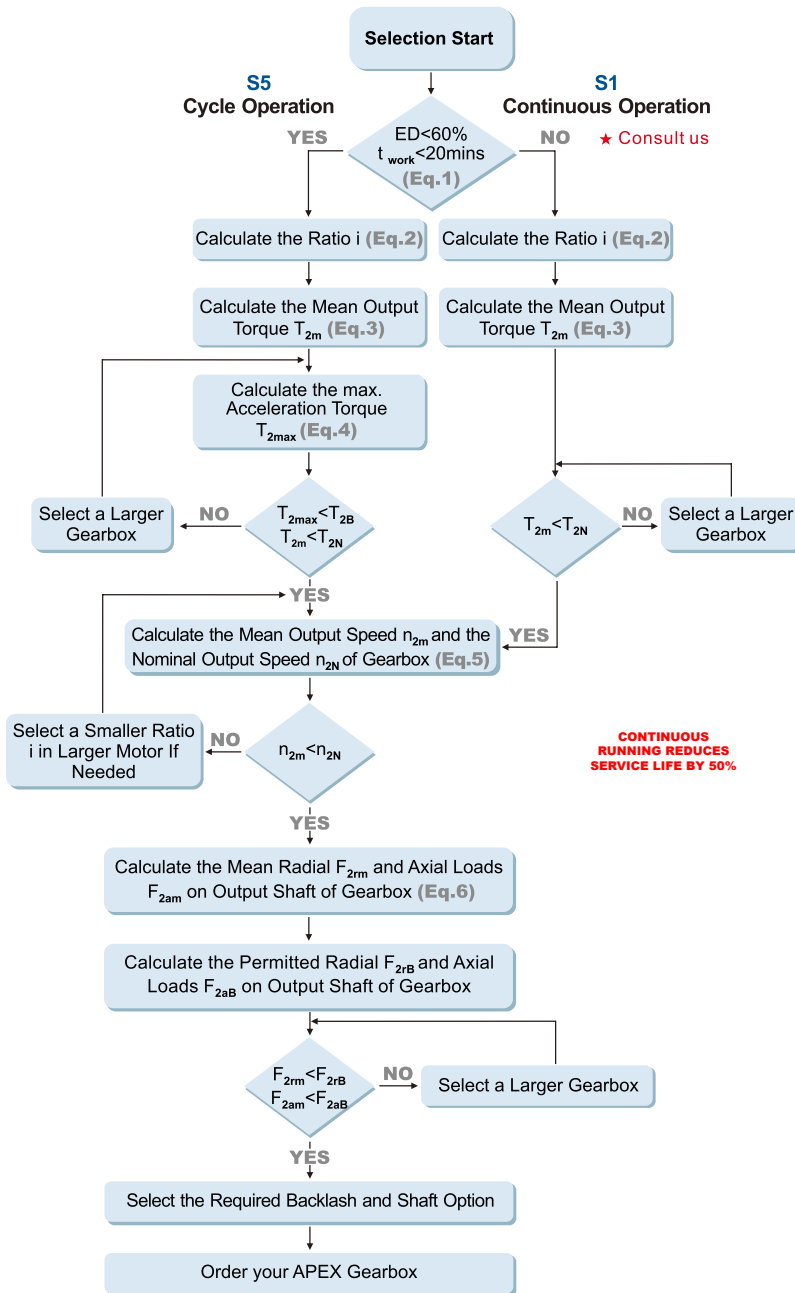
Output Shaft Option	Order Code
Smooth Shaft	S1
Keyed Shaft	S2

Ø C3	Mass Moment of Inertia (kg/cm ²)	
	Single Stage	Double Stage
19	-	13.57
24	13.87	13.87
28	14.36	14.36
32	17.33	17.33
35	18.74	18.74
38	20.79	20.79
42	26.54	-

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PAII Selection

Selection of the Optimum Gearbox



Recommended (for S5 Cycle Operation)

The general design is given for

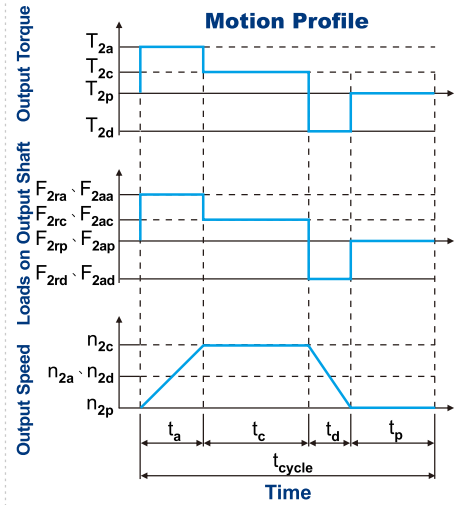
$$\frac{J_L}{i^2} \leq 4 \times J_m$$

The optimal design is given for

$$\frac{J_L}{i^2} \cong J_m$$

J_L Load Inertia

J_m Motor Inertia



$$1. ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%, t_{work} = t_a + t_c + t_d$$

Index : a. Acceleration, c. Constant,
d. Deceleration, p. Pause (Eq.1)

$$2. i \cong \frac{n_m}{n_{work}}$$

n_m Output Speed of the Motor
 n_{work} Working Speed (Eq.2)

$$3. T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.3)

$$4. T_{2max} = T_{mB} \times i \times K_s \times \eta$$

where K_s is

K_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

T_{mB} Max. Output Torque of the Motor

η Efficiency of the Gearbox (Eq.4)

$$5. n_{2a} = n_{2d} = -\frac{1}{2} \times n_{2c}$$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

$$n_{2N} = \frac{n_{1N}}{i}$$

(Eq.5)

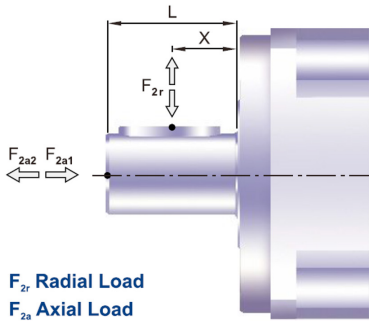
$$6. F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^3 + n_{2c} \times t_c \times F_{2rc}^3 + n_{2d} \times t_d \times F_{2rd}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.6)

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PAII Output Loads

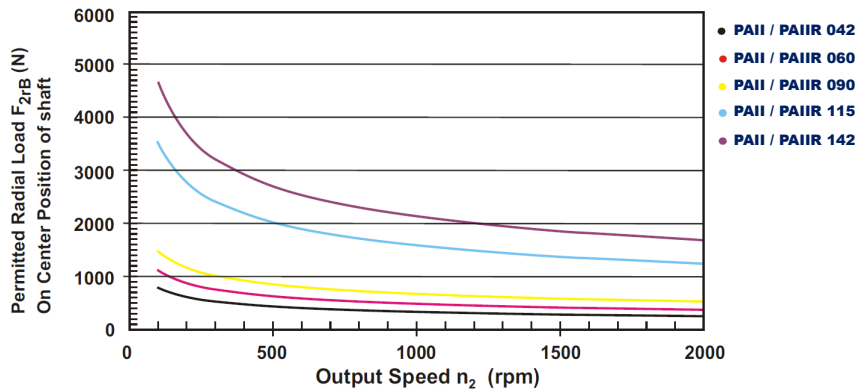


The permitted radial and axial loads on the output shaft of the gearbox is dependant on the design of the output bearing arrangement.

APEX use the extension straddle oversized bearing design thus allowing for heavy loads on both axis.

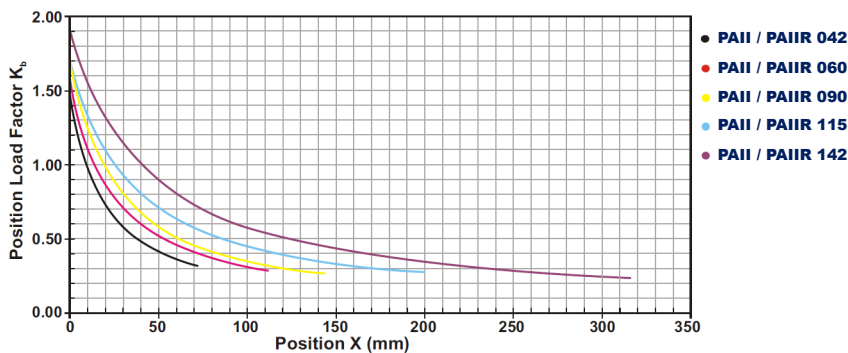
Permitted radial loads are dependant on the nominal output speed of the gearbox as can be seen on the below graph.

PA



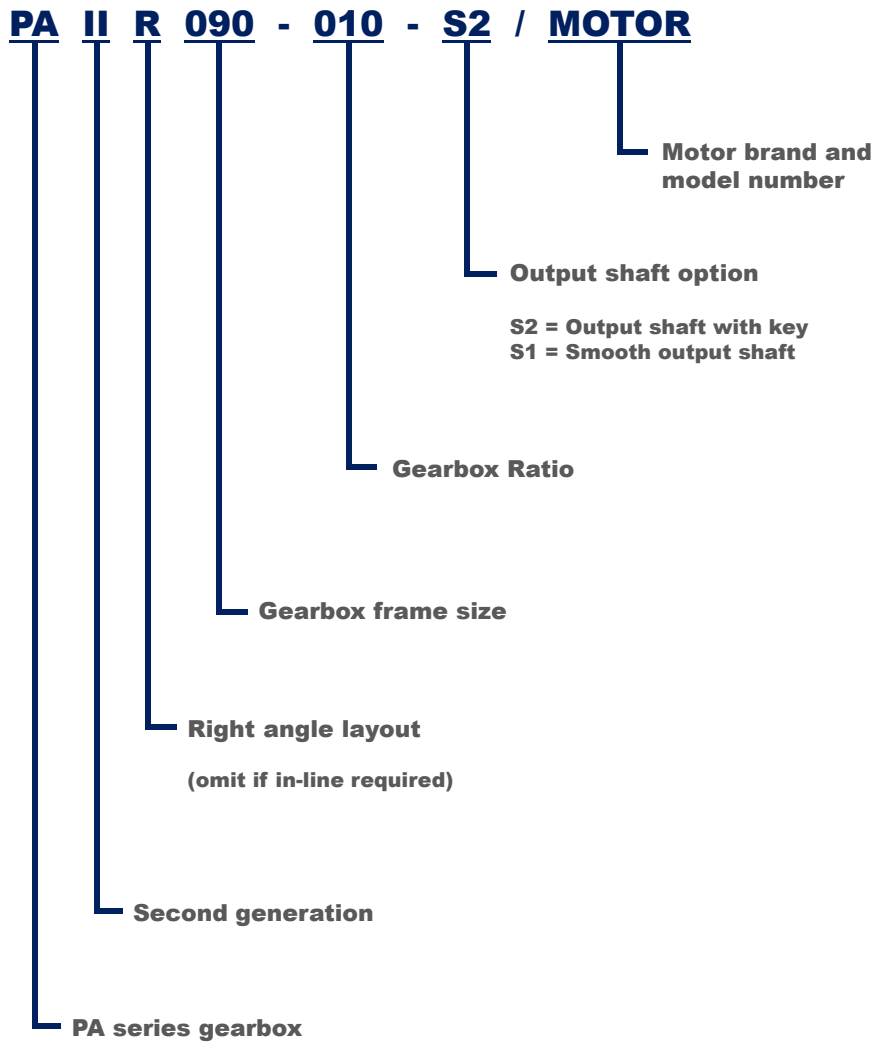
CONTINUOUS RUNNING REDUCES SERVICE LIFE BY 50%

If the radial force is not exerted on the centre of the output shaft (length/2) then the permitted loads can be calculated based on the position load factor as depicted on the below graph.



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PAII Order Codes



Example Order Code: **PAII115-025-S2 / ALLEN BRADLEY MPL-A230P**

FOR ANY NON STANDARD ENQUIRES
PLEASE CONTACT OUR SALES TEAM