

SUPPLEMENT

X-RAY TUBE STATOR COMPATIBILITY TABLES

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1.0 INTRODUCTION

This supplement contains the X-Ray Tube Stator Compatibility Tables for the Low Speed Starter and the Dual Speed Starter.

2.0 LOW SPEED STARTER TUBE SELECT TABLE

The boost voltage may be set to either 240 VAC (factory default) or 120 VAC. This should be set to 240 VAC, except where specifically noted in Table 1 below. The Low Speed Starter output is at the same frequency as the AC line (50 Hz or 60 Hz).

The Low Speed Starter (LSS) is a separate sub-assembly within the Indico 100 Generator. The LSS part number corresponds to the value of phase-shift capacitor incorporated within this sub-assembly. The boost time is selectable to either 1.5 seconds or 2.5 seconds, and the run voltage is selectable to any of 52 VAC, 73 VAC or 94 VAC.

The Low Speed Starter is not yet available for the Indico IQ generators.

The Low Speed Starter is integrated into the H.V. Auxiliary Board within the CMP 200® and CMP 200® DR generators. The phase-shift capacitor is chassis-mounted and may be changed in the field. The LSS part number corresponds to the value of capacitor installed. The boost time is software-configurable from the console or GenWare®. Note that these generators do not use a separate run voltage, instead cycling the boost voltage on/off as required. The boost duty cycle is not hardware-configurable.

The Low Speed Starter is a separate sub-assembly within mobile generator configurations. The boost voltage is 240 VAC, 60 Hz, 1.5 seconds boost time, and uses a 30µF phase-shift capacitor.

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TABLE 1: TUBE TYPES (LOW SPEED STARTER)						
TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
CGR (GE) Statorix 200A/240/260 (50/110 Ω stator)	MN640 M641 MN641 M643	94 VAC	2.5 sec	Indico 100 only	12.5 μF	732752-02
CGR (GE) Statorix 550 (50/110 Ω stator)	RN620 RN621	94 VAC	2.5 sec	Indico 100 only	12.5 μF	732752-02
Chirana Rotax KA 125 (20/50 Ω stator)	RIK-T 0.8/2.0 12/50 RIK-T 1.2/2.0 30/50	73 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Chirana Rotax KA 125 (20/20/20 Ω stator)		52 VAC	1.5 sec	Indico 100 only	100 μF, 52 mH Inductor	732752-04
Comet DO7 / DX7 (25/50 Ω stator)	DX7 DX71HS (See note 1)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Comet DO9 / DX9 (20/50 Ω stator)	DX9 DX91H / HS DX92H / HS DX93H / HS DX94HS DX96HS DX97HS (See note 1)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Comet D010 / DX10 (20/50 Ω stator)	DX10H / HS DX101H / HS DX104HS DX105HS DX106HS (See note 1)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Comet XSTAR (25/50 Ω stator)	XSTAR8 (XST-8) XSTAR74 (XST-74) XSTAR-WHIS	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Dunlee (Philips) DA10 series (20/50 Ω stator)	DA1002 DA1029 DA1036 DA1083 DA1092 DA1094 DU404 (0.6/1.25)	52 VAC	2.5 sec	Indico 100	45 μF (prefer)	732752-01
				50 or 60 Hz		
			2.0 sec	Indico 100	33 μF	732752-00
				60 Hz only		
			CMP 200	40 μF (prefer)	903836-01	
				50 or 60 Hz		
				CMP 200	30 μF	903836-00
				60 Hz only		

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Dunlee (Philips) DA90, DA90HS (36/44 Ω stator) (See note 2)	DU 1750 DU 3050 DU 2550 DU 33100	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Dunlee (Philips) DR1400 series (20/50 Ω stator)	DR1429 DR1436 DR1492 DR1494 DU404 (0.6/1.25)	52 VAC	2.5 sec	Indico 100 50 or 60 Hz	45 μF (prefer)	732752-01
				Indico 100 60 Hz only	33 μF	732752-00
			2.0 sec	CMP 200 50 or 60 Hz	40 μF (prefer)	903836-01
				CMP 200 60 Hz only	30 μF	903836-00
Dunlee (Philips) DR1800 series (36/44 Ω stator) (See note 2)	DR1817 DR1825 DR1833	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Dunlee (Picker / Philips) PX1300 series (3" anode) "S" stator (15/30 Ω)	PX1302 PX1312 PX1351 DU303 (1.0/2.0)	52 VAC	2.5 sec	Indico 100	33 μF	732752-00
			2.0 sec	CMP 200	30 μF	903836-00
Dunlee (Picker / Philips) PX1400 series (4" anode) "S" stator (15/30 Ω)	PX1402 PX1412 PX1415 PX1425 PX1429 PX1431 PX1436 PX1456 PX1463 PX1472 PX1473 PX1475 PX1482 PX1483 PX1492 PX1494 DU404 (0.6/1.25)	52 VAC	2.5 sec	Indico 100	33 μF	732752-00
			2.0 sec	CMP 200	30 μF	903836-00
Eureka (see Varian)						
GE Maxiray 75 (3" anode) (23/23 Ω equal impedance "E" stator) * Dunlee tube	MX-75 DU303 (1.0/2.0) * DU303 (0.6/1.2) *	73 VAC	1.5 sec	Indico 100	45 μF	732752-02
				CMP 200	40 μF	903836-01
GE Maxiray 100 (4" anode) (23/23 Ω equal impedance "E" stator)	MX-100	73 VAC	1.5 sec	Indico 100	45 μF	732752-02
				CMP 200	40 μF	903836-01
Gilardoni Rotagil S/AS	AR11-30 AR20-50 AR30-00-1 AR30-60 AR30-100 AR40-100 AR9000-1 AR9000-2	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Hangzhou Kailong (see Kailong RADII)						

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Hangzhou Wandong WANRAY (Polygala / Yuan Zhi) XD51-20.40/125 (LQ16-XA2) XD51-10.40/125 (LQ16-XA4) XD52-30.50/125 (LQ17-XB1)		52 VAC	1.5 sec	Indico 100	45 μ F	732752-02
				CMP 200	40 μ F	903836-01
IAE C30 (25/62 Ω stator)	RTM 70H X20P X22 X40	52 VAC	1.5 sec	Indico 100	33 μ F	732752-00
				CMP 200	30 μ F	903836-00
IAE C40 (33/64 Ω stator)	X39 X40 X42	52 VAC	1.5 sec	Indico 100	33 μ F	732752-00
				CMP 200	20 μ F	903836-02
IAE C52, C52 Super C100 C352 (20/40 Ω stator)	RTC 600HS RTC 700HS RTC 1000HS RTM 78H / HS RTM 90H / HS RTM 92H / HS RTM 101H / HS RTM 102H / HS RTM 780H / HS RTM 782H / HS X40 X50H X50AH	52 VAC	1.5 sec	Indico 100	33 μ F (prefer)	732752-00
					45 μ F	732752-02
				CMP 200	30 μ F (prefer)	903836-00
					40 μ F	903836-01
Kailong RADII H1064 H1065 H1066 (25/62 Ω stator)	KL64 KL65 KL66	52 VAC	1.5 sec	Indico 100	33 μ F	732752-00
				CMP 200	30 μ F	903836-00
Kailong RADII H1074 H1080 H1086 (20/50 Ω stator)	KL74 KL80 KL80A KL86	52 VAC	1.5 sec	Indico 100 50 or 60 Hz	33 μ F (prefer)	732752-00
				Indico 100 50 Hz only	45 μ F	732752-00
				CMP 200 50 or 60 Hz	30 μ F (prefer)	903836-00
				CMP 200 50 Hz only	40 μ F	903836-00
Kailong RADII H1076	KL76	52 VAC	1.5 sec	Indico 100	33 μ F	732752-00
				CMP 200	20 μ F	903836-02
Machlett (see Varian)						
Philips ROT350 ROT351 (36/44 Ω stator) (See note 2)* Dunlee tube ** NAGO tube *** Varian tube	RO 1230 RO 1750 / DU 1750* RO 2050 RO 2550 / DU 2550* RO 3050 / DU 3050* RO 33100 / DU 33100 * SRO 2250 GD6 3050 ** PG-256 *** PG-292 *** RAD-34 *** RAD-50 ***	52 VAC	1.5 sec	Indico 100	33 μ F	732752-00

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Picker (see Dunlee)						
Shimadzu CIRCLEX RX80 (7.5/35 Ω stator)	P18DE-85 P38E	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Shimadzu CIRCLEX RX150 (8.4/24 Ω stator)	P18DK	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Siemens Opti 150 "S" stator (14/18 Ω)	20/40 30/52R	52 VAC	2.5 sec	Indico 100	45 μF	732752-02
			2.0 sec	CMP 200	40 μF	903836-01
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Siemens (SXVT) RAY-6_1 RAY-8(S)_1 RAY-12(S)_1 RAY-14(S)_1 (1-phase only) (20/50 Ω stator)	SV 150/12/40-S SV 150/25/48-S SV 150/22/54-S SV 150/33/78R-S	73 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Siemens (SXVT) SDR (1-phase only) (20/50 Ω stator)	SDR 150/30/50-1	73 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	30 μF	903836-00
Siemens (SXVT) SV 150 "S" stator (1-phase only) (14/18 Ω)	SV 150/40/80C-100_1	52 VAC	2.5 sec	Indico 100	45 μF	732752-02
			2.0 sec	CMP 200	40 μF	903836-01
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Toshiba Rotanode	Toshiba x-ray tubes are identified by their "E" number, which is used to represent both the Tube Insert and the complete assembly. The housing number is usually not shown on the identification label. A specific "E" number may be available with several different stator types, each having different starter requirements. Furthermore, a specific stator type may require different starter requirements depending on the housing used. For ease of use, the Toshiba tubes are sorted by Tube Insert Type ("E" number) within this table. The installer must confirm the stator type for the planned tube(s). If the stator type is not identified within the Toshiba documentation, match the stator winding resistance to the appropriate table entry. Contact the factory if the desired Tube Type and stator type / winding resistance are not listed on the same row within this table.					
Toshiba Rotanode XH-121 XH-126 XH-150 XS-AV stator XS-RA stator (27.5/58 Ω)	E7132 E7239 E7240 E7242 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Toshiba Rotanode XH-106V XH-180 XH-181 XS-AL stator (9.4/28.3 Ω)	E7252 (See note 3)	52 VAC	1.5 sec	Indico 100 50 or 60 Hz	45 μF (prefer)	732752-02
				Indico 100 60 Hz only	33 μF	732752-00
				CMP 200 50 or 60 Hz	40 μF (prefer)	903836-01
				CMP 200 60 Hz only	30 μF	903836-00
Note: The starter boost voltage is 120 VAC (XS-AL stator only). This is only available with one-tube generators.						
Toshiba Rotanode XH-106V XH-180 XH-181 XS-RA stator (27.5/58 Ω)	E7252 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02
Toshiba Rotanode XH-157 XS-RB stator (20.2/38 Ω)	E7254 E7255 (See note 3)	94 VAC	1.5 sec	Indico 100 60 Hz only	33 μF	732752-00
				CMP 200 60 Hz only	30 μF	903836-00
Toshiba Rotanode XH-121 XH-126 XS-AV stator XS-RA stator (27.5/58 Ω)	E7299 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02
Toshiba Rotanode XH-106V XH-180 XS-AL stator (9.4/28.3 Ω)	E7813 (See note 3)	52 VAC	1.5 sec	Indico 100 50 or 60 Hz	45 μF (prefer)	732752-02
				Indico 100 60 Hz only	33 μF	732752-00
				CMP 200 50 or 60 Hz	40 μF (prefer)	903836-01
				CMP 200 60 Hz only	30 μF	903836-00
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Toshiba Rotanode XH-121 XS-BA stator (18/47.5 Ω)	E7843 (See note 3)	52 VAC	1.5 sec	Indico 100 50 or 60 Hz	45 μF	732752-02
				Indico 100 60 Hz only	33 μF	732752-00
				CMP 200 50 or 60 Hz	40 μF	903836-01
				CMP 200 60 Hz only	30 μF	903836-00

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Toshiba Rotanode XH-121 XH-126 XH-150 XS-RA stator (27.5/58 Ω)	E7861 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02
Toshiba Rotanode XH-112V XS-AG stator (9.4/28.3 Ω)	E7864 (See note 3)	52 VAC	1.5 sec	Indico 100	45 μF	Contact factory
				CMP 200	40 μF	Contact factory
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Toshiba Rotanode XH-121 XS-AV-stator XS-RA stator (27.5/58 Ω)	E7876 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02
Toshiba Rotanode XH-121 XH-126 XH-150 XS-AL stator (9.4/28.3 Ω)	E7884 (See note 3)	52 VAC	1.5 sec	Indico 100 50 or 60 Hz	45 μF (prefer)	732752-02
				Indico 100 60 Hz only	33 μF	732752-00
				CMP 200 50 or 60 Hz	40 μF (prefer)	903836-01
				CMP 200 60 Hz only	30 μF	903836-00
Note: The starter boost voltage is 120 VAC. This is only available with one-tube generators.						
Toshiba Rotanode XH-121 XH-126 XS-AV stator XS-RA stator (27.5/58 Ω)	E7886 (See note 3)	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
				CMP 200	20 μF	903836-02

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	RUN VOLTAGE (Indico only)	BOOST TIME	GENERATOR	SHIFT CAP.	LSS PART #
Varian (Machlett) Dynamax (DX) 52 "R" stator (16/50 Ω)	A-102	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	A-132 A-142			CMP 200	30 μF	903836-00
Varian (Machlett) Dynamax (DX) 62 "R" stator (23/56 Ω) Dynamax (DX) 62U cfg as "STD" or "R" stator (15/36 Ω)	A-192B	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	A-196 A-197 A-256 A-272 A-282 A-286 A-292 A-482 A-486			CMP 200	30 μF	903836-00
Varian B-100 "STD" stator (16/50 Ω)	A-102	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	A-132 / A-134* A-142 / A-144* A-145 * (See note 34)			CMP 200	30 μF	903836-00
Varian B-130 B-130H B-135H B-146 B-147 B-150 B-150H Std "R" stator (16/50 Ω)	A-152	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	A-182 / A-184* A-192 / A-194* A-195 A-196 A-197 A-252 A-272 / A-274* A-277 / A-278* A-282 / A-284* A-286 A-292 / A-294* A-482 G-242 G-256 G-292 / G-294* G-296 G-892 G-896 * (See note 4)			CMP 200	30 μF	903836-00
Varian (Eureka) Diamond Std "R" stator (20/50 Ω)	RAD-12	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	RAD-13 RAD-14 RAD-68			CMP 200	30 μF	903836-00
Varian (Eureka) Diamond Std "R" stator (20/50 Ω)	RAD-68	52 VAC	1.5 sec	Mobile	30 μF	904832-00
Varian (Eureka) Emerald Std "R" stator (20/50 Ω)	RAD-8	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	RAD-74			CMP 200	30 μF	903836-00
Varian (Eureka) Sapphire Std "R" stator (20/50 Ω)	RAD-21	52 VAC	1.5 sec	Indico 100	33 μF	732752-00
	RAD-40 RAD-44 RAD-56 RAD-60 RAD-92 RAD-94			CMP 200	30 μF	903836-00

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2.0 LOW SPEED STARTER TUBE SELECT TABLE (cont)

NOTE 1: Comet tube inserts with the prefix "DI" and "DX" are interchangeable.

NOTE 2: Philips / Dunlee housing with the windings connected in series (low-speed / high impedance configuration).

NOTE 3: Complete Toshiba tube assemblies include the suffix "X", "FX", "GX", or "JX", which are interchangeable with respect to rotor and anode characteristics.

NOTE 4: These X-ray tubes incorporate a control grid. Grid control is currently not supported by CPI generators. Connect the grid connection to Ground when using these tubes, and select the insert type within the Generator software corresponding to the equivalent non-grid tube.

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE

The Dual Speed Starter (DSS) synthesizes its output frequencies independently of the line frequency and will operate all tubes at 60/180 Hz, unless a particular tube only has published ratings to operate at 150 Hz. In this case, the starter will output 50/150 Hz when set for these tubes.

Unless indicated otherwise within Table 2, setting the switches to the code indicated for the applicable Tube Type selects all required operating parameters. The Dual Speed Starter part number corresponds to the AC line voltage and the configuration of phase-shift capacitors installed.

Reference notes are provided at the end of Table 2. Tube operating parameters for each switch code are contained in Table 3 for reference.

TABLE 2: TUBE TYPES (HIGH SPEED STARTER)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
CGR (GE) Statorix 200A/240/260 (50/110 Ω stator)	MN640 M641 MN641 M643	00111	LOW SPEED OPERATION ONLY (See note 1) Dual Speed Starters "-15" must be jumper-configured to provide the required 15.5 μF low speed shift capacitance. Please see note 10 before attempting to use this Dual Speed Starter configuration.	50 Hz	N/A	12.5μF to 15.5μF	733317-15 735925-15 (See note 10) 906716-23	904925-23	901297-15 901298-15 (See note 10) 906672-23
	MS740 MSN740 MSN742 RSN742	00111	HIGH SPEED OPERATION ONLY (See note 1) For Dual Speed operation, contact factory.	150 Hz	3 μF	12.5μF to 15.5μF	733317-15 735925-15 (See note 10) 906716-23	904925-23	901297-15 901298-15 (See note 10) 906672-23
CGR (GE) Statorix 550 (50/110 Ω stator)	RN620 RN621	00111	LOW SPEED OPERATION ONLY (See note 1) Dual Speed Starters "-15" must be jumper-configured to provide the required 15.5 μF low speed shift capacitance. Please see note 10 before attempting to use this Dual Speed Starter configuration.	50 Hz	N/A	12.5μF to 15.5μF	733317-15 735925-15 (See note 10) 906716-23	904925-23	901297-15 901298-15 (See note 10) 906672-23
	RSN722	00111	HIGH SPEED OPERATION ONLY (See note 1) For Dual Speed operation, contact factory.	150 Hz	3 μF	12.5μF to 15.5μF			

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Chirana Rotax KA 125 (20/50 Ω stator, single phase)	RIK-T	10101	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Comet DO7 / DX7 (25/50 Ω stator)	DX7 DX71HS (See note 3)	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Comet DO9 / DX9 (20/50 Ω stator)	DX9 DX91H / HS DX92H / HS DX93H / HS DX94HS DX96HS DX97HS (See note 3)	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Comet DO10 / DX10 (20/50 Ω stator)	DX10H (See note 3)	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
	DX10HS DX104HS (See note 3)	00011	None	50/150 Hz	6 μ F	30 μ F to 36 μ F			
	DX105HS DX106HS (See note 3)	10011	None	50/150 Hz	6 μ F	30 μ F to 36 μ F			

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Comet DO700 / DX700 (25/50 Ω stator)	DX700HS (See note 3)	10011	None	50/150 Hz	6 μ F	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Dunlee (Philips) DA10 series (20/50 Ω stator)	DA1002 DA1029 DA1036 DA1083 DA1092 DA1094 DU404 (0.6/1.25)	00100	None	60/180 Hz	6 μ F	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Dunlee (Philips) DA90 DA90HS (36/44 Ω stator) (See note 4)	DU 1750 DU 3050 DU 2550 DU 33100 (See note 6)	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F	733317-13 735925-13 906716-21 906716-23	904556-13 903255-13 904925-21 904925-23	901297-13 901298-13 906672-21 906672-23
Dunlee (Philips) DA90 DA90HS (9/11 Ω stator) (See note 5)	DU 1750 DU 3050 (See note 6)	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	37.5 μ F	733317-16 735925-16 733317-17	904925-21 904925-23	901297-16 901298-16 906672-21 906672-23
	DU 2550 (See note 6)	10010	None	60/180 Hz	12.5 μ F	37.5 μ F	735925-17 906716-21 906716-23		
	DU 33100 (See note 6)	10010	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	12.5 μ F	37.5 μ F			
Dunlee (Philips) DR1400 (20/50 Ω stator)	DR1429 DR1436 DR1492 DR1494 DU404 (0.6/1.25)	00100	None	60/180 Hz	6 μ F	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Dunlee (Philips) DR 1800 (19/22 Ω stator) (See note 4)	DR1817	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30µF to 32µF	733317-13 735925-13 906716-21 906716-22 906716-23	904556-13 903255-13 904925-21 904925-22 904925-23	901297-13 901298-13 906672-21 906672-22 906672-23
Dunlee (Philips) DR 1800 (9/11 Ω stator) (See note 5)	DR1817	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	37.5µF	733317-16 735925-16	904925-21 904925-23	901297-16 901298-16
	DR1825	10010	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	12.5µF	37.5µF	733317-17 735925-17		906672-21 906672-23
	DR1833	10010	None	60/180 Hz	12.5µF	37.5µF	906716-21 906716-23		
Dunlee (Picker / Philips) PX1300 3" anode "S" stator (15/30 Ω)	PX1302 PX1312 PX1351 DU303 (1.0/2.0)	11100	None	60/180 Hz	6 µF	30 µF to 36 µF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Dunlee (Picker / Philips) PX1400 series 4" anode "S" stator (15/30 Ω)	PX1402 PX1412 PX1415 PX1425 PX1429 PX1431 PX1436 PX1456 PX1463 PX1472 PX1473 PX1475 PX1482 PX1483 PX1492 PX1494 DU404 (0.6/1.25)	10000	None	60/180 Hz	6 µF	30 µF to 36 µF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Dunlee (Picker / Philips) PX1400 series 4" anode "Q" stator (6/12 Ω)	PX1402 PX1412 PX1415 PX1425 PX1429 PX1431 PX1436 PX1456 PX1463 PX1472 PX1473 PX1482 PX1483 PX1492 PX1494 DU404 (0.6/1.25)	10110	None	60/180 Hz	20 µF	60 µF to 62 µF	733317-02 735925-02 906716-22	904925-22	901297-02 901298-02 906672-22

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Eureka (see Varian)									
GE Maxiray 75 (3" anode) 23/23 Ω equal impedance "E" stator * Dunlee tube	MX-75 DU303 (1.0/2.0) * DU303 (0.6/1.2) *	01110	None	60/180 Hz	7.5 μ F	36 μ F to 37.5 μ F	733317-12 735925-12 906716-21	904556-12 903255-12 904925-21	901297-12 901298-12 906672-21
GE Maxiray 100 (4" anode) 23/23 Ω equal impedance "E" stator	MX-100	00101	None	60/180 Hz	7.5 μ F	36 μ F to 37.5 μ F	733317-12 735925-12 906716-21	904556-12 903255-12 904925-21	901297-12 901298-12 906672-21
Gilardoni Rotagil (33/36 Ω stator)	AR11-30 AR30-60	01101	LOW SPEED OPERATION ONLY (See note 1)	50 Hz	N/A	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Gilardoni Rotagil A/A5 (33/36 Ω stator)	AR20-50 AR30-100 AR40-100	01101	None	50/150 Hz	6 μ F	30 μ F to 36 μ F	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
IAE C30 (25/62 Ω stator)	X20P X22 X40	01010	LOW SPEED OPERATION ONLY (See note 1)	50 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13	904556-12 903255-12 904556-13 903255-13	901297-12 901298-12 901297-13 901298-13
	RTM 70H	01010	None	50/150 Hz	6 μF	30 μF to 36 μF	906716-21 906716-22 906716-23	904925-21 904925-22 904925-23	906672-21 906672-22 906672-23
IAE C40 (33/64 Ω stator)	X39 X40 X42	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-01 735925-01 733317-13 735925-13 906716-21 906716-22 906716-23 *	904556-13 903255-13 904925-21 904925-22 904925-23 * * Preferred	901297-13 901298-13 906672-21 906672-22 906672-23 * * Preferred
IAE C52 C52 Super C100 C352 (20/40 Ω stator)	RTM 78H RTM 90H RTM 92H RTM 101H RTM 102H RTM 780H RTM 782H X39 X40 X42 X50H X50AH	11011	LOW SPEED OPERATION ONLY (See note 1)	50 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22
	RTC 600HS RTC 700HS RTC 1000HS RTM 78HS RTM 90HS RTM 92HS RTM 101HS RTM 102HS RTM 780HS RTM 782HS	11011	None		50/150 Hz	5 μF	30 μF	733317-13 735925-13 733317-17 735925-17 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Machlett (see Varian)									
Philips ROT 350 ROT 351 (36/44 Ω stator) (See note 4) * Dunlee tube (See note 6) ** NAGO tube *** Varian tube	RO 1230 RO 1750 RO 2050 RO 3050 SRO 2250 DU 1750 * DU 3050 * GD6 3050 ** PG-256 *** PG-292 *** RAD-34 *** RAD-50 ***	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μ F to 32 μ F	733317-13 735925-13 906716-21 906716-22 906716-23	904556-13 903255-13 904925-21 904925-22 904925-23	901297-13 901298-13 906672-21 906672-22 906672-23
Philips ROT 350 ROT 351 (9/11 Ω stator) (See note 5) * Dunlee tube (See note 6) *** Varian tube	RO 1230 RO 1750 RO 3050 DU 1750 * DU 3050 *	10010	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	37.5 μ F	733317-16 735925-16 733317-17 735925-17 906716-21 906716-23	904925-21 904925-23	901297-16 901298-16 906672-21 906672-23
	RO 2050 SRO 2250 PG-256 *** PG-292 *** RAD-34 *** RAD-50 ***	10010	None	60/180 Hz	12.5 μ F	37.5 μ F			
	RO 2550 RO 33100 SRO 1330 DU 2550 * DU 33100 *	10010	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	12.5 μ F	37.5 μ F			

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Philips ROT 500 ROT 501 (9/11 Ω stator)	SRM 0310	01111	None	60/180 Hz	12.5μF	37.5μF	733317-16 735925-16	904925-21 904925-23	901297-16 901298-16
	SRM 1080 SRM 35100	01111	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	12.5μF	37.5μF	733317-17 735925-17 906716-21 906716-23		906672-21 906672-23
Picker (see Dunlee)									
Shimadzu (Circlex) RX80 RX81 RX82 (7.5/35 Ω stator)	P18DE-85	00001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
	P33D P38D P38DE-85	00001	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Shimadzu (Circlex) RX100	P38E	00001	None	60/180 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Shimadzu (Circlex) RX150 (8.4/24 Ω stator)	P18DK	00001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
	P38DK P324DK	00001	HIGH SPEED OPERATION ONLY (See note 1)	180 Hz	5 μF	30 μF			

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Siemens Biangulix "S" stator (1-phase only) (14/18 Ω)	BI 125/20/40 BI 125/30/50 BI 150/30/50 BI 150/30/52R	11101	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens Opti-150 "S" stator (1-phase only) (14/18 Ω) * Varian tube	150/30/52R 150/40/72C 150/12/50 150/40/80 150/30/50 150/40/102C SG-796B *	11101	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens OptiTop "S" stator (1-phase only) (14/18 Ω) * Varian tube	150/40/80HC- 100L 150/40/80HC- 102L SG-1096 *	11101	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens Optilix "S" stator (1-phase only) (14/18 Ω)	150/30/50C-100L 150/40/80C-100L	11101	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens Megalix Siemens SV 125 "S" stator (1-phase only) (14/18 Ω)	125/30/82CM- 120LW 125/40/82CM- 120LW	00010	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	6 μF	30 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Siemens SV 150 "S" stator (1-phase only) (14/18 Ω)	SV 150/30/50C- 100L	11101	HIGH SPEED OPERATION ONLY (See note 1)	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22

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TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Siemens SV 150 "S" stator (1-phase only) (14/18 Ω)	SV 150/40/80C- 100L	11101	None	60/180 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens (SXVT) RAY-6_1 RAY-8(S)_1 RAY-12(S)_1 (1-phase only) (20/50 Ω stator)	SV 150/12/40-S SV 150/25/48-S SV 150/22/54-S	11111	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF	733317-13 735925-13 906716-21 906716-22 906716-23	904556-13 903255-13 904925-21 904925-22 904925-23	901297-13 901298-13 906672-21 906672-22 906672-23
Siemens (SXVT) RAY-13(S)_1 RAY-14(S)_1 (1-phase only) (20/50 Ω stator)	SV 150/33/78R-S	11111	None	60/180 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens (SXVT) SDR (1-phase only) (20/50 Ω stator)	SDR 150/30/50-1	11111	None	60/180 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Siemens (SXVT) SV 150 "S" stator (1-phase only) (14/18 Ω)	SV 150/40/80C- 100_1 (See note 7)	11101	None	150 Hz	5 μF	30 μF	733317-13 735925-13 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Toshiba Rotanode	Most Toshiba x-ray tubes are identified by their "E" number, which is used to represent both the Tube Insert and the complete assembly. The housing number is usually not shown on the identification label. A specific "E" number may be available with several different stator types, each having different starter requirements. Furthermore, a specific stator type may require different starter requirements depending on the housing used. For ease of use, the Toshiba tubes are sorted by Tube Type ("E" number) within this table. The installer must confirm the stator type for the planned tube(s). If the stator type is not identified within the Toshiba documentation, match the stator winding resistance to the appropriate table entry. Contact the factory if the desired Tube Type and stator type / winding resistance are not listed on the same line within this table.								
Toshiba XH-112V-2 XH-112W XS-AA stator XS-AG stator (9.4/28.3 Ω)	DRX-3624H DRX-3724H DRX-4634H	10001	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-121 XH-126 XH-150 XS-AV stator XS-RA stator (27.5/58 Ω)	E7132 E7239 E7240 E7242 (See note 8)	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 * * Preferred	904556-13 903255-13 904925-21 904925-22 904925-23 * * Preferred	901297-13 901298-13 906672-21 906672-22 906672-23 * * Preferred
Toshiba XH-112V XS-AG stator (9.4/28.3 Ω)	E7250 (See note 8)	10001	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Toshiba XH-106V XH-180 XH-181 XS-AL stator (9.4/28.3 Ω)	E7252 (See note 8)	10111	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-106V XH-180 XH-181 XS-RA stator (27.5/58 Ω)	E7252 (See note 8)	11001	Dual Speed Starters "-15" must be jumper-configured to provide the required 28 μF low speed shift capacitance. <i>Please refer to note 10 before attempting to use this Dual Speed Starter configuration.</i>	60/180 Hz	3 μF	23 μF to 28 μF	733317-15 735925-15 (See note 10) 906716-23	904925-23	901297-15 901298-15 (See note 10) 906672-23
			LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 *	904556-13 903255-13 904925-21 904925-22 904925-23 *	901297-13 901298-13 906672-21 906672-22 906672-23 *
Toshiba XH-157 XS-RB stator (20.2/38 Ω)	E7254 E7255 (See note 8)	10101	None	60/180Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-121 XH-126 XS-AV stator XS-RA stator (27.5/58 Ω)	E7299 (See note 8)	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 *	904556-13 903255-13 904925-21 904925-22 904925-23 *	901297-13 901298-13 906672-21 906672-22 906672-23 *

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Toshiba XH-106V XH-180 XS-AL stator (9.4/28.3 Ω)	E7813 (See note 8)	10111	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-121 XS-BA stator (18/47.5 Ω)	E7843 (See note 8)	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-121 XH-126 XH-150 XS-RA stator (27.5/58 Ω)	E7861 (See note 8)	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 * * Preferred	904556-13 903255-13 904925-21 904925-22 904925-23 * * Preferred	901297-13 901298-13 906672-21 906672-22 906672-23 * * Preferred
Toshiba XH-112V XS-AG stator (9.4/28.3 Ω)	E7864 E7869 (See note 8)	10001	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Toshiba XH-121 XS-AV stator XS-RA stator (27.5/58 Ω)	E7876 (See note 8)	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 * * Preferred	904556-13 903255-13 904925-21 904925-22 904925-23 * * Preferred	901297-13 901298-13 906672-21 906672-22 906672-23 * * Preferred
Toshiba XH-121 XH-126 XH-150 XS-AL stator (9.4/28.3 Ω)	E7884 (See note 8)	10111	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Toshiba XH-121 XS-126 XS-AV stator XS-RA stator (27.5/58 Ω)	E7886 (See note 8)	11001	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	20 μF to 30 μF	733317-13 735925-13 906716-21 906716-22 906716-23 * * Preferred	904556-13 903255-13 904925-21 904925-22 904925-23 * * Preferred	901297-13 901298-13 906672-21 906672-22 906672-23 * * Preferred

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Varian/Machlett Dynamax 52 Std "R" stator (16/50 Ω)	A-102 A-132 A-142	00000	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian/Machlett Dynamax 62 "STD" stator (23/56 Ω) Dynamax 62U configured as "STD" or "R" (15/36 Ω)	A-192B A-196 A-197 A-256 A-272 A-282 A-286 A-292 A-482 A-486	00000 10000	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian B-100 "R" stator (16/50 Ω)	A-102 A-132 / A-134* A-142 / A-144* * (See note 9) A-145	00000 01000	None LOW SPEED OPERATION ONLY (See note 1)	60/180 Hz 60 Hz	6 μF N/A	30 μF to 36 μF 30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian B-100 "Q" stator (8/15 Ω)	A-102 A-132 / A-134* A-142 / A-144* * (See note 9)	11010	None	60/180 Hz	20 μF	60 μF to 62 μF	733317-02 735925-02 906716-22	904925-22	901297-02 901298-02 906672-22

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Varian B-130 B-130H B-135H B-146 B-147 B-150 B-150H "R" stator (16/50 Ω)	A-152 A-182 / A-184* A-192 / A-194* A-195 A-196 A-197 * (See note 9)	00000	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian B-130 B-130H B-135H B-150 B-150H "Q" stator (6/11 Ω)	A-152 A-182 / A-184* A-192 / A-194* A-195 / A-196 A-197 / A-252 A-272 / A-274* A-277 / A-278* A-282 / A-284 * A-286 A-292 / A-294* A-482 G-242 G-256 G-292 / G-294* G-296 RAD-60 * (See note 9)	00110	None	60/180 Hz	20 μF	60 μF to 62 μF	733317-02 735925-02 906716-22	904925-22	901297-02 901298-02 906672-22

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Varian B-160 B-160H B-165H "R" Stator (16/50 Ω)	G-1077 G-1078 G-1080 G-1082 / G-1084* G-1086 / G-1087* G-1092 / G-1094* * (See note 9)	11110	May use CODE 11000 for shorter exposure delay during high-speed boost. Consult factory.	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian B-180 B-180H B-185 B-185H "R" Stator (16/50 Ω)	G-1582 G-1592 G-1593	11110	May use CODE 11000 for shorter exposure delay during high-speed boost. Consult factory.	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian B-199 "S" Stator (15/18 Ω)	SG-1096	01001	None	50/150 Hz	5 μF	30 μF	733317-13 735925-13 733317-17 735925-17 906716-21 906716-22	904556-13 903255-13 904925-21 904925-22	901297-13 901298-13 906672-21 906672-22
Varian B-240H "R" Stator (14/46 Ω)	G-2090	01100	None	100 / 180 Hz	6 μF	12.5μF to 20μF	733317-16 735925-16 906716-21 906716-22 906716-23	904925-21 904925-22 904925-23	901297-16 901298-16 906672-21 906672-22 906672-23
Varian (Eureka) Diamond "R" stator (20/50 Ω)	RAD-12	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13	904556-12 903255-12 904556-13 903255-13	901297-12 901298-12 901297-13 901298-13
	RAD-13 RAD-14 RAD-68	00000	None	60/180 Hz	6 μF	30 μF to 36 μF	906716-21 906716-22 906716-23	904925-21 904925-22 904925-23	906672-21 906672-22 906672-23

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

TUBE TYPE (HOUSING)	TUBE TYPE (INSERT)	CODE Switches 1.....5	OPERATING NOTES (SEE TABLE 3 FOR OPERATING PARAMETERS)	OUTPUT FREQ.	H.S. SHIFT CAP.	L.S. SHIFT CAP.	INDICO 100 DSS PART NO. (See note 2)	INDICO IQ DSS PART NO. (See note 2)	CMP 200 DSS PART NO. (See note 2)
Varian (Eureka) Emerald "R" stator (20/50 Ω)	RAD-8 RAD-74	00000	LOW SPEED OPERATION ONLY (See note 1)	60 Hz	N/A	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23
Varian (Eureka) Sapphire "R" stator (20/50 Ω) * For "Q" stator, refer to B-130 housing	RAD-21 RAD-40 RAD-44 RAD-56 RAD-60 * RAD-92 RAD-94	10100	None	60/180 Hz	6 μF	30 μF to 36 μF	733317-12 735925-12 733317-13 735925-13 906716-21 906716-22 906716-23	904556-12 903255-12 904556-13 903255-13 904925-21 904925-22 904925-23	901297-12 901298-12 901297-13 901298-13 906672-21 906672-22 906672-23

NOTE 1: Tube types designated as low speed only or high speed only must be programmed for low speed only or high speed only operation. Refer to the section **Tube Selection** within Chapter 3 of the applicable generator service manual for details. For some tubes listed as high speed only, the starter may be capable of low speed operation but the Manufacturer's data sheet for the Insert lists high speed only. In other cases, the limitation is due to operational limitations of the Dual Speed Starter itself.

NOTE 2: Dual Speed Starter part numbers 733317-XX (Indico 100), 904556-XX (Indico IQ) and 901297-XX (CMP 200® DR) are used in 400 VAC 3φ generators / power supplies and in 480 VAC 3φ generators / power supplies with a line adjusting transformer.

Dual Speed Starter part numbers 735925-XX (Indico 100), 903255-XX (Indico IQ) and 901298-XX (CMP 200® DR) are used in 230 VAC 1φ generators / power supplies and in 480 VAC 3φ direct input generators / power supplies (using no line adjusting transformer).

Dual Speed Starter part numbers 906716-XX (Indico 100), 904925-XX (Indico IQ) and 906672-XX (CMP 200® DR) are used in both 400 VAC and 480 VAC 3φ generators. These RoHS-compliant Starters replace the existing 733317-XX / 735925-XX series (Indico 100), 904556-XX / 903255-XX series (Indico IQ) and 901297-XX / 901298-XX series (CMP 200® DR) and provide a greater selection of available shift capacitance.

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

Where more than one Dual Speed Starter part number is referenced for a particular tube type, any of these (applicable to the generator and input voltage) is acceptable. For 2-tube systems using different tube types, both tube types must be considered. Where available, the XXXXXX-21 starter is generally preferred, unless otherwise indicated in the tables.

The Dual Speed Starters provide a selection of shift capacitance values for both high speed and low speed operation, as identified by the DSS part number suffix ("tab type"). Unless otherwise specified, capacitor selection is made automatically by relays located on the Dual Speed Starter board. The following table lists the capacitance values provided, along with applicable notes.

DSS Part No.	HIGH-SPEED SHIFT CAPACITANCE	LOW-SPEED SHIFT CAPACITANCE	COMMENTS
XXXXXX-01 (obsolete, Indico 100 only)	6 μ F	31 μ F	May be replaced by XXXXXX-21 in all configurations.
XXXXXX-02 (All except Indico IQ)	20 μ F	40 μ F	Typically used to support "Q" stator tubes. May be replaced by XXXXXX-22 in all configurations.
XXXXXX-12 (All except Indico IQ)	6 μ F, 7.5 μ F	36 μ F, 37.5 μ F	May be replaced by XXXXXX-21 in all configurations.
XXXXXX-13 (All except Indico IQ)	5 μ F, 6 μ F	30 μ F	May be replaced by XXXXXX-21 in all configurations.
XXXXXX-15 (All except Indico IQ)	3 μ F, 6 μ F	15.5 μ F, 18.5 μ F or 28 μ F, 31 μ F (manually selected)	Typically used to support CGR (GE) Statorix or Toshiba E7252 (XS-R/RA) tubes. May be replaced by XXXXXX-23 in all configurations. Manual configuration required; see Note 10.
XXXXXX-16 (All except Indico IQ)	6 μ F, 12.5 μ F	12.5 μ F, 31.5 μ F, 37.5 μ F	Used to support Philips ROT350/500 tubes. May be used in place of Dual Speed Starters "-12" or "-13" in two-tube systems that include both a standard "R" stator tube (6 μ F high speed shift capacitance) and a Philips ROT 350/500 tube. All such configurations may be replaced by XXXXXX-21.
XXXXXX-17 (Indico 100 only)	5 μ F, 12.5 μ F	30 μ F, 37.5 μ F	Used in place of Dual Speed Starter "-13" in two-tube systems that include both a standard "R" stator tube (6 μ F of high speed shift capacitance) and an IAE tube (5 μ F of high speed shift capacitance). All such configurations may be replaced by XXXXXX-21. Do not use these starters in place of XXXXXX-13 with Siemens tubes due to high-speed shift capacitor voltage limitations.
XXXXXX-21	5 μ F, 6 μ F, 7.5 μ F, 12.5 μ F	12.5 μ F, 30 μ F, 37.5 μ F	Generally preferred, unless otherwise indicated within the tables.
XXXXXX-22	5 μ F, 6 μ F, 20 μ F	20 μ F, 30 μ F, 62.5 μ F	Typically used to support "Q" stator tubes. Preferred over XXXXXX-02.
XXXXXX-23	3 μ F, 6 μ F, 12.5 μ F	23 μ F, 32.5 μ F	Typically used to support CGR (GE) Statorix or Toshiba E7252 (XS-R/RA) tubes. Preferred over XXXXXX-15.

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3.0 DUAL SPEED STARTER TUBE SELECT TABLE (cont)

- NOTE 3: Comet tube inserts with the prefix “DI” and “DX” are interchangeable.
- NOTE 4: Philips / Dunlee housing with the windings connected in series (low-speed / high impedance configuration).
- NOTE 5: Philips / Dunlee housing with the windings connected in parallel (high-speed / low impedance configuration).
- NOTE 6: Dunlee tube inserts with the prefix “DU” and Philips tube inserts with the prefix “RO” are interchangeable. Select the corresponding Philips insert type within the Generator software if the Dunlee type is not available.
- NOTE 7: Siemens (SXVT) housing with the “phase-shifted” windings connected in parallel (low impedance, high speed configuration).
- NOTE 8: Complete Toshiba x-ray tube assemblies include the suffix “X”, “FX”, “GX”, or “JX”, which are interchangeable with respect to rotor and anode characteristics.
- NOTE 9: These X-ray tubes incorporate a control grid. Grid control is currently not supported by CPI generators. Connect the grid connection to Ground when using these tubes, and select the insert type within the Generator software corresponding to the equivalent non-grid tube.
- NOTE 10: Dual Speed Starters 733317-15 / 735925-15 (Indico 100) and 901297-15 / 901298-15 (CMP 200® DR) have jumper selectable phase shift capacitance that allows selection of 15.5 μF or 28 μF low speed shift capacitors for operation with CGR (GE) Statorix or Toshiba E7252 (XS-R/RA stator) tubes, respectively, as per table 2. **By default, this starter is factory set to the 28 μF position. Confirm proper configuration per the section “Configuring Dual Speed starter 733317-15 / 735925-15” in chapter 2 before proceeding.** These starters also support standard “R” stators that require 6 μF of high speed shift capacitance.

(Indico 100 only): If configured for 28 μF of low speed capacitance, these Dual Speed Starters also support tubes listed in Table 2 as requiring Dual Speed Starters 733317-13 / 735925-13 and requiring 6 μF of high speed capacitance. For two-tube operation, this configuration will support:

- a) These tubes and the Toshiba E7252/XS-RA (high and low speed) simultaneously, or;
- b) These tubes and a CGR Statorix tube (high-speed only) simultaneously.
- c) The Toshiba E7252/XS-RA and a CGR tube simultaneously if one or both of these tubes is operated in high-speed mode only.

(CMP 200® DR only): If configured for 28 μF low speed capacitance, these Dual Speed Starters also support tubes listed in Table 2 as requiring Dual Speed Starters 901297-13 / 901298-13 and requiring 6 μF of high speed capacitance.

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3.1 DUAL SPEED STARTER TUBE CODES

Tube operating parameters for each tube type are selected by setting switches to the applicable Code, as indicated in Table 2. For reference, operating parameters applicable to each Code are contained in Table 3 below.

Reference notes are provided at the end of Table 3.

TABLE 3: TUBE TYPE CODES (HIGH SPEED STARTER)

CODE Switches 1.....5	TUBE TYPE (CODE)	H.S. START VOLTS	H.S. RUN VOLTS	H.S. BOOST TIME	H.S. FREQ.	H.S. BRAKE VOLTS	H.S. BRAKE TIME	L.S. START VOLTS	L.S. RUN VOLTS	L.S. BOOST TIME	L.S. FREQ. Hz	H.S. SHIFT CAP.	APPLICABLE DSS TYPES (See note 1)
00000	0	400 V	100 V	1.4 sec	180 Hz	100 V	3.0 sec	240 V	60 V	1.4 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
10000	1	400 V	100 V	1.9 sec	180 Hz	100 V	3.0 sec	240 V	70 V	1.9 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
01000	2	400 V	100 V	1.0 sec	180 Hz	100 V	3.0 sec	240 V	60 V	1.0 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
11000	3	400 V	100 V	5.0 sec*	180 Hz	150 V	3.0 sec	240 V	70 V	5.0 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23 * (2.5 sec Ready)
00100	4	420 V	70V	2.5 sec	180 Hz	170 V	3.0 sec*	240 V	50 V	1.6 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23 * (LS braking 0.8 sec)
10100	5	400 V	100 V	2.3 sec	180 Hz	100 V	3.0 sec	240 V	50 V	2.3 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
01100	6	440 V	140 V	6.0 sec*	180 Hz	250 V	4.0 sec**	400 V	110 V	5.0 sec	100 Hz	6 μ F ***	-16, -21, * (5.0 sec Ready) -22, -23 ** (LS braking 2.0s) *** (12.5 μ F-20 μ F L.S. cap.)
11100	7	240 V	120 V	2.3 sec	180 Hz	100 V	3.0 sec	240 V	50 V	2.3 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
00010	8	400 V	90 V	3.0 sec	150 Hz	100 V	3.0 sec	240 V	100 V	1.5 sec	50 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
10010	9	280 V	60 V	1.5 sec	180 Hz	80 V	3.0 sec	180 V	50 V	1.5 sec	60 Hz	12.5 μ F	-12 (LS only), -16, -17, -21, -23, -22 (LS only)
01010	10	440 V	100 V	0.8 sec	150 Hz	120 V	1.8 sec	220 V	50 V	0.6 sec	50 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23
11010	11	290 V	70 V	0.8 sec	180 Hz	60 V	3.0 sec	150 V	50 V	0.8 sec	60 Hz	20 μ F	-02, -22
00110	12	290 V	60/80V	1.3 sec	180 Hz	60 V	3.0 sec	150 / 180 V	50 V	1.3 sec	60 Hz	20 μ F	-02, -22
10110	13	340 V	60 V	1.0 sec	180 Hz	100 V	3.0 sec	240 V	70 V	1.0 sec	60 Hz	20 μ F	-02, -22
01110	14	400 V	90 V	0.9 sec	180 Hz	80 V	2.0 sec	230 V	70 V	0.9 sec	60 Hz	7.5 μ F	-12, -21
11110	15	400 V	100 V	5.0 sec	180 Hz	150 V	3.0 sec	240 V	70 V	5.0 sec	60 Hz	6 μ F	-12, -13, -15, -16, -21, -22, -23

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CODE Switches 1.....5	TUBE TYPE (CODE)	H.S. START VOLTS	H.S. RUN VOLTS	H.S. BOOST TIME	H.S. FREQ.	H.S. BRAKE VOLTS	H.S. BRAKE TIME	L.S. START VOLTS	L.S. RUN VOLTS	L.S. BOOST TIME	L.S. FREQ. Hz	H.S. SHIFT CAP.	APPLICABLE DSS TYPES (See note 1)
00001	16	340 V	80 V	1.6 sec	180 Hz	80 V	3.0 sec	150 V	50 V	1.6 sec	60 Hz	5 µF	-13, -17, -21, -22, -23 (LS only)
10001	17	320 V	80 V	2.3 sec	180 Hz	100 V	3.0 sec	200 V	50 V	1.5 sec	60 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
01001	18	400 V	100 V	2.8 sec	150 Hz	120 V	3.0 sec	180 V	60 V	1.5 sec	50 Hz	5 µF	-13, -17, -21, -22, -23 (LS only)
11001	19	320 V	130 V	2.0 sec	180 Hz	130 V	3.0 sec	240 V	60 V	1.4 sec	60 Hz	3 µF	-12, -13, -16, -21, -22 (all LS only), -15, -23
00101	20	400 V	90 V	1.0 sec	180 Hz	80 V	3.0 sec	230 V	70 V	1.0 sec	60 Hz	7.5 µF	-12, -21
10101	21	420 V	100 V	2.2 sec	180 Hz	150 V	3.0 sec	240 V	80 V	1.8 sec	60 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
01101	22	340 V	60 V	1.4 sec	150 Hz	120 V	4.0 sec	220 V	60 V	1.5 sec	50 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
11101	23	360 V	90 V	1.6 sec	150 Hz	80 V	3.0 sec	150 V	50 V	1.6 sec	50 Hz	5 µF	-13, -21, -22, -23 (LS only)
00011	24	420 V	80 V	1.8 sec	150 Hz	150 V	3.0 sec	240 V	80 V	1.8 sec	50 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
10011	25	420 V	80 V	2.2 sec	150 Hz	150 V	3.0 sec	240 V	80 V	1.8 sec	50 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
01011	26	400 V	80 V	1.0 sec	150 Hz	120 V	3.0 sec	240 V	80 V	1.0 sec	50 Hz	5 µF	Reserved
11011	27	440 V	100 V	1.1 sec	150 Hz	120 V	1.8 sec	220 V	80 V	1.1 sec	50 Hz	5 µF	-13, -17, -21, -22, -23 (LS only)
00111	28	450 V	150 V	3.0 sec	150 Hz	120 V	3.0 sec	240 V	90 V	3.0 sec	50 Hz	3 µF	-15, -21 (LS only), -23
10111	29	240 V	60 V	2.2 sec	180 Hz	80 V	1.6 sec	130 V	50 V	1.3 sec	60 Hz	6 µF	-12, -13, -15, -16, -21, -22, -23
01111	30	420 V	50 V	1.8 sec	180 Hz	150 V	3.0 sec*	240 V	50 V	1.8 sec	60 Hz	12.5 µF	-16, -17, -21, -23 * (LS braking 1.2 sec)
11111	31	330V	80 V	1.4 sec	180 Hz	70V	3.0 sec	240 V	80 V	1.4 sec	60 Hz	5 µF	-13, -21, -22, -23 (LS only)

THE DUAL SPEED STARTER USES MODULATION STRATEGIES TO OBTAIN THE DESIRED OUTPUTS. MEASURED VOLTAGES MAY NOT AGREE WITH THOSE LISTED IN THE TABLE. HOWEVER, THE CURRENTS FLOWING IN THE STATOR WINDINGS ARE EQUIVALENT TO THOSE THAT WOULD EXIST IF THE STATOR WAS EXCITED WITH THESE VOLTAGES.

NOTE 1: Tube Type codes should only be used with the applicable DSS types specified in this table.
Refer to Table 2 for DSS Part Numbers applicable to each Tube Type (Housing and Insert).

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