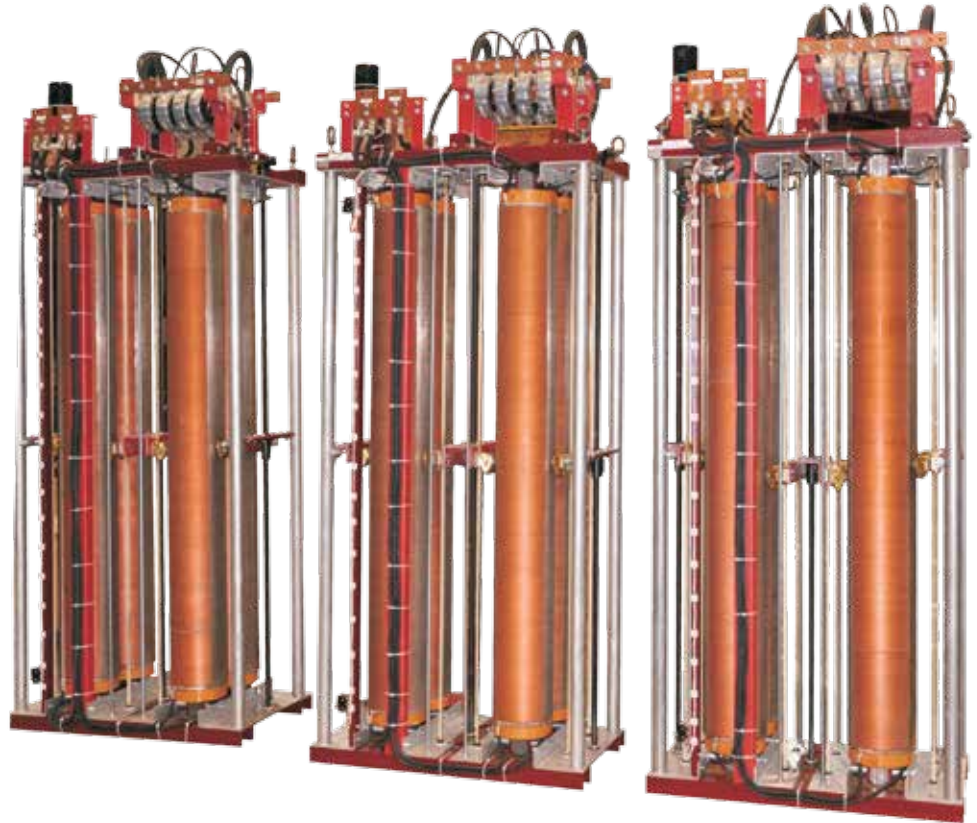


Voltage Regulators

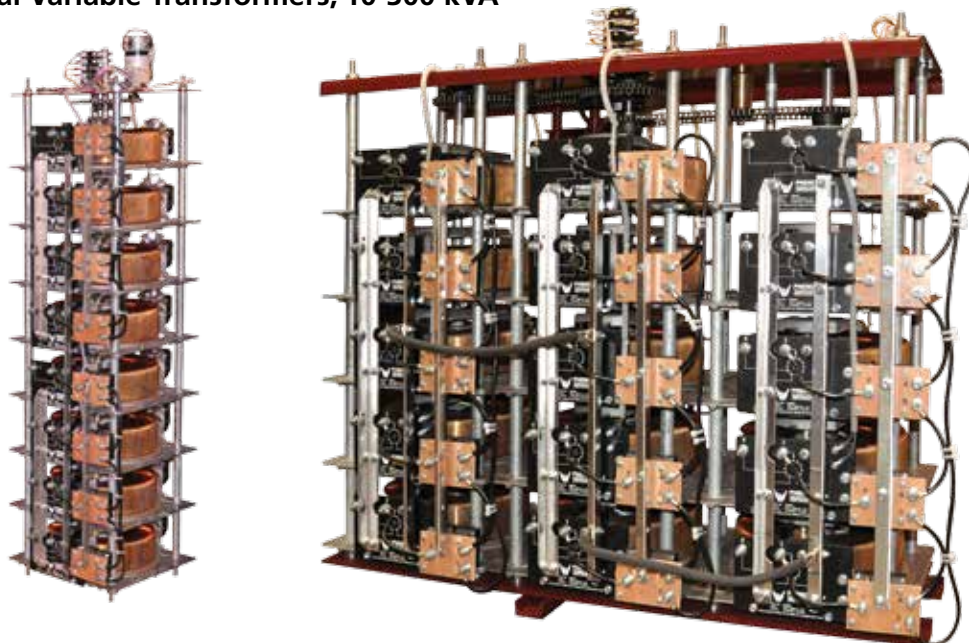


Phenix Technologies offers an extensive line of voltage regulators to accommodate the enormous variety of electrical equipment in use today. Variable transformers provide an adjustable output voltage whenever a continuous regulation of AC voltages with load is necessary. With standard input voltages and different transformer designs to choose from, we are sure to have a regulator that meets your specific application.

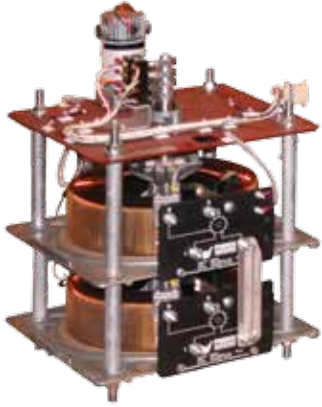
Column-Type Variable Transformers, 40-1200 kVA



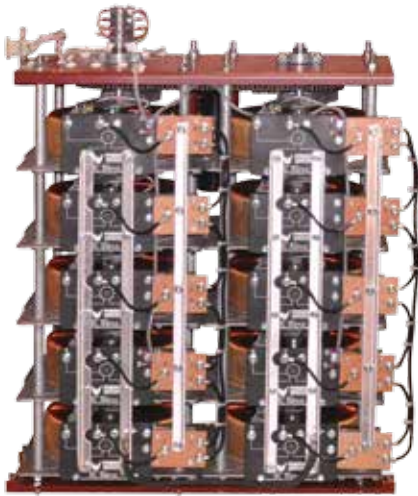
Toroidal Variable Transformers, 10-300 kVA



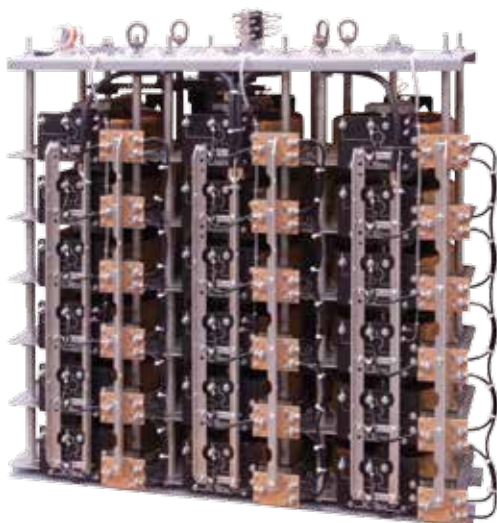
Toroidal Variable Transformers (TOVT)



Single Stack



Twin Stack



Triple Stack

- Continuously adjustable output voltage for inputs ranging from 120 to 600 Volts AC
- Provides output voltage as a percentage of input voltage over a range of either 0-100% or 0-117%
- Applications include test equipment and lab instruments, as well as an enormous variety of power supplies

Description

TOVTs are a simple and efficient auto-transformer distinguished by their unique shape. Copper windings encompass a toroidal, or "doughnut" shaped core, to form a toroidal helix. The outer face of the windings is exposed to provide a path for current collection. A carbon brush traverses the windings by means of output voltage selector, or "swinger". The swinger originates at the center of the toroid and rotates a maximum of 318 degrees about the face of the transformer. The result is an output voltage that varies linearly in proportion to the angle of rotation of the swinger. By stacking multiple transformers on a common shaft and wiring them in series and/or parallel, the line voltage may be doubled and the current and kVA rating increased accordingly.

Mechanical Features

- Single and three phase configurations
- Motorized and manual units available
- Standard rise time for AC units is 60 seconds, DC units is 15 seconds
- Stackable design for wide KVA range
- Precise assembly provides longer life with minimal maintenance
- Individual cooling fans

Electrical Features

- Line voltage inputs from 120 to 600 Volts AC
- Output voltage from 0 to 17% above line voltage
- Parallel configurations include current chokes
- 250% overload capability for 2 minutes
- Wiring diagram conveniently located on terminal plate

Drive

For low KVA applications, TOVT assemblies can be operated manually to provide precise voltage control. For automatic control and larger power ratings a motor drive is required. Motorized units contain a chain and sprocket assembly that can be manipulated to modify the swinger speed with respect to motor rpm, thereby increasing or decreasing regulation time. Limit switches are installed at the upper and lower limits of the windings to prevent over-travel of the voltage selector. Furthermore, DC motor drives can be applied in order to obtain a variable rate of rise.

Enclosure

Each TOVT unit is equipped with lifting points for movement by overhead crane. Also available are IP21 enclosures/cabinets, which provide a protective category designation in accordance with IEC 529. IP21 enclosures protect against penetration of solid objects 12 mm in diameter or larger as well as protect against dripping water. The enclosure is constructed of heavy gauge steel coated with a durable polyurethane based paint. The base of the cabinet rests on steel skids for movement by forklift.

	Stack Height	Phase	Model*	Input (V)	Current (A)			Width inches (mm)	Depth inches (mm)	Height inches (mm)	Weight lbs (kgs)
					Continuous	1 Hr ON/ 1 Hr OFF	5 Min ON/ 15 Min OFF				
SINGLE STACK (S)	1	1	VXA__-S1	208-240	35	49	60	14 (356)	18 (457)	16 (406)	76 (35)
	2	1	VXA__-S2P	208-240	70	98	120	14 (356)	21(533)	22 (559)	138 (63)
	2	1	VXA__-2S2	380-575	35	49	60	14 (356)	18 (457)	22 (559)	138 (63)
	3	1	VXA__-S3P	208-240	105	148	180	14 (356)	21(533)	28(699)	202 (92)
	3	3	VXA__-S3Y	380-600	35	49	60	14 (356)	18 (457)	28(699)	198 (90)
	4	1	VXA__-S4P	208-240	140	197	240	14 (356)	21(533)	33 (838)	264 (120)
	4	3	VXA__-S4SP	380-575	70	98	120	14 (356)	21(533)	33 (838)	262 (119)
	5	1	VXA__-S5P	208-240	175	247	300	14 (356)	21(533)	39 (978)	326 (148)
	6	1	VXA__-S6P	208-240	210	296	360	14 (356)	21(533)	45 (1130)	388 (176)
	6	1	VXA__-S6SP	380-575	105	148	180	14 (356)	21(533)	45 (1130)	388 (176)
	6	3	VXA__-S6Y	380-600	70	98	120	14 (356)	21(533)	45 (1130)	384 (174)
	7	1	VXA__-S7P	208-240	245	346	420	14 (356)	21(533)	50 (1270)	450 (204)
	8	1	VXA__-S8P	208-240	280	395	480	14 (356)	21(533)	56 (1410)	512 (232)
	8	1	VXA__-S8SP	380-575	140	197	240	14 (356)	21(533)	56 (1410)	512 (232)
	9	1	VXA__-S9P	208-240	315	445	540	14 (356)	21(533)	61(1549)	574 (260)
	9	3	VXA__-S9Y	380-600	105	148	180	14 (356)	21(533)	61(1549)	574 (260)

TWIN STACK (TW)	4	1	VXA__-TW4SP	380-575	140	197	240	30 (762)	21(533)	30 (762)	550 (250)
	5	1	VXA__-TW5SP	380-575	175	247	300	30 (762)	21(533)	36(902)	670 (304)
	6	1	VXA__-TW6SP	380-575	210	296	360	30 (762)	21(533)	42 (1054)	795 (360)
	6	3	VXA__-TW6Y	380-600	140	197	240	30 (762)	21(533)	42 (1054)	795 (360)
	7	1	VXA__-TW7SP	380-575	245	346	420	30 (762)	21(533)	47 (1194)	920 (417)
	8	1	VXA__-TW8SP	380-575	280	395	480	30 (762)	21(533)	53(1334)	1045 (474)
	9	1	VXA__-TW9SP	380-575	315	445	540	30 (762)	21(533)	58 (1473)	1170 (531)
	9	3	VXA__-TW9Y	380-600	210	296	360	30 (762)	21(533)	58 (1473)	1170 (531)

TRIPLE STACK (TR)	7	3	VXA__-TR7Y	380-600	245	346	420	42 (1054)	21(533)	49(1245)	1375 (624)
	8	1	VXA__-TR8SP	380-575	420	593	720	42 (1054)	21(533)	55 (1384)	1560 (708)
	8	3	VXA__-TR8Y	380-600	280	395	480	42 (1054)	21(533)	55 (1384)	1560 (708)
	9	3	VXA__-TR9Y	380-600	315	445	540	42 (1054)	21(533)	60 (1524)	1745 (792)
	10	1	VXA__-TR10SP	380-575	525	742	900	42 (1054)	21(533)	66(1664)	1930 (875)
	10	3	VXA__-TR10Y	380-600	350	494	600	42 (1054)	21(533)	66(1664)	1930 (875)

*Criteria required to generate model number

M = Manual drive (available up to and including "-S6" model numbers only, larger power ratings require a motorized drive)

N = 120 VAC, 1 phase (rise time 60 seconds)

O = 230 VAC, 1 phase (rise time 60 seconds)

P = 230 VAC, 3 phase (rise time 15 seconds @ 60 Hz)

Q = 90 VDC (rise time 15 seconds)

Column-Type Variable Transformers (CTVT)

- Regulate large throughput power with fewer components
- Single and three phase units available providing a continuously adjustable output voltage for inputs from 240 to 600 Volts

Description

The CTVT is constructed of an outer copper coil, as well as a series of internal compensation coils, both encompassing a laminated steel core. The coils are encapsulated using a process known as vacuum pressure impregnation (VPI) to strengthen the column and provide uniform heat transfer. A contact face of the windings is exposed to reveal the individual turns. The face is then nickel-plated to provide a wear-resistant and corrosion-free path for current collection. A combination of aluminum and steel structures support the columns providing a heavy duty and structurally dependable unit.

Mechanical Features

- Single and three phase configurations
- Nickel-plated commutator path
- Rolling carbon current collectors
- Unique plus/minus design available
- Motorized ball-screw drive
- Fixed or variable rate or rise
- Heavy duty construction
- Continuous duty to 40 degrees C ambient
- Upper and lower limit micro switches
- Modular design for extensive kVA capacity

Electrical Features

- Low turn-to-turn voltage difference (.7 volts max)
- Quasi-stepless regulation from 0-100%
- Compensation winding on all columns
- Step-up output available for 0-115% rated input voltage
- Delta and wye auto-winding standard
- Operating frequency range from 50-60 Hz
- Minimal output distortion

Dependability

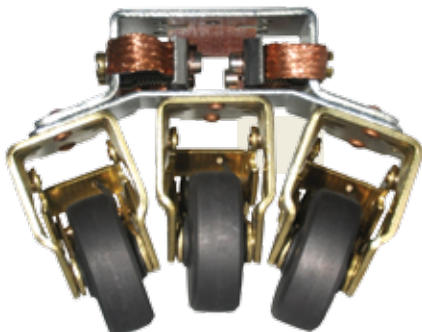
The most important feature of the PHENIX CTVT is the low turn-to-turn voltage difference across the transformer windings, (designed to never exceed .7 volts per turn). In order for a variable transformer to yield continuous, uninterrupted output voltage, the current collector must touch the next turn before leaving the previous one. The potential difference across the collector results in current flow, which results in heat dissipation. CTVTs use 35mm diameter carbon rollers as the collector device. In addition to eliminating mechanical problems associated with sliding contacts, the rollers endure greater cycles due to decreased friction. The carbon offers excellent electrical conductivity as well as exceptional thermal withstand capabilities. When the rollers bridge two turns, a combination of the low potential difference and the resistance characteristics of the contact devices limit current flow throughout the roller. These properties make the PHENIX CTVT ideal for applications in which the rollers are stationary or do not experience frequent movement.



Carbon Rollers



Roller Holders



Roller Holder Assembly

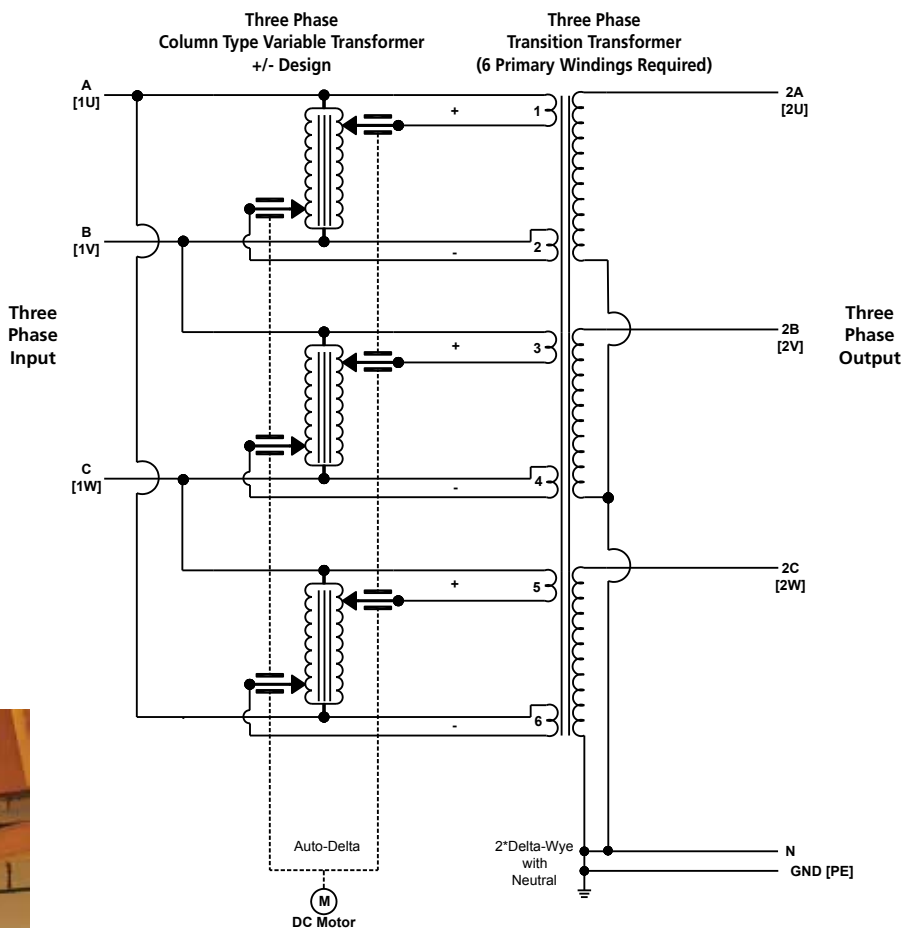


Plus/Minus Design

The PHENIX CTVT uses two types of roller holders. Termed three-holder and four-holder; the first holds 3 carbon rollers and the latter 4. With each roller capable of carrying 25 Amps, the face of each column is able to provide up to 100 Amps of current. However, the unique double current collector design termed “plus/minus” allows for higher KVA throughout than conventional auto-transformer designs. A roller assembly is installed on both sides, but at opposite ends of the column providing two output circuits for each column, thus doubling the KVA capacity. The plus/minus design is ideal for stabilizer applications in which a buck-boost transformer requires regulation capable of shifting voltage polarity.



System Diagram of a Three Phase +/- Column Type Variable Transformer with a Three Phase Transition Transformer



Compensation Winding

Each CTVT contains a compensation winding located beneath the actual commutating winding. This ensures a uniform current distribution across the length of the column, providing a much improved regulator impedance characteristic. The result is minimum voltage drop and increased efficiency.

Drive

Phenix designs the motion of the current collectors by using a motor drive attached to a ball-screw and miter gear assembly. Fixed or variable rate of rise is achieved through the use of an AC or DC gear motor. Common regulation is 0-100% in 1 minute for AC units, 30 seconds for DC units, with custom speeds available. The use of high quality miter gears and pillow-block ball bearings linked to a ball-screw drive eliminates problems associated with conventional chain drives. The result is a mechanically reliable unit, with a long life and minimal maintenance.

Single Phase (conventional) = 2 wire output

Current (A)	Input Voltage													
	400 V			415 V			480 V			600 V				
	continuous	1 Hr ON/ 1 Hr OFF	5 Min ON/ 15 Min OFF	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)
2	110	140	178	CTR400T-44-21	75 (1905)	788 (358)	44	CTR415T-45-21	77 (1955)	814 (370)	52	CTR480T-52-21	85 (2159)	916 (416)
2	140	178	227	CTR400T-56-21	81 (2057)	908 (412)	56	CTR415T-58-21	83 (2108)	936 (425)	67	CTR480T-67-21	91 (2311)	1040 (472)
4	220	280	356	CTR400T-88-41	75 (1905)	1612 (732)	88	CTR415T-91-41	77 (1955)	1663 (755)	105	CTR480T-105-41	85 (2159)	1863 (846)
4	280	356	453	CTR400T-112-41	81 (2057)	1827 (830)	112	CTR415T-116-41	83 (2108)	1882 (855)	134	CTR480T-134-41	91 (2311)	2086 (948)
6	330	420	535	CTR400T-132-61	77 (1955)	2388 (1085)	132	CTR415T-136-61	79 (2006)	2465 (1120)	158	CTR480T-158-61	87 (2209)	2763 (1255)
6	420	535	681	CTR400T-168-61	83 (2108)	2710 (1231)	174	CTR415T-174-61	85 (2159)	2791 (1268)	201	CTR480T-201-61	93 (2362)	3096 (1407)
8	440	560	713	CTR400T-176-81	78 (1981)	3161 (1436)	176	CTR415T-182-81	80 (2032)	3263 (1483)	211	CTR480T-211-81	88 (2235)	3661 (1664)
8	560	713	908	CTR400T-224-81	84 (2133)	3590 (1631)	224	CTR415T-232-81	86 (2184)	3698 (1680)	268	CTR480T-268-81	94 (2387)	4105 (1865)
10	550	700	891	CTR400T-220-101	78 (1981)	3932 (1787)	220	CTR415T-228-101	80 (2032)	4060 (1845)	264	CTR480T-264-101	88 (2235)	4556 (2070)
10	700	891	1134	CTR400T-280-101	84 (2133)	4468 (2030)	280	CTR415T-290-101	86 (2092)	4604 (2092)	336	CTR480T-336-101	94 (2387)	5111 (2323)
12	660	840	1069	CTR400T-264-121	78 (1981)	4692 (2132)	264	CTR415T-273-121	80 (2032)	4845 (2202)	316	CTR480T-316-121	88 (2235)	5439 (2472)
12	840	1069	1361	CTR400T-336-121	84 (2133)	5334 (2424)	336	CTR415T-348-121	86 (2184)	5496 (2498)	403	CTR480T-403-121	94 (2387)	6103 (2774)

Single Phase (conventional) = 2 wire output

Single Phase (+/- Design) = 4 wire output

Current (A)	Input Voltage													
	400 V			415 V			480 V			600 V				
	continuous	1 Hr ON/ 1 Hr OFF	5 Min ON/ 15 Min OFF	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)
2	110	140	178	CTR400-88P-21	75 (1905)	800 (363)	88	CTR415-91P-21	77 (1955)	830 (377)	105	CTR480-105P-21	85 (2159)	935 (425)
2	140	178	227	CTR400-112P-21	81 (2057)	980 (445)	112	CTR415-116P-21	83 (2108)	1005 (456)	134	CTR480-134P-21	91 (2311)	1115 (506)
4	220	280	356	CTR400-176P-41	75 (1905)	1638 (744)	176	CTR415-182P-41	77 (1955)	1692 (769)	211	CTR480-211P-41	85 (2159)	1900 (863)
4	280	356	453	CTR400-224P-41	81 (2057)	1898 (862)	224	CTR415-232P-41	83 (2108)	1954 (888)	268	CTR480-268P-41	91 (2311)	2166 (984)
6	330	420	535	CTR400-264P-61	75 (1905)	2409 (1095)	264	CTR415-273P-61	77 (1955)	2489 (1131)	316	CTR480-316P-61	85 (2159)	2794 (1270)
6	420	535	681	CTR400-336P-61	81 (2057)	2798 (1271)	336	CTR415-348P-61	83 (2108)	2882 (1310)	403	CTR480-403P-61	91 (2311)	3197 (1453)
8	440	560	713	CTR400-352P-81	76 (1930)	3193 (1451)	352	CTR415-365P-81	78 (1981)	3300 (1500)	422	CTR480-422P-81	86 (2184)	3706 (1684)
8	560	713	908	CTR400-448P-81	82 (2082)	3712 (1687)	448	CTR415-464P-81	84 (2133)	3823 (1737)	537	CTR480-537P-81	92 (2336)	4244 (1929)
10	550	700	891	CTR400-440P-101	76 (1930)	3695 (1802)	440	CTR415-456P-101	78 (1981)	4097 (1862)	528	CTR480-528P-101	86 (2184)	4603 (2092)
10	700	891	1134	CTR400-560P-101	82 (2082)	4612 (2096)	560	CTR415-581P-101	84 (2133)	4750 (2159)	672	CTR480-672P-101	92 (2336)	5275 (2397)
12	660	840	1069	CTR400-528P-121	76 (1930)	4736 (2152)	528	CTR415-547P-121	78 (1981)	4895 (2225)	633	CTR480-633P-121	86 (2184)	5501 (2500)
12	840	1069	1361	CTR400-672P-121	82 (2082)	5512 (2505)	672	CTR415-697P-121	84 (2133)	5678 (2580)	806	CTR480-806P-121	92 (2336)	6306 (2866)

Single Phase (+/- Design) = 4 wire output

Three Phase Wye (conventional) = 3 wire + neutral output

Current (A)		Input Voltage																
		400 V			415 V			480 V			600 V							
# of columns	# of rollers per column	continuous	1 Hr ON/ 1 Hr OFF	5 Min ON/ 15 Min OFF	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	Depth inches (mm)	Width inches (mm)	
3	3	55	70	89	CTR231T-38-33	53 (1346)	721 (327)	38	CTR240T-39-33	55 (1397)	763 (346)	39	CTR277T-45-33	59 (1498)	834 (379)	69 (1752)	27 (685)	19 (482)
3	4	70	89	113	CTR231T-48-33	57 (1447)	853 (387)	48	CTR240T-50-33	59 (1498)	889 (404)	50	CTR277T-58-33	63 (1600)	967 (436)	73 (1854)	28 (711)	19 (482)
6	3	110	140	178	CTR231T-76-63	53 (1346)	1478 (671)	76	CTR240T-79-63	55 (1397)	1561 (709)	79	CTR277T-91-63	59 (1498)	1701 (773)	69 (1752)	27 (685)	35 (889)
6	4	140	178	227	CTR231T-96-63	57 (1447)	1788 (812)	96	CTR240T-100-63	59 (1498)	1858 (844)	100	CTR277T-116-63	63 (1600)	2013 (915)	73 (1854)	28 (711)	35 (889)
9	3	165	210	267	CTR231T-114-93	56 (1422)	2294 (1042)	114	CTR240T-118-93	58 (1473)	2417 (1098)	118	CTR277T-137-93	62 (1574)	2627 (1194)	72 (1828)	27 (685)	52 (1320)
9	4	210	267	340	CTR231T-145-93	60 (1524)	2640 (1200)	145	CTR240T-150-93	62 (1574)	2744 (1247)	150	CTR277T-174-93	66 (1676)	2976 (1352)	76 (1930)	28 (711)	52 (1320)
12	3	220	280	356	CTR231T-152-123	56 (1422)	3020 (1372)	152	CTR240T-158-123	58 (1473)	3185 (1447)	158	CTR277T-182-123	62 (1574)	3464 (1574)	72 (1828)	27 (685)	68 (1727)
12	4	280	356	453	CTR231T-193-123	60 (1524)	3481 (1582)	193	CTR240T-201-123	62 (1574)	3620 (1645)	201	CTR277T-232-123	66 (1676)	3929 (1785)	76 (1930)	28 (711)	68 (1727)
15	3	275	350	445	CTR231T-190-153	55 (1397)	3758 (1708)	190	CTR240T-197-153	57 (1447)	3964 (1801)	197	CTR277T-228-153	61 (1549)	4312 (1960)	71 (1803)	27 (685)	84 (2133)
15	4	350	445	566	CTR231T-242-153	59 (1498)	4334 (1970)	242	CTR240T-251-153	61 (1549)	4508 (2049)	251	CTR277T-290-153	65 (1651)	4894 (2224)	75 (1905)	28 (711)	84 (2133)
18	3	330	420	535	CTR231T-228-183	55 (1397)	4478 (2035)	228	CTR240T-237-183	57 (1447)	4724 (2147)	237	CTR277T-274-183	61 (1549)	5141 (2336)	71 (1803)	27 (685)	101 (2565)
18	4	420	535	681	CTR231T-290-183	59 (1498)	5168 (2349)	290	CTR240T-301-183	61 (1549)	5376 (2443)	301	CTR277T-349-183	65 (1651)	5839 (2654)	75 (1905)	28 (711)	101 (2565)

Three Phase Wye (conventional) = 3 wire + neutral output

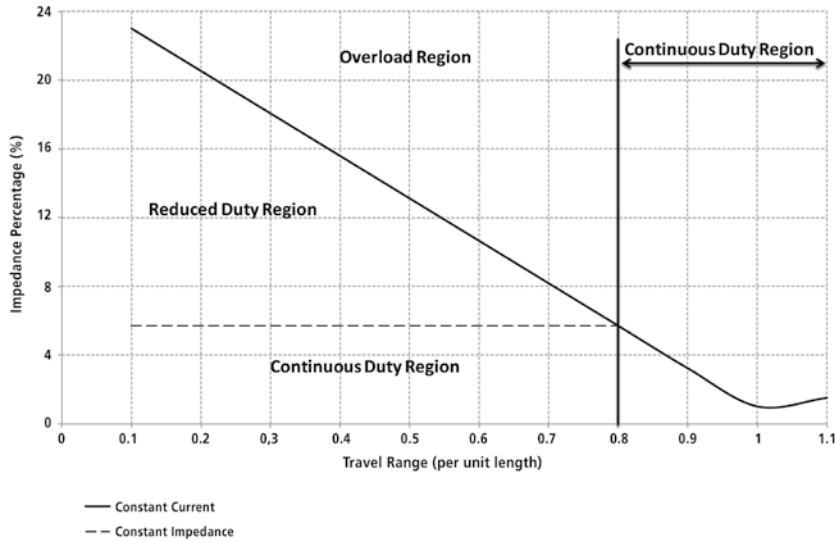
Three Phase Delta (+/- Design) = 9 wire output

Current (A)		Input Voltage																
		400 V			415 V			480 V			600 V							
# of columns	# of rollers per column	continuous	1 Hr ON/ 1 Hr OFF	5 Min ON/ 15 Min OFF	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	continuous kVA	MODEL NUMBER	Height inches (mm)	Weight lbs (kgs)	Depth inches (mm)	Width inches (mm)	
3	3	55	70	89	CTR400-132P-33	75 (1905)	1139 (517)	132	CTR415-136P-33	77 (1955)	1180 (536)	136	CTR480-158P-33	85 (2159)	1334 (606)	97 (2463)	27 (685)	19 (482)
3	4	70	89	113	CTR400-168P-33	81 (2057)	1366 (620)	168	CTR415-174P-33	83 (2108)	1408 (640)	174	CTR480-201P-33	91 (2311)	1568 (712)	28 (711)	19 (482)	N/A
6	3	110	140	178	CTR400-264P-63	75 (1905)	2334 (1060)	264	CTR415-273P-63	77 (1955)	2413 (1096)	273	CTR480-316P-63	85 (2159)	2717 (1235)	97 (2463)	27 (685)	35 (889)
6	4	140	178	227	CTR400-336P-63	81 (2057)	2800 (1272)	336	CTR415-348P-63	83 (2108)	2883 (1310)	348	CTR480-403P-63	91 (2311)	3198 (1453)	28 (711)	35 (889)	N/A
9	3	165	210	267	CTR400-396P-93	76 (1930)	3556 (1616)	396	CTR415-410P-93	78 (1981)	3675 (1670)	410	CTR480-475P-93	86 (2184)	4128 (1876)	98 (2489)	27 (685)	52 (1320)
9	4	210	267	340	CTR400-504P-93	82 (2082)	4135 (1879)	504	CTR415-522P-93	84 (2133)	4259 (1935)	604	CTR480-604P-93	92 (2336)	4730 (2150)	28 (711)	52 (1320)	N/A
12	3	220	280	356	CTR400-528P-123	76 (1930)	4705 (2138)	528	CTR415-547P-123	78 (1981)	4864 (2210)	547	CTR480-633P-123	86 (2184)	5468 (2485)	98 (2489)	27 (685)	68 (1727)
12	4	280	356	453	CTR400-672P-123	82 (2082)	5478 (2490)	672	CTR415-697P-123	84 (2133)	5644 (2565)	697	CTR480-806P-123	92 (2336)	6270 (2850)	28 (711)	68 (1727)	N/A
15	3	275	350	445	CTR400-660P-153	75 (1905)	5854 (2660)	660	CTR415-684P-153	77 (1955)	6052 (2750)	792	CTR480-792P-153	85 (2159)	6806 (3093)	97 (2463)	27 (685)	84 (2133)
15	4	350	445	566	CTR400-840P-153	81 (2057)	6819 (3099)	840	CTR415-871P-153	83 (2108)	7025 (3193)	1008	CTR480-1008P-153	91 (2311)	7807 (3548)	28 (711)	84 (2133)	N/A
18	3	330	420	535	CTR400-792P-183	75 (1905)	6994 (3179)	792	CTR415-821P-183	77 (1955)	7231 (3286)	950	CTR480-950P-183	85 (2159)	8135 (3697)	97 (2463)	27 (685)	101 (2565)
18	4	420	535	681	CTR400-1008P-183	81 (2057)	8151 (3705)	1008	CTR415-1045P-183	83 (2108)	8398 (3817)	1209	CTR480-1209P-183	91 (2311)	9335 (4243)	28 (711)	101 (2565)	N/A

Three Phase Delta (+/- Design) = 9 wire output

The model designation for a CTVT is as follows:
 CTR [full load column voltage]
 [T=step-up tap] [S=line separation]
 [throughput kVA] [P=plus/minus design]
 [number of columns] [phase]

Typical Impedance Characteristic for a Variable Transformer Under Constant Current Loading Versus Constant Impedance Loading



Controls

Optional controls and metering are available to accommodate a PHENIX voltage regulator. Each assembly can be custom designed to best match your equipment capabilities and your metering requirements. Standard components include digital voltmeter and ammeter, on/off controls with "zero-start" interlock, raise/lower controls, input circuit breaker, and main contactor.

Enclosure

Each CTVT unit is equipped with lifting points for movement by forklift or crane. Also available are IP21 enclosures, as detailed in the PHENIX Toroidal Variable Transformer section. The structurally solid frame has removable panels for easy access to columns. Cabinets may also include fan assemblies to provide forced air cooling.



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