

ENGINEERING INFORMATION, TERMS & CONDITIONS AND ALPHA-NUMERIC MODEL INDEX

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PART NUMBERING SYSTEM & NAME PLATE INFO.

ENCLOSED DRIVE PRODUCTS

PRODUCT CATEGORY CODE

- 02 – Power Transmission Products
- 03 – Accessory Products
- 04 – Contract Machine Products

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NUMERICAL SEQUENCE CODE

PRODUCT IDENTIFICATION CODE

Power Transmission Products:

- 20 – Standard Units
- 21 – Modified Standard Units
- 22 – Special Units – Custom Designs
- 23 – Standard Components
- 25 – Special Components
- 27 – Modules – Poweratio, others
- 29 – Accessory Kits
- 50 – High Efficiency Drives - Standard Units
- 51 – High Efficiency Drives - Modified Standard Units
- 53 – High Efficiency Drives - Standard Components
- 55 – High Efficiency Drives - Special Components
- 60 – Standard Electric Motors
- 65 – Modified Standard Electric Motors
- 70 – Powertorque® Shaft Mount & Spartan Aluminum Worm Drives - Standard Units
- 71 – Powertorque® Shaft Mount & Spartan Aluminum Worm Drives - Modified Standard Units
- 72 – Powertorque® Shaft Mount & Spartan Aluminum Worm Drives - Accessory Kits

Accessory Products:

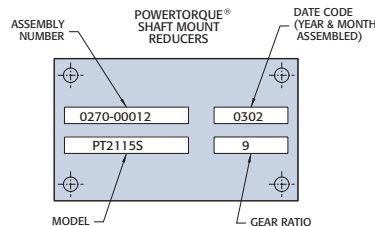
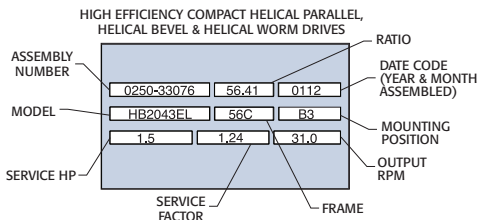
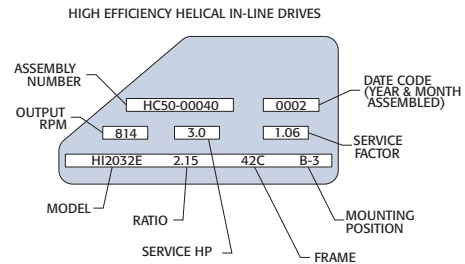
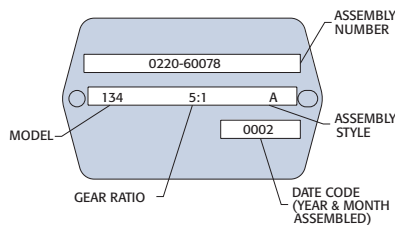
- 31 – Over-running Couplers
- 32 – PTO Adaptors
- 34 – Overhung Load Adaptors
- 35 – Standard Yokes

Contract Machine Products:

- 40 – Contract Parts

CeanLine HUB^{3™} Worm Gear Speed Reducers and Bevel Gear Drives do not have an attached nameplate. The information is directly marked on the housing. Bevel Gear Drives have the ASSEMBLY NUMBER, MODEL, GEAR RATIO, STYLE/MOUNTING POSITION, and DATE CODE. Worm Gear Speed Reducers have the ASSEMBLY NUMBER, MODEL, GEAR RATIO, STYLE, and DATE CODE.

HUB CITY NAME PLATE INFORMATION



MOUNTED BEARING PRODUCTS

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NUMERICAL SEQUENCE CODE

PRODUCT IDENTIFICATION CODE

BALL BEARING

1001	Standard	Pillow Blocks	1102	Modified	Flange Blocks	1203	Special	Flange Cartridges
1002	Standard	Flange Blocks	1103	Modified	Flange Cartridges	1204	Special	Take-Up Units
1003	Standard	Flange Cartridges	1104	Modified	Take-Up Units	1205	Special	Accessories
1004	Standard	Take-Up Units	1105	Modified	Accessories	1300	Standard	Components
1005	Standard	Accessories	1201	Special	Pillow Blocks	1500	Special	Components
1101	Modified	Pillow Blocks	1202	Special	Flange Blocks			

TYPE E – TAPERED ROLLER BEARING (DISCONTINUED)

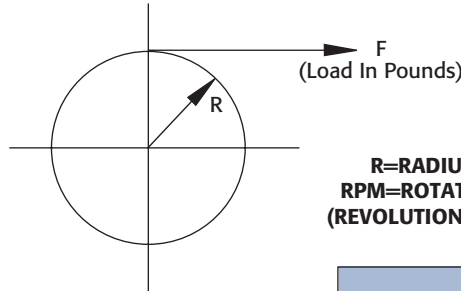
1031	Standard	Pillow Blocks	1132	Modified	Flange Blocks	1203	Special	Flange Cartridges
1032	Standard	Flange Blocks	1133	Modified	Flange Cartridges	1330	Standard	Components
1033	Standard	Flange Cartridges	1201	Special	Pillow Blocks	1530	Special	Components
1131	Modified	Pillow Blocks	1202	Special	Flange Blocks			



MECHANICAL ENGINEERING FORMULAE

POWER AND TORQUE IMPERIAL STANDARDS

HORSEPOWER (HP)
Common unit of mechanical power, one HP is the rate of work required to raise 33,000 pounds one foot in one minute.



$$HP = \frac{F \times \pi \times 2R \times RPM}{33,000 \times 12}$$

OR

$$HP = \frac{F \times R \times RPM}{63,025}$$

OR

$$HP = \frac{TORQUE \times RPM}{63,025}$$

R=RADIUS (INCHES)
RPM=ROTATIONAL SPEED (REVOLUTIONS PER MINUTE)

ONE IMPERIAL HORSEPOWER EQUALS
33,000 foot pounds per minute.
36 inch pounds torque at 1750 RPM.
.746 Kilowatts
1.014 Metric Horsepower (PS)
42.4 BTU per Minute.

TORQUE (T)
TORQUE is a twisting force. Torque causes rotation of a shaft, or it will set up a twist in a stationary shaft. It is generally expressed in foot pounds or in inch pounds. Torque is measured by the load or pull and by the distance of the pull from the center of a shaft.

$$T = F \times R$$

OR

$$T = \frac{HP \times 63,025}{RPM}$$

CALCULATION EXAMPLES
A cable wrapped around a 6" dia. drum must lift 2,500 pounds weight. The drum rotates at 30 RPM.

TO CALCULATE HP:

$$HP = \frac{F \times R \times RPM}{63,025}$$

$$HP = \frac{2500 \times 3 \times 30}{63,025}$$

$$HP = 3.57$$

TO CALCULATE T:

$$T = F \times R$$

$$T = 2500 \times 3"$$

$$T = 7,500 \text{ INCH POUNDS}$$

METRIC (SI) STANDARDS

POWER (P)
The basic unit power measurement in the metric (SI) system is the Watt. **1000 WATTS=1 KILOWATT (KW)**

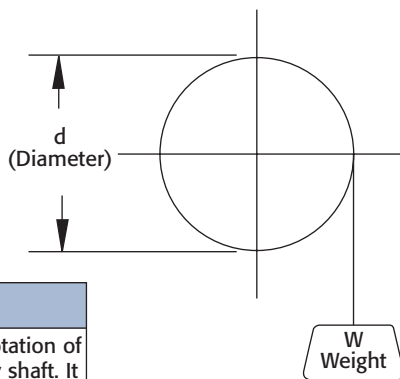
RPM = ROTATIONAL SPEED
REVOLUTIONS PER MINUTE

$$P = \frac{W \cdot g \cdot V}{1000}$$

Constant g = ACCELERATION OF FREE FALL 9.81 M/S²

V = VELOCITY IN METERS/SEC.

$$V = \frac{\pi \cdot d \cdot RPM}{60}$$



TORQUE (M)
TORQUE is a twisting force. Torque causes rotation of a shaft, or it will set up a twist in a stationary shaft. It is generally expressed in Newton-meters.

$$N\text{-m} = \frac{9550 \cdot P}{RPM}$$

CALCULATION EXAMPLES
A cable wrapped around a .5 meter dia. drum must lift 5,000 kilograms weight. The drum rotates at 50 RPM.

TO CALCULATE P: Power in Kilowatts

$$P = \frac{W \cdot g \cdot V}{1000}$$

$$P = \frac{5000 \cdot 9.81 \cdot \frac{\pi \cdot .5 \cdot 50}{60}}{1000}$$

$$P = 64.2 \text{ KILOWATTS}$$

TO CALCULATE N-m:

$$N\text{-m} = \frac{9550 \cdot 64.2}{50}$$

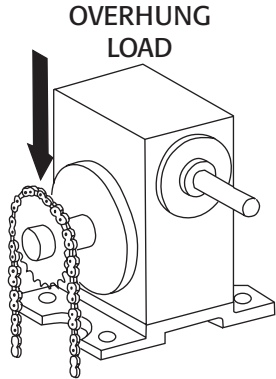
$$N\text{-m} = 12,262$$

SI SYMBOLS
P = Power in Kilowatts
N = Newton
m = Meter
kgfm = Kilogram force meter
N-m = Torque in Newton-meters
• = Multiplication Symbol

CONVERSION FACTORS				
1 KILOWATT =	1 N-M =	1 KGFM =	1 LB. FT. =	1 LB. IN. =
1.341 Imperial Horsepower	.10197 kgfm .73756 lb. ft. 8.8507 lb. in.	9.807 N-m 7.233 lb. ft. 86.796 lb. in.	1.356 N-m .1883 kgfm 12 lb. in.	.1129 N-m .0115 kgfm .083 lb. ft.



MECHANICAL ENGINEERING FORMULAE



OVERHUNG LOAD

An overhung load is a bending force imposed on a shaft due to the torque transmitted by V-drives, chain drives and other power transmission devices, other than flexible couplings.

Most motor and reducer manufacturers list the maximum values allowable for overhung loads. It is desirable that these figures be compared with the load actually imposed by the connected drive.

F – LOAD CONNECTION FACTOR

1.00	–	Single Chain Drives
1.25	–	Spur or Helical Gear Drives, Timing Belt or Double Chain Drives
1.50	–	V-Belt Drives
2.50	–	Flat Belt Drives
3.50	–	Variable Pitch Pulley

OVERHUNG LOADS MAY BE CALCULATED AS FOLLOWS:

USING IMPERIAL DATA

$$\text{OHL (Lbs.)} = \frac{63,000 \times \text{HP} \times F}{N \times R}$$

WHERE HP=TRANSMITTED HP
 N = RPM OF SHAFT
 R = RADIUS OF SPROCKET, PULLEY, ETC. IN INCHES
 F = LOAD CONNECTION FACTOR

EXAMPLE:

CALCULATE OVERHUNG LOAD IMPOSED ON THE OUTPUT SHAFT OF A REDUCER BY A SINGLE CHAIN DRIVE TRANSMITTING 5 HP AT 30 RPM. THE SPROCKET RADIUS IS 6 INCHES.

$$\text{OHL} = \frac{63,000 \times 5 \times 1}{30 \times 6} = 1,750 \text{ Lbs.}$$

USING METRIC (SI) DATA

$$\text{OHL (Kg)} = \frac{M \cdot F \cdot 102}{R}$$

WHERE M = TORQUE IN NEWTON-METERS
 F = LOAD CONNECTION FACTOR
 R = RADIUS OF SPROCKET, PULLEY, ETC. IN MILLIMETERS

EXAMPLE:

CALCULATE OVERHUNG LOAD IMPOSED ON THE OUTPUT SHAFT OF A REDUCER BY A SINGLE CHAIN DRIVE TRANSMITTING 200 NEWTON-METERS TORQUE. THE SPROCKET RADIUS IS 150 MILLIMETERS.

$$\text{OHL} = \frac{200 \cdot 1 \cdot 102}{150} = 136 \text{ Kilograms}$$

The radius of a sprocket, pulley gear, etc. to be mounted on a reducer shaft must be at least as large as – and preferably larger than – the result of dividing the torque requirement by the calculated overhung load imposed on the reducer shaft.

$$\text{MINIMUM PITCH DIA.} = 2 \times \frac{T \times F}{\text{OHL}}$$

WHERE T = TORQUE IN POUND INCHES
 F = LOAD CONNECTION FACTOR
 OHL = OVERHUNG LOAD RATING OF REDUCER SELECTED

EXAMPLE:

CALCULATE THE MINIMUM PITCH DIAMETER FOR A SINGLE CHAIN SPROCKET TRANSMITTING 10,500 POUND INCHES OF TORQUE. REDUCER HAS OVERHUNG LOAD CAPACITY OF 2,000 LBS.

$$\text{MINIMUM PITCH DIA.} = 2 \times \frac{10,500 \times 1}{2,000} = 10.5 \text{ Inches}$$

$$\text{MINIMUM PITCH DIA.} = 2 \cdot \frac{M \cdot F \cdot 102}{\text{OHL}}$$

WHERE T = TORQUE IN NEWTON-METERS
 F = LOAD CONNECTION FACTOR
 OHL = OVERHUNG LOAD RATING OF REDUCER SELECTED

EXAMPLE:

CALCULATE THE MINIMUM PITCH DIAMETER FOR A SINGLE CHAIN SPROCKET TRANSMITTING 200 NEWTON-METERS TORQUE • REDUCER HAS OVERHUNG LOAD CAPACITY OF 250 KILOGRAMS.

$$\text{MINIMUM PITCH DIA.} = 2 \cdot \frac{200 \cdot 1 \cdot 102}{250} = 163.2 \text{ MM}$$



ENGINEERING FORMULAE

ELECTRICAL POWER FORMULAE

	=	DIRECT CURRENT		ALTERNATING CURRENT	
				SINGLE PHASE	THREE PHASE
AMPS	=	$\frac{HP \times 746}{VOLTS \times \% \text{ EFF.}}$ OR $\frac{KW \times 1000}{VOLTS}$	$\frac{HP \times 746}{VOLTS \times \% \text{ EFF.} \times P.F.}$ OR $\frac{KW \times 1000}{VOLTS \times P.F.}$	$\frac{HP \times 746}{VOLTS \times \% \text{ EFF.} \times P.F. \times 1.73}$ OR $\frac{KW \times 1000}{VOLTS \times P.F. \times 1.73}$	
KILOWATTS	=	$\frac{AMPS \times VOLTS}{1000}$	$\frac{AMPS \times VOLTS \times P.F.}{1000}$	$\frac{AMPS \times VOLTS \times P.F. \times 1.73}{1000}$	
HORSEPOWER	=	$\frac{AMPS \times VOLTS \times \% \text{ EFF.}}{746}$	$\frac{AMPS \times VOLTS \times \% \text{ EFF.} \times P.F.}{746}$	$\frac{AMPS \times VOLTS \times \% \text{ EFF.} \times P.F. \times 1.73}{746}$	

PF = POWER FACTOR (USUALLY ESTIMATED AT 80%).

EFF. = EFFICIENCY (USUALLY 80-90%).

CONTACT MOTOR MANUFACTURER FOR COMPLETE INFORMATION.

HYDRAULIC FORMULAE

	LETTER FORMULA:	WORD FORMULA:
CYLINDER VELOCITY or SPEED <i>Feet/Second</i>	$v = \frac{231Q}{720A}$ or $v = \frac{3208Q}{A}$	VELOCITY = $\frac{231 \times \text{FLOW RATE (GPM)}}{12 \times 60 \times \text{NET AREA (Square Inches)}}$
CYLINDER VOLUME CAPACITY <i>Gallons of Fluid</i>	$v = \frac{\pi r^2 l}{231}$ $v = \frac{A t}{231l} = \text{Length of Stroke}$	VOLUME = $\frac{\pi \times \text{RADIUS}^2 \text{ (Inches)} \times \text{STROKE (Inches)}}{231}$ = $\frac{\text{NET AREA (Square Inches)} \times \text{STROKE (Inches)}}{231}$
CYLINDER FLOW RATE <i>Gallons Per Minute</i>	$Q = \frac{720vA}{231}$ or $Q = 3.117vA$	FLOW RATE = $\frac{12 \times 60 \times \text{VELOCITY (Feet/Sec.)} \times \text{NET AREA (Square Inches)}}{231}$
FLUID MOTOR TORQUE <i>Inch Pounds</i>	$T = \frac{\text{psi } d}{2\pi}$ or $T = \frac{Pd}{2\pi}$ $T = \frac{63025 \text{ HP}}{n}$ $T = \frac{36.77QP}{n}$ or $T = \frac{36.77Q \text{ psi}}{n}$	TORQUE = $\frac{\text{PRESSURE (psi)} \times \text{F.M. DISPLACEMENT (Cu. In./Rev.)}}{2\pi}$ = $\frac{\text{HORSEPOWER} \times 63025}{\text{RPM}}$ = $\frac{\text{FLOW RATE (GPM)} \times \text{PRESSURE (psi)} \times 36.77}{\text{RPM}}$
FLUID MOTOR TORQUE / 100 psi <i>Inch Pounds</i>	$T_{100\text{psi}} = \frac{3}{0628}$	TORQUE/100 psi = $\frac{\text{F.M. DISPLACEMENT (Cu. Inches/Revolution)}}{0628}$
FLUID MOTOR SPEED <i>Revolutions/Minute</i>	$n = \frac{231Q}{d}$	SPEED = $\frac{231 \times \text{FLOW RATE (GPM)}}{\text{F.M. DISPLACEMENT (Cu. Inches/Revolution)}}$
FLUID MOTOR POWER <i>Horsepower Output</i>	$HP = \frac{Tn}{63025}$	HORSEPOWER = $\frac{\text{TORQUE OUTPUT (Inch Pounds)} \times \text{RPM}}{63025}$
PUMP OUTLET FLOW <i>Gallons/Minute</i>	$Q = \frac{nd}{231}$	FLOW-GPM = $\frac{\text{RPM} \times \text{PUMP DISPLACEMENT (Cu. In./Rev.)}}{231}$
PUMP INPUT POWER <i>Horsepower Required</i>	$HP_{in} = \frac{QP}{1714\text{Eff.}}$ or $\frac{\text{GPM} \times \text{psi}}{1714\text{Eff.}}$	HORSEPOWER INPUT = $\frac{\text{FLOW RATE OUTPUT (GPM)} \times \text{PRESSURE (psi)}}{1714 \times \text{EFFICIENCY (Overall)}}$

Wattage for heating hydraulic oil:

Each watt will raise the temperature of 1 gallon of oil by 1°F per hour.

Flow velocity in hydraulic lines:

Pump suction lines 2 to 4 feet per second;
pressure lines up to 500 PSI. 10 to 15 feet/sec.;
pressure lines 500 to 3000 PSI. 15 to 20 feet/sec.;
pressure lines over 3000 PSI. 25 feet/sec.; all oil
lines in air-over-oil system, 4 feet/sec.

Torque and horsepower relations:

$T = HP \times 5252 \div RPM$

$HP = T \times RPM \div 5252$

$RPM = HP \times 5252 \div T$

Torque values are in foot pounds.

Hydraulic (fluid power) horsepower:

$HP = \text{PSI} \times \text{GPM} \div 1714$

PSI is gauge pressure in pounds per square inch,

GPM is oil flow in gallons per minute.



DECIMAL AND METRIC EQUIVALENTS

EQUIVALENT OF COMMON FRACTIONS OF AN INCH

INCHES			INCHES			INCHES			INCHES			INCHES		
FRACTIONS	DECIMALS	MILLIMETERS	FRACTIONS	DECIMALS	MILLIMETERS	FRACTIONS	DECIMALS	MILLIMETERS	FRACTIONS	DECIMALS	MILLIMETERS	FRACTIONS	DECIMALS	MILLIMETERS
	.00394	.1		.20866	5.3		.41339	10.5		.62205	15.8		.828125	21.0344
	.00787	.2		.21	5.334		.41732	10.6		.625	15.875		.83	21.082
	.01	.254		.21260	5.4		.42	10.668	5/8	.62598	15.9		.83071	21.1
	.01181	.3		.21654	5.5		.42126	10.7		.62992	16.0		.83464	21.2
1/64	.015625	.3969	7/32	.21875	5.5562	27/64	.421875	10.7156		.63	16.002		.83858	21.3
	.01575	.4		.22	5.588		.42520	10.8		.63386	16.1		.84	21.336
	.01969	.5		.22047	5.6		.42913	10.9		.63779	16.2		.84252	21.4
	.02	.508		.22441	5.7		.43	10.922		.64	16.256		.84375	21.4312
	.02362	.6		.22835	5.8		.43307	11.0	41/64	.640625	16.2719		.84646	21.5
	.02756	.7		.23	5.842		.43701	11.1		.64173	16.3		.85	21.590
	.03	.762		.23228	5.9	7/16	.4375	11.1125		.64567	16.4		.85039	21.6
1/32	.03125	.7938	15/64	.234375	5.9531		.44	11.176		.64961	16.5		.85433	21.7
	.0315	.8		.23622	6.0		.44094	11.2		.65	16.510		.85827	21.8
	.03543	.9		.24	6.096		.44488	11.3		.65354	16.6		.8614	22.0
	.03937	1.0		.24016	6.1		.44882	11.4	21/32	.65625	16.6688	55/64	.86220	21.9
	.04	1.016		.24409	6.2		.45	11.430		.65748	16.7		.86614	22.0
	.04331	1.1		.24803	6.3		.45276	11.5		.66	16.764		.87	22.098
3/64	.046875	1.206	1/4	.25	6.35	29/64	.453125	11.5094		.66142	16.8		.87008	22.1
	.04724	1.2		.25197	6.4		.45669	11.6		.66535	16.9		.87401	22.2
	.05	1.27		.25591	6.5		.46	11.684		.66929	17.0		.87795	22.3
	.05118	1.3		.25984	6.6		.46063	11.7		.67	17.018	7/8	.875	22.225
	.05512	1.4		.26	6.604		.46457	11.8		.671875	17.0656		.87795	22.3
	.05906	1.5		.26378	6.7		.46850	11.9		.67323	17.1		.88	22.352
	.06	1.524	17/64	.265625	6.7469	15/32	.46875	11.9062		.67716	17.2		.88189	22.4
1/16	.0625	1.5875		.26772	6.8		.47	11.938		.68	17.272		.88583	22.5
	.06299	1.6		.27	6.858		.47244	12.0		.68110	17.3		.88976	22.6
	.06693	1.7		.27165	6.9		.47638	12.1		.68504	17.4		.89	22.606
	.07	1.778		.27559	7.0		.48	12.192	11/16	.6875	17.4625	57/64	.890625	22.6219
	.07087	1.8		.27953	7.1		.48031	12.2		.68898	17.5		.89370	22.7
	.07480	1.9		.28	7.112		.48425	12.3		.69	17.526		.89764	22.8
5/64	.078125	1.9844	9/32	.28125	7.1438	31/64	.484375	12.3031		.69291	17.6		.9	22.860
	.07874	2.0		.28346	7.2		.48819	12.4		.69685	17.7		.90157	22.9
	.08	2.032		.28740	7.3		.49	12.446		.7	17.778		.90551	23.0
	.08268	2.1		.29	7.366		.49213	12.5		.70079	17.8		.90625	23.0188
	.08661	2.2		.29134	7.4		.49606	12.6	45/64	.703125	17.8594	29/32	.90945	23.1
	.09	2.286		.29528	7.5		.5	12.7		.70472	17.9		.91	23.114
	.09055	2.3	19/64	.296875	7.5406	1/2	.50394	12.8		.70866	18.0		.91338	23.2
3/32	.09375	2.3812		.29921	7.6		.50787	12.9		.71	18.034		.91732	23.368
	.09449	2.4		.30	7.62		.51	12.954		.71250	18.1		.92	23.368
	.09843	2.5		.30315	7.7		.51181	13.0		.71653	18.2		.92126	23.4
	.1	2.54		.30709	7.8	33/64	.515625	13.0969	23/32	.71875	18.2562	59/64	.921875	23.4156
	.10236	2.6		.31	7.874		.51575	13.1		.72	18.288		.92520	23.5
	.10630	2.7		.31102	7.9		.51968	13.2		.72047	18.3		.92913	23.6
7/64	.109375	2.7781	5/16	.3125	7.9375		.52	13.208		.72441	18.4		.93	23.622
	.11	2.794		.31496	8.0		.52362	13.3		.72735	18.5		.93307	23.7
	.11024	2.8		.31890	8.1		.52756	13.4		.73	18.542		.93701	23.8
	.11417	2.9		.32	8.128		.53	13.462		.73228	18.6		.9375	23.8125
	.11811	3.0		.32283	8.2	17/32	.53125	13.4938		.734375	18.6531	15/16	.94	23.876
	.12	3.048		.32677	8.3		.53150	13.5		.73622	18.7		.94094	23.9
	.12205	3.1	21/64	.328125	8.3344		.53543	13.6		.74	18.796		.94488	24.0
1/8	.125	3.175		.33	8.382		.53937	13.7		.74016	18.8		.94882	24.1
	.12598	3.2		.33071	8.4	35/64	.546875	13.8906	3/4	.75	19.050	61/64	.95	24.130
	.12992	3.3		.33465	8.5		.54724	13.9		.75197	19.1		.95275	24.2
	.13	3.302		.33858	8.6		.55	13.970		.75590	19.2		.95669	24.3
	.13386	3.4		.34	8.636		.55118	14.0		.75984	19.3		.96	24.384
	.13780	3.5		.34252	8.7		.55512	14.1		.76	19.304		.96063	24.4
	.14	3.556	11/32	.34375	8.7312		.55905	14.2		.76378	19.4		.96457	24.5
9/64	.140625	3.5719		.34646	8.8		.56	14.224		.76772	19.5		.96850	24.6
	.14173	3.6		.35	8.89	9/16	.5625	14.2875	49/64	.765625	19.4469	31/32	.96785	24.6062
	.14567	3.7		.35309	8.9		.56693	14.3		.77	19.558		.97	24.638
	.14961	3.8		.35433	9.0		.57	14.478		.77165	19.6		.97244	24.7
	.15	3.810		.35827	9.1		.57087	14.5		.77559	19.7		.97638	24.8
	.15354	3.9	23/64	.359375	9.1281		.57480	14.6		.77953	19.8		.98	24.892
5/32	.15625	3.9688		.36	9.144		.578125	14.6844	25/32	.78125	19.8438	63/64	.98031	24.9
	.15748	4.0		.36220	9.2		.58	14.7		.78346	19.9		.98245	25.0
	.16	4.064		.36614	9.3		.58268	14.8		.78740	20.0		.98459	25.1
	.16142	4.1		.37	9.398		.58661	14.9		.79	20.066		.98673	25.2
	.16535	4.2		.37008	9.4	3/8	.59	15.0		.79134	20.1		.98887	25.3
	.16929	4.3		.37402	9.5		.59440	15.1		.79527	20.2		.99066	25.4
	.17	4.318		.375	9.525		.59842	15.2		.79921	20.3		1	25.4000
11/64	.171875	4.3656		.3795	9.6		.6	15.24		.80315	20.4		1-1/4	1.25
	.17323	4.4		.38	9.652		.60236	15.3		.80709	20.5		1-1/2	1.5
	.17717	4.5		.38189	9.7		.60630	15.4		.81	20.574		1-3/4	1.75
	.18	4.572		.38583	9.8	19/32	.59375	15.0812		.81102	20.6		2	2.0000
	.18110	4.6		.38976	9.9		.59842	15.2		.8125	20.6375		2-1/2	2.5
	.18504	4.7		.39	9.906		.6	15.24		.81496	20.7		3	3.0000
3/16	.1875	4.7625	25/64	.390625	9.9219		.60375	15.4781	13/16	.8125	20.6375		3-1/2	3.5
	.18898	4.8		.39370	10.0		.61	15.494		.81890	20.8		4	4.0000
	.19	4.826		.39764	10.1		.61024	15.5		.82	20.828		4-1/2	4.5
	.19291	4.9		.40157	10.2		.61417	15.6		.82283	20.9		5	5.0000
	.19685	5.0		.40551	10.3		.61811	15.7		.82677	21.0		6	6.0000
	.2	5.08		.40945	10.4		.62	15.748					7	7.0000
	.20079	5.1	13/32	.40625	10.3188								8	8.0000
	.203125	5.1594		.41	10.414								9	9.0000
13/64	.20472	5.2											10	10.0000

CONVERSIONS BETWEEN IMPERIAL AND (SI) STANDARD UNITS

SI (International Standards) units should be used on documents prepared for international circulation.

QUANTITY	SI UNIT FOR FLUID POWER	CUSTOMARY IMPERIAL UNIT	CONVERSION FACTOR
Length	millimeter (mm)	inch (in.)	1 inch = 25



TERMS & CONDITIONS OF SALE

QUOTATIONS ARE MADE AND ORDERS ARE ACCEPTED BY SELLER SUBJECT ONLY TO THESE TERMS AND CONDITIONS:

1. AGREEMENT AND MODIFICATION OF SALES TERMS. The agreement between Seller and Buyer ("Sales Contract") is with respect to the sale of goods described on the other side hereof (the "goods"). Any Terms and Conditions contained in any purchase order or other form of communication from Seller's customers which are additional to or different from these Terms and Conditions shall be deemed rejected by Seller unless expressly accepted in writing by Seller.

2. ACCEPTANCE OF ORDERS. Acceptance by Seller of Buyer's purchase order(s) is expressly conditioned upon Buyer's assent to these Terms and Conditions. Buyer will be deemed to have assented to such Terms and Conditions unless Seller receives written notice of any objections within 10 days after Buyer's receipt of this form or in all events prior to any delivery or other performance by Seller of Buyer's order if less than 10 days.

3. QUOTATIONS. Quotations by Sellers shall be deemed to be offers by Seller to sell the goods described therein subject to these Terms and Conditions, and acceptance of such offers is expressly limited to acceptance by Buyer of all of these Terms and Conditions within 30 days from the date of the quotation or as specified. Purchase orders submitted by Buyer for the goods quoted by Seller shall be subject to and will be deemed to constitute acceptance of these Terms and Conditions. All purchase orders will be subject to approval by Seller.

4. TERMINATION OR MODIFICATION. The Sales Contract may be modified or terminated only upon Seller's express written consent, which consent will at all times be conditioned on Buyer's agreement to pay Seller's modification or termination charge including, but not limited to expenses and costs plus a reasonable profit, except that any goods completed on or before Seller's acceptance of termination shall be accepted and paid in full by Buyer.

5. PRICES AND TERMS. Fulfillment of Buyer's order is contingent upon the availability of materials. The price of the goods sold pursuant to the Sales Contract shall be based upon Seller's prices in effect at the time of shipment and any acceptance of the order will be on the basis of the freight rates now in effect. In the event of an increase or decrease in the applicable freight charges before the material is shipped, such changes in freight charges will be for the account of Buyer. Price advances, discounts, extras and terms and conditions are subject to changes without notice. Unless otherwise provided on the front side hereof, price is F.O.B. Seller's point of shipment, and terms of payment shall be net 30 days from date of invoice. Seller may assess a delinquency charge of 1-1/2 percent per month on invoices not paid within stated payment terms. Seller may require full or partial payment or payment guarantees in advance of shipment whenever, in its opinion, the financial condition of Buyer so warrants. In addition, Seller may, at any time, suspend performance of any order or require payment in cash, security or other adequate assurance satisfactory to Seller when, in Seller's opinion, the financial condition of Buyer warrants such action.

6. TAXES. Prices do not include sales, use or other similar federal, state or local taxes. Buyer shall pay to Seller, in addition to the price of the goods, all applicable taxes which may be invoiced separately at a later date.

7. DESIGN; EXTRA WORK; BUYER'S MATERIAL. (a) If any order accepted by Seller contemplates the preparation of special designs by Seller, Buyer issuing such order will have a responsible representative specifically approve all designs prepared by Seller.

(b) If Buyer requests extra work not included in the quotation or original order, Buyer will pay for the extra work at reasonable rates as determined by Seller.

(c) In the event spoilage/damage occurs on orders where Buyer furnishes the material, Seller shall not be liable for replacement of or damage to such material.

8. RISK OF LOSS, TITLE, SECURITY INTEREST. Delivery shall occur, and risk of loss shall pass to Buyer, upon delivery of the material to a carrier at the F.O.B. point of shipment. Transportation shall be at Buyer's sole risk and expense, and any claims for losses or damage in transit shall be against the carrier only. However, Seller retains title to all products until paid for in full in cash and Buyer agrees to perform all acts necessary to provide a fully perfected security interest in the goods in favor of Seller. Seller may, at Seller's option, repossess the same, upon Buyer's default in payment hereunder, and charge Buyer with any deficiency.

9. DELIVERIES AND QUANTITIES. (a) Delivery dates are not guaranteed but are estimated on the basis of immediate receipt by Seller of all information to be furnished by Buyer and the absence of delay, direct or indirect, resulting from or contributed to by circumstances beyond Seller's reasonable control. If the goods are non-catalog goods, Seller may ship

overages or underages to the extent of 10 percent of quantity ordered, and Buyer shall pay for such quantity based upon the unit price of the goods. Sellers shall not be required to maintain closer control of quantity, unless specifically agreed to by Seller in writing. Quantities of all items may be determined by weight. Any claims for shortage must be within 10 days from the date of receipt of the goods by Buyer, and in every case the weights found in any particular shipment, including tare, must be given and Seller advised as to the method used by Buyer in computing the count of parts.

(b) In the event that Buyer is unable to accept delivery of the goods at time of shipment, Seller shall invoice Buyer for the full purchase price as if shipment had been made and: (i) if Seller is able to store such goods in its own facilities, Buyer will pay Seller the reasonable handling and storage charges for the period of such storage, and (ii) if Seller is unable to store such goods at its own facility, Seller reserves the right to arrange handling and storage in a suitable bonded warehouse for the Buyer at Buyer's expense. In cases where handling and storage become necessary, it shall be Buyer's responsibility to notify Seller when shipment is to be made. Seller will make necessary arrangements for shipment at Buyer's expense.

10. RETURNED GOODS. Goods may not be returned. However, if Seller consents in writing or upon verbal authorization to the return of goods for any reason, transportation charges must be prepaid by Buyer, who also shall assume all risk of loss of such returned goods until actual receipt by Seller.

11. INSPECTION, ACCEPTANCE. Buyer shall inspect the goods immediately upon the receipt thereof. All claims by Buyer (including claims for shortages), except only those provided for under the WARRANTY AND LIMITATIONS OF LIABILITY and PATENTS clauses below, must be asserted in writing by Buyer within a 10 day period or they are waived. If this contract involves partial performances, all such claims must be asserted within a 10 day period for each partial performance. Rejection may be only for defects substantially impairing the value of products or work. Buyer's remedy for lesser defects shall be those provided for under the Warranty and Liability clauses. THERE SHALL BE NO REVOCATION OF ACCEPTANCE. If Buyer wrongfully rejects, revokes or delays acceptance of items or work tendered under this contract, or fails to make a payment due on or before delivery, or repudiates this contract, Seller shall, at its option, have a right to recover as damages, either the price as stated herein (upon recovery of the price, the items involved shall become the property of the Buyer) or the profit (including reasonable overhead) which the Seller would make from performance together with incidental damages and reasonable cost.

12. WARRANTIES AND LIMITATIONS OF LIABILITY. (a) Seller warrants to Buyer that the goods will conform to the following warranty: The goods will be commercially free from defects in material and workmanship under normal use for a period of 1 year from the date of shipment of the goods by Seller and will conform at the date of shipment to applicable specifications, drawings and blueprints, except for departures therefrom with written approval of Buyer; provided that work performed by Seller upon blanks and other materials furnished by Buyer is excluded from this warranty. Seller shall have no liability to Buyer for cost of blanks furnished by Buyer which are damaged or spoiled during heat treat or machining operations;

(b) In the case of drives, gears and reducers manufactured by Seller, Seller warrants only that such products, when shipped, shall be capable of delivering the service rating as indicated in Seller's written documents, including quotations and catalogs or as noted on such products, providing such equipment is properly installed and maintained, correctly lubricated, operating under normal conditions with competent supervision, and within the load limits for which it was sold, and provided further that the equipment is free from critical speed, torsional or other type vibration, no matter how induced;

(c) If any model or sample was provided to the Buyer, it was used merely to illustrate the general type and quality of goods and not to warrant that goods shipped would be of that type or quality;

(d) UNLESS AUTHORIZED IN WRITING BY A CORPORATE OFFICER OR VICE PRESIDENT, NO AGENT, EMPLOYEE OR REPRESENTATIVE OF SELLER HAS ANY AUTHORITY TO BIND SELLER TO ANY AFFIRMATION, REPRESENTATION OR WARRANTY CONCERNING THE GOODS SOLD UNDER THE SALES CONTRACT AND ANY SUCH AFFIRMATION, REPRESENTATION OR WARRANTY HAS NOT FORMED A PART OF THE BASIS OF THE BARGAIN AND SHALL BE UNENFORCEABLE;

(e) Seller's sole obligation under the foregoing warranties is limited to either, at Seller's option, replacing or repairing defective goods (or defective parts thereof). This warranty does not cover the cost of installation of



TERMS & CONDITIONS OF SALE

the new or repaired goods or parts. Replacement goods or parts are warranted for the remainder of the warranty period applicable to the goods originally supplied by Seller. All claims for allegedly defective goods must be made within 10 days after Buyer learns of such alleged defects. All claims not made in writing and received by Seller within such 10 day period shall be deemed waived. Buyer shall return a sample of the alleged defective part for Seller's inspection, and no other goods shall be returned to Seller without Seller's written consent. This warranty shall not extend to goods subjected to misuse, abuse, neglect, accident or improper installation or maintenance, incorrect lubrication, or goods which have been altered or repaired by anyone other than Seller or its authorized representative;

(f) THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND/OR ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED;

(g) Products not manufactured and work not performed by Seller are warranted only to the extent and in the manner that the same are warranted to Seller by Seller's vendors, and then only to the extent that Seller is reasonably able to enforce such warranty. In enforcing such warranty, it is understood Seller shall have no obligation to initiate litigation unless Buyer undertakes to pay all costs and expenses therefor, including but not limited to Attorney's fees, and indemnifies Seller against any liability to Seller's vendors arising out of such litigation;

(h) THE FOREGOING IS SELLER'S ONLY OBLIGATION AND BUYER'S EXCLUSIVE REMEDY FOR BREACH OF WARRANTY. BUYER'S FAILURE TO SUBMIT A CLAIM AS PROVIDED ABOVE SHALL SPECIFICALLY WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. IN NO EVENT SHALL BUYER BE ENTITLED TO INCIDENTAL, CONSEQUENTIAL, CONTINGENT, OR SPECIAL DAMAGES, NOR SHALL SELLER'S LIABILITY EXCEED THE PURCHASE PRICE OF THE GOODS. EVEN IF THE REPAIR OR REPLACEMENT REMEDY SHALL BE DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE UNDER SECTION 2-719 OF THE UNIFORM COMMERCIAL CODE, SELLER SHALL HAVE NO LIABILITY TO BUYER FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, SUCH AS LOST PROFITS, LOST REVENUE, DAMAGE TO OTHER EQUIPMENT OR LIABILITY OR INJURY TO A THIRD PARTY. ANY ACTION ARISING HEREUNDER OR RELATED HERETO MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION OCCURS OR IT SHALL BE BARRED, NOTWITHSTANDING ANY STATUTORY PERIOD OF LIMITATIONS TO THE CONTRARY; and

(i) In the event of the resale of any of the goods, in whatever form, Buyer will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such resale: "THE MANUFACTURER MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS SOLD HEREUNDER. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS PURCHASED HEREUNDER WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. IN NO EVENT WILL MANUFACTURER BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES."

(j) Nuclear Use Disclaimer - Equipment sold by Seller is not intended for use in connection with any nuclear facility or activity. If so used, Seller disclaims all liability for any nuclear damage, injury or contamination, and Buyer shall indemnify and hold Seller, its officers, agents, employees, successors, assigns and customers harmless from and against any and all losses, damages or expenses of whatever form or nature (including attorneys' fees and other costs of defending any action) which they or any of them may sustain or incur, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, by reason of such use.

13. REMEDIES AND LIMITATIONS OF LIABILITY. In the event Buyer claims Seller has breached any of its obligations under the Sales Contract, whether of warranty or otherwise, Seller may request the return of goods and tender to Buyer, at Seller's option, a replacement shipment of goods. If Seller so requests the return of the goods, the goods will be redelivered to Seller in accordance with Seller's instructions and at Buyer's expense. Except as herein provided, Seller shall have no further obligation under the Sales Contract. The remedies contained in this paragraph and paragraph 12 hereof shall constitute the sole recourse of Buyer against Seller for breach of any of Seller's obligations under the Sales Contract, whether warranty or otherwise.

14. TECHNICAL ADVICE. Any technical advice furnished or recommendation made by Seller or any representative of Seller concerning any use or application of any of the goods is believed to be reliable, but SELLER

MAKES NO WARRANTY, EXPRESSED OR IMPLIED, ON RESULTS TO BE OBTAINED. BUYER ASSUMES ALL RESPONSIBILITY FOR LOSS OR DAMAGE RESULTING FROM THE HANDLING OR USE OF ANY OF THE GOODS.

15. FORCE MAJEURE. Seller shall not be liable for failure to perform its obligations under the Sales Contract in whole or in part caused by the occurrence of any contingencies beyond the reasonable control either of Seller or of suppliers of Seller. If any such contingency occurs, Seller may allocate goods and deliveries among Seller's customers.

16. ASSIGNMENT AND DELEGATION. No right or interest in the Sales Contract shall be assigned by Buyer without Seller's prior written consent, and no delegation of any obligation owed, or to the performance of any obligation by Buyer shall be made without Seller's prior written consent. Any attempt at assignment or delegation shall be wholly void and totally ineffective for all purposes unless made in conformity with this paragraph.

17. PATTERNS AND TOOLING. Unless otherwise agreed to in writing with Buyer, Seller shall retain title to and possession of all special tooling, patterns and dies whether paid for by Buyer or not, but such special tooling, patterns and dies that are specifically paid for by Buyer will be held by Seller exclusively for the manufacture of Buyer's goods for not more than 2 years after the date of Buyer's last order requiring their use. Seller will exercise reasonable care in handling and storing any tooling, patterns or dies specifically paid for by Buyer, but Seller shall not be liable for damage or loss thereof.

18. PATENTS. SELLER MAKES NO REPRESENTATION OR WARRANTY WITH RESPECT TO THE PATENTABILITY OF THE GOODS OR THAT ANY OF THE GOODS WILL BE FREE FROM CLAIMS OF INFRINGEMENT. Buyer agrees to indemnify and defend Seller in any such suit, action or proceeding for any claim resulting from actual or alleged infringement of any domestic or foreign letters patent for (i) any feature, construction or design incorporated at Buyer's request in any goods or to adapt such goods to the particular use of Buyer or Buyer's customers or (ii) any additions, changes or adaptations made by Buyer or Buyer's customers after delivery of the goods.

19. CONFIDENTIAL INFORMATION. All drawings, diagrams, specifications, technical data and other materials furnished by Seller and identified by Seller as confidential are and shall remain the exclusive property of Seller and shall be returned to Seller upon request. Buyer agrees to treat such information and material as confidential and not to reproduce or disclose such information or materials without Seller's prior written consent. This paragraph does not apply to any information already known to and readily accessible in the trade or which may become so through no fault of Buyer.

20. CHANGES. Seller may, at any time, without notice, make changes (whether in design, material, improvements or otherwise) in any catalog goods, and may discontinue the manufacture of any catalog goods, all in its sole discretion, without incurring any obligations of any kind as a result thereof, whether for failure to fill an order of Buyer or otherwise.

21. INSTALLATION. Installation of the goods shall be by Buyer unless otherwise specifically stated in the Sales Contract.

22. SEVERABILITY. If any term or provision contained in the Sales Contract is declared or held invalid by a court of competent jurisdiction, such declaration or holding shall not affect the validity of any other term, clause or provision contained herein.

23. GOVERNING LAW AND LIMITATION. (a) The formation and performance of the Sales Contract shall be deemed to have been made and governed by the Uniform Commercial Code as adopted in the state of Seller's principal place of business;

(b) Buyer hereby agrees to the jurisdiction of any state or federal court located in the county of Seller's principal place of business. Buyer waives any objection based on forum non conveniens and any objection to venue of any action instituted hereunder, and consents to the granting of such legal or equitable relief as is deemed appropriate by a court of competent jurisdiction. The rights and obligations of Seller and Buyer shall not be governed by the provisions of the United Nations Convention on Contracts for the International Sale of Goods; and

(c) Seller represents that the goods will be produced in compliance with the Fair Labor Standards Act of 1938, as amended.

(d) BUYER AGREES TO PAY ALL OF SELLER'S COSTS AND EXPENSES OF COLLECTION AND LITIGATION, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES AND COSTS.

Revised December 2008



HUB CITY

ALPHA-NUMERIC MODEL INDEX

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1T200	NA	M28	264	B18	B32-B33	1810	B57	See pg B93
2	F36	F37	265	B18	B34-B35	2101	B57	B62-B63
3	F38	F39	266	B18	B36-B37	2102	B57	B64-B65
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3T210	NA	M27	280	F16	F17	2104	B57	B70-B71
4	F40	F41	290	F26	F27	2105	B57	B72-B73
5	F42	F43	320V	B18	See pg B93	2106	B57	B74-B75
6	F44	F45	321	B18	B24-B25	2109	B57	See pg B93
6T200	NA	M28	322	B18	B26-B27	2110	B57	See pg B93
6T210	NA	M27	323	B18	B28-B29	2200	D48	D49
8	F48	F49	324	B18	B32-B33	2212	P1	P1
9T200	NA	M28	325	B18	B34-B35	2213	P1	P1
9T210	NA	M27	326	B18	B36-B37	2401	B58	B62-B63
11	D16	D17	327	B18	B40-B41	2402	B58	B64-B65
12T200	NA	M28	328	B18	B42-B43	2403	B58	B66-B67
12T210	NA	M27	329V	B18	See pg B93	2404	B58	B70-B71
18T200	NA	M28	330	Q18	Q19	2405	B58	B72-B73
18T210	NA	M27	380V	B19	See pg B93	2406	B58	B74-B75
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65	D26	D27	384	B19	B32-B33	2604	B58	B70-B71
65M	D26	D58	385	B19	B34-B35	2605	B58	B72-B73
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89	F32	F33	451	B20	B24-B25	2654	See Page B86	
95H	F24	F25	452	B20	B26-B27	2655	See Page B86	
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105M	D40	D58	455	B20	B34-B35	2660	See Page B86	
120M	D42	D57	456	B20	B38-B39	3201	B58	B62-B63
125M	D44	D58	457	B20	B40-B41	3202	B58	B64-B65
131	B16	B24-B25	458	B20	B42-B43	3203	B58	B66-B67
134	B16	B32-B33	459V	B20	B44-B45	3204	B58	B70-B71
150	D18	D19	520V	B20	B46-B47	3205	B58	B72-B73
165	D20	D21	521	B20	B24-B25	3206	B58	B74-B75
165M	D20	D57	522	B20	B26-B27	3207	B58	B78-B79
175	D22	D23	523	B20	B30-B31	3208	B58	B80-B81
175M	D22	D58	524	B20	B32-B33	3209	B58	See pg B93
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185	B16	B34-B35	600	D28	D29	3255	See Page B86	
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212	B17	B26-B27	850M	D34	D58	3801	B59	B62-B63
213	B17	B28-B29	920	D52	D53	3802	B59	B64-B65
214	B17	B32-B33	950	D54	D55	3803	B59	B66-B67
215	B17	B34-B35	1000	D36	D37	3804	B59	B70-B71
216	B17	B36-B37	1010	D38	D39	3805	B59	B72-B73
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240	F14	F15	1250	D44	D45	3808	B59	B80-B81
241	B17	B24-B25	1301	B57	B62-B63	3809	B59	See pg B93
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3858	See Page B86		AL631	C7	C8	ARM1	F6	F9
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4503	B59	B68-B69	AL852	C7	C9	B350	M31	M35
4504	B59	B70-B71	AL854	C7	C8	C223	H3	H3, H8
4505	B59	B72-B73	AL855	C7	C9	C224	H3	H3, H8
4506	B59	B76-B77	ALHI4032A	I54	I58	C225	H3	H3, H8
4507	B59	B78-B79	ALHI4032C	I54	I58	C226	H3	H3, H8
4508	B59	B80-B81	ALHI4032E	I54	I58	C227	H3	H3, H8
4509	B59	B81-B83	ALHI4032G	I54	I58	C383	H3	H3, H8
4510	B59	B84-B85	ALHI4033A	I54	I58	C387	H3	H3, H8
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4552	See Page B86		ALHI4033E	I54	I58	C394	H3	H3, H8
4553	See Page B86		ALHI4033G	I54	I58	C403	H4	H4, H8
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4558	See Page B86		ALHI4043A	I55	I59	CPARM2	O24	O25
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5202	B59	B64-B65	ALHI4052C	I56	I60	D404	H4	H4, H8
5203	B59	B68-B69	ALHI4052E	I56	I60	D450	H4	H4, H8
5204	B59	B70-B71	ALHI4052G	I56	I60	D452	H4	H4, H8
5205	B59	B72-B73	ALHI4053A	I56	I60	D454	H4	H4, H8
5206	B59	B76-B77	ALHI4053C	I56	I60	D456	H4	H4, H8
5207	B59	B78-B79	ALHI4053E	I56	I60	D457	H4	H4, H8
5208	B59	B80-B81	ALHI4053G	I56	I60	FB100	M12	M10
5209	B59	B81-B83	ALHI4062A	I57	I61	FB100UR	N14	N9
5210	B59	B84-B85	ALHI4062C	I57	I61	FB110	M12	M10
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5252	See Page B86		ALHI4062G	I57	I61	FB150	M12	M11
5253	See Page B86		ALHI4063A	I57	I61	FB150UR	N14	N9
5254	See Page B86		ALHI4063C	I57	I61	FB160	M12	M11
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9000	E3	E4	ALHW8505	C13	C15	FB260CTW	O34-O35	O33
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AD2	D6	D7	ALWW4502	C10	C12	FB260HW	M12	M23
AD3	D8	D9	ALWW4504	C10	C11	FB260N	M12	M22
AD3M	D8	D56	ALWW4505	C10	C12	FB260STW	O34	O31
AD4	D8	D9	ALWW5001	C10	C11	FB260UR	N14	N7
AD4M	D8	D56	ALWW5002	C10	C12	FB350	M31	M32
AD5	D8	D9	ALWW5004	C10	C11	FB350H	M31	M33
AD5M	D8	D56	ALWW5005	C10	C12	FB350UR	N14	N13
AL451	C7	C8	ALWW6301	C10	C11	FC350	M31	M34
AL452	C7	C9	ALWW6302	C10	C12	FR250URW	N14	N11
AL454	C7	C8	ALWW6304	C10	C11	G502	H3	H3, H8
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G511	H4	H4, H8	HB2085A	K28	K36-K37	HI4073K	165	151
G513	H4	H4, H8	HB2085E	K28	K34-K35	HI4074A	166	179
G515	H4	H4, H8	HB2085I	K28	K24-K25	HI4074C	166	181
G517	H4	H4, H8	HB2093A	K28	K32-K33	HI4074E	166	178
G519	H4	H4, H8	HB2093E	K28	K30-K31	HI4074G	166	180
G522	H3	H3, H8	HB2095A	K28	K36-K37	HI4074I	166	152
G523	H3	H3, H8	HB2095E	K28	K34-K35	HI4074K	166	153
G527	H3	H3, H8	HB2095I	K28	K24-K25	HI4082A	166	171
G528	H3	H3, H8	HB2103A	K29	K32-K33	HI4082C	166	173
G531	H4	H4, H8	HB2103E	K29	K30-K31	HI4082E	166	170
G541	H3	H3, H8	HB2105A	K29	K36-K37	HI4082G	166	172
G544	H3	H3, H8	HB2105E	K29	K34-K35	HI4082I	166	148
G547	H3	H3, H8	HB2105I	K29	K24-K25	HI4082K	166	149
G548	H3	H3, H8	HI4042A	162	171	HI4083A	166	175
G549	H3	H3, H8	HI4042C	162	173	HI4083C	166	177
GW601	B21	B24-B25	HI4042E	162	170	HI4083E	166	174
GW602	B21	B26-B27	HI4042G	162	172	HI4083G	166	176
GW604	B21	B32-B33	HI4042I	162	148	HI4083I	166	150
GW605	B21	B34-B35	HI4042K	162	149	HI4083K	166	151
GW607	B21	B40-B41	HI4043A	162	175	HI4084A	167	179
GW608	B21	B42-B43	HI4043C	162	177	HI4084C	167	181
GW701	B22	B24-B25	HI4043E	162	174	HI4084E	167	178
GW702	B22	B26-B27	HI4043G	162	176	HI4084G	167	180
GW707	B22	B40-B41	HI4043I	162	150	HI4084I	167	152
GW801	B22	B24-B25	HI4043K	162	151	HI4084K	167	153
GW802	B22	B26-B27	HI4062A	162	171	HI4092A	167	171
GW807	B22	B40-B41	HI4062C	162	173	HI4092C	167	173
GW1001	B23	B24-B25	HI4062E	162	170	HI4092E	167	170
GW1002	B23	B26-B27	HI4062G	162	172	HI4092G	167	172
GW1007	B23	B40-B41	HI4062I	162	148	HI4093A	168	175
GW6001	B60	B62-B63	HI4062K	162	149	HI4093C	168	177
GW6002	B60	B64-B65	HI4063A	163	175	HI4093E	168	174
GW6004	B60	B70-B71	HI4063C	163	177	HI4093G	168	176
GW6005	B60	B72-B73	HI4063E	163	174	HI4093I	168	150
GW6007	B60	B78-B79	HI4063G	163	176	HI4093K	168	151
GW6008	B60	B80-B81	HI4063I	163	150	HI4094A	168	179
GW7001	B60	B62-B63	HI4063K	163	151	HI4094C	168	181
GW7002	B60	B64-B65	HI4064A	163	179	HI4094E	168	178
GW7004	B60	B70-B71	HI4064C	163	181	HI4094G	168	180
GW7005	B60	B72-B73	HI4064E	163	178	HI4102A	168	171
GW7007	B60	B78-B79	HI4064G	163	180	HI4102C	168	173
GW7008	B60	B80-B81	HI4064I	163	152	HI4102E	168	170
GW8001	B61	B62-B63	HI4064K	163	153	HI4102G	168	172
GW8002	B61	B64-B65	HI4662A	163	171	HI4103A	169	175
GW8004	B61	B70-B71	HI4662C	163	173	HI4103C	169	177
GW8005	B61	B72-B73	HI4662E	163	170	HI4103E	169	174
GW8007	B61	B78-B79	HI4662G	163	172	HI4103G	169	176
GW8008	B61	B80-B81	HI4662I	163	148	HI4103I	169	150
GW10001	B61	B62-B63	HI4662K	163	149	HI4103K	169	151
GW10002	B61	B64-B65	HI4663A	164	175	HI4104A	169	179
GW10004	B61	B70-B71	HI4663C	164	177	HI4104C	169	181
GW10005	B61	B72-B73	HI4663E	164	174	HI4104E	169	178
GW10007	B61	B78-B79	HI4663G	164	176	HI4104G	169	180
GW10008	B61	B80-B81	HI4663I	164	150	HP2032A	J26	J32-J33
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HB2043E	K26	K30-K31	HI4664A	164	179	HP2032I	J26	J22-J23
HB2043I	K26	K22-K23	HI4664C	164	181	HP2033A	J26	J32-J33
HB2063A	K26	K32-K33	HI4664E	164	178	HP2033E	J26	J30-J31
HB2063E	K26	K30-K31	HI4664G	164	180	HP2033I	J26	J22-J23
HB2063I	K26	K22-K23	HI4664I	164	152	HP2042A	J27	J32-J33
HB2065A	K26	K36-K37	HI4664K	164	153	HP2042E	J27	J30-J31
HB2065E	K26	K34-K35	HI4072A	165	171	HP2042I	J27	J22-J23
HB2065I	K26	K24-K25	HI4072C	165	173	HP2043A	J27	J32-J33
HB2073A	K27	K32-K33	HI4072E	165	170	HP2043E	J27	J30-J31
HB2073E	K27	K30-K31	HI4072G	165	172	HP2043I	J27	J22-J23
HB2073I	K27	K22-K23	HI4072I	165	148	HP2062A	J28	J32-J33
HB2075A	K27	K36-K37	HI4072K	165	149	HP2062E	J28	J30-J31
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HB2075I	K27	K24-K25	HI4073C	165	177	HP2063A	J28	J32-J33
HB2083A	K27	K32-K33	HI4073E	165	174	HP2063E	J28	J30-J31



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HP2065E	J28	J34J35	PB250N	M12	M16	U727	H3	H3, H8
HP2065I	J28	J24-J25	PB250UR	N14	N3	U728	H3	H3, H8
HP2072A	J29	J32-J33	PB250W	M12	M17	W300	B-48	B-48
HP2072E	J29	J30-J31	PB251	M12	M16	W50B	B-49	B-49
HP2072I	J29	J22-J23	PB251CTW	O34-O35	O32	W516	B-50	B-50
HP2073A	J29	J32-J33	PB251DRW	N14	N4	WSTU220	M12	M26
HP2073E	J29	J30-J31	PB251HW	M12	M18	WSTU250	M12	M26
HP2073I	J29	J22-J23	PB251N	M12	M16	Y534	H6	H6, H8
HP2075A	J29	J36-J37	PB251STW	O34	O30	Y536	H6	H6, H8
HP2075E	J29	J34J35	PB251UR	N14	N3	Y541	H6	H6, H8
HP2075I	J29	J24-J25	PB251W	M12	M17	Y543	H6	H6, H8
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HW2042A	L28	L34-L35	PB350H	M31	M33	Y547	H6	H6, H8
HW2042E	L28	L32-L33	PB350UR	N14	N13	Y551	H6	H6, H8
HW2042I	L28	L22-L23	PT1107	G12	G14	Y555	H6	H6, H8
HW2043A	L28	L38-L39	PT2115	G12	G14	Y556	H6	H6, H8
HW2043E	L28	L36-L37	PT3203	G12	G14	Y557	H6	H6, H8
HW2043I	L28	L24-L25	PT4207	G12	G14	Y558	H6	H6, H8
HW2052A	L28	L34-L35	PT5215	G12	G14	Y559	H6	H6, H8
HW2052E	L28	L32-L33	PT6307	G13	G14	Y560	H6	H6, H8
HW2052I	L28	L22-L23	PT7315	G13	G14	Y561	H6	H6, H8
HW2053A	L29	L38-L39	PT8407	G13	G14	Y592	H6	H6, H8
HW2053E	L29	L36-L37	PT9415	G13	G14	YW220	M12	M30
HW2053I	L29	L24-L25	PT10507	G13	G14	YW250	M12	M30
HW2062A	L30	L34-L35	RA-0	D59	D59	Z602	H7	H7, H8
HW2062E	L30	L32-L33	RA-1	D60	D60	Z603	H7	H7, H8
HW2062I	L30	L22-L23	RA-2	D61	D61	Z604	H7	H7, H8
HW2063A	L30	L38-L39	RA-3	D62	D62	Z605	H7	H7, H8
HW2063E	L30	L36-L37	RA-4	D63	D63	Z606	H7	H7, H8
HW2063I	L30	L24-L25	RM1	F6	F7	Z607	H7	H7, H8
HW2064A	L30	L42-L43	RM2	F6	F7	Z610	H7	H7, H8
HW2064E	L30	L40-L41	RM3	F6	F8	Z611	H7	H7, H8
HW2064I	L30	L26-L27	SS165	O15	O17	Z612	H7	H7, H8
HW2072A	L30	L34-L35	SS175	O15	O18	Z613	H7	H7, H8
HW2072E	L30	L32-L33	SS181	O9	O10	Z614	H7	H7, H8
HW2072I	L30	L22-L23	SS182	O9	O11	Z616	H7	H7, H8
HW2073A	L31	L38-L39	SS184	O9	O12	Z630	H7	H7, H8
HW2073E	L31	L36-L37	SS185	O9	O13	Z631	H7	H7, H8
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HW2074E	L31	L40-L41	SS214	O9	O12	Z636	H7	H7, H8
HW2074I	L31	L26-L27	SS215	O9	O13	Z637	H7	H7, H8
M2	D10	D11	SS261	O9	O10	Z638	H7	H7, H8
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PB220	M12	M13	TPB250CTW	O34-O35	O32			
PB220DRW	N14	N6	TPB250DRW	N14	N12			
PB220HW	M12	M15	TPB250STW	O34	O30			
PB220UR	N14	N5	TPB250UR	N14	N12			
PB220W	M12	M14	TPB250W	M12	M19			
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PB221DRW	N14	N6	TU220W	M12	M25			
PB221HW	M12	M15	TU250	M12	M24			
PB221UR	N14	N5	TU250W	M12	M25			
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