Advanced transformers built for the industrial environment

Micron chose to encapsulate its control transformer designs over 40 years ago and still does so today. Why? Encapsulation provides:

- Improved heat dissipation from the core.
- Windings and solder connections protected from corrosion for longer transformer life.
    - The average MTBF of our 600 volt class Impervi**TRAN**™ is 192,720 hours.
- The use of encapsulation and robust terminal block construction greatly reduces freight and installation damage.

From the beginning, Micron designed a user-centric product that stands the test of time.

- Compact terminal spacing.
- Integral secondary fusing capability was designed into the first Impervi**TRAN™**.
- Offering primary fusing capability for nearly 40 years! Simplified by the factory installed Impervi**MOUNT**™ accessory mounting plate.
- Impervi**MOUNT**™ is standard on all Series 2 designs and is optional on all other Micron transformer products, including open construction transformers and reactors; thus allowing the installer an additional accessory mounting location.
- Philslot/pressure plate terminal screws simplify the wiring process.

How to size a transformer

Inrush VA: Helps choose final VA

Sealed VA: helps choose FLA

Selection Guide for Control Transformers

REGULATION DATA CHART

Inrush VA at 20% Power Factor

VA	NEMA / IEC 95% Sec. Voltage	NEMA / IEC 90% Sec. Voltage	NEMA / IEC 85% Sec. Voltage
25[1]	100 / ----	130 / ---	150 / ---
50[1]	170 / 190	200 / 220	240 / 270
75[1]	310 / 350	410 / 460	540 / 600
100[1]	370 / 410	540 / 600	730 / 810
150[2]	780 / 850	930 / 1030	1150 / 1270
200[2]	810 / 900	1150 / 1270	1450 / 1600
250[2]	1400 / 1540	1900 / 2090	2300 / 2530
300[2]	1900 / 2090	2700 / 2970	3850 / 4240
350[2]	3100 / 3410	3650 / 4020	4800 / 5280
500[2]	4000 / 4400	5300 / 5830	7000 / 7700
750[2]	8300 / 9130	11000 / 12100	14000 / 15400
1000[2]	15000 / 16500	21000 / 23000	27000 / 29500
1000[3]	9000 / 9900	13000 / 14300	18500 / 20300
1500[3]	10500 / 11500	15000 / 16500	20500 / 22500
2000[3]	17000 / 18900	25500 / 27300	34000 / 36400
3000[3]	24000 / 25700	36000 / 38500	47500 / 50200
5000[3]	55000 / 58800	92500 / 98900	115000 / 122000

[1] For units with class 105° C insulation system.
[2] For units with class 130° C insulation system.
[3] For units with class 180° C insulation system.

SELECTION PROCESS

Selecting a transformer for industrial control circuit applications requires understanding the relationships between the following terms.

INRUSH VA is the product of the *load voltage (V)* multiplied by the *current (A)* that is required during start-up. This is also known as *magnetizing current*. It is calculated by adding together the inrush VA of all components that might be energized simultaneously. Inrush VA is available from the component manufacturer.

SEALED VA also called *Steady State VA* is the product of the *load voltage (V)* multiplied by the *current (A)* that is required during normal operation. It is calculated by adding together the sealed VA of all components that might be operating simultaneously. Sealed VA is available from the component manufacturer.

PRIMARY VOLTAGE is the voltage available from the distribution system and its operational frequency, which is connected to the transformer *supply* voltage (H) terminals.

SECONDARY VOLTAGE is the voltage required for load operation, which is connected to the transformer *load* voltage (X) terminals.

Once the circuit variables have been determined, transformer selection is a simple four step process:

1) Based on the industry accepted formula: **Application Inrush VA = √((Inrush VA)² + (Sealed VA)²)**
2) Refer to the regulation data chart. If the load can tolerate a 10% voltage sag upon start-up select from the 90% secondary voltage column; if only 5%, select from the 95% column.
3) After determining the proper secondary voltage column, read down until a value equal or greater than the Application Inrush VA is found. The numbers indicate the *maximum* Application Inrush VA that will still generate the required secondary voltage upon start-up.
4) Read left to the transformer VA column and select the proper transformer for the application. *As a final check make sure that the Transformer VA is equal or greater than the total Sealed VA requirements.*

Pick the VA rating requested + the **secondary** voltage. ie: 250VA @ 24 volts. The chart indicates a maximum 15 amp fuse

Pick the VA rating requested + the **primary** voltage. ie: 250Va @ 480 volts. The chart indicates a maximum 1-1/4 amp fuse.

SECONDARY AND PRIMARY OVERCURRENT PROTECTION

Secondary Voltage	VA RATING															
	25	50	75	100	150	200	250	300	350	500	750	1000	1500	2000	3000	5000
12	3-2/10	6-1/4	10	12	15	20	25	30	--	--	--	--	--	--	--	--
23	1-8/10	3-1/2	5	7	10	12	15	17-1/2	20	30	--	--	--	--	--	--
24	1-6/10	3-2/10	5	6-1/4	10	12	15	17-1/2	20	30	--	--	--	--	--	--
25	1-6/10	3-2/10	5	6-1/4	10	12	15	15	17-1/2	25	--	--	--	--	--	--
90	4/10	8/10	1-1/4	1-8/10	2-1/2	3-1/2	4-1/2	5	6-1/4	9	12	15	20	25	--	--
95	4/10	8/10	1-1/4	1-6/10	2-1/2	3-1/2	4	5	6	8	12	15	17-1/2	25	--	--
100	4/10	8/10	1-1/4	1-6/10	2-1/2	3-2/10	4	5	5-6/10	8	12	15	17-1/2	25	--	--
110	3/10	3/4	1-1/8	1-1/2	2-1/4	3	3-1/2	4-1/2	5	7-1/2	10	12	17-1/2	25	--	--
115	3/10	6/10	1	1-4/10	2	2-8/10	3-1/2	4	5	7	10	12	17-1/2	25	--	--
120	3/10	6/10	1	1-1/4	2	2-1/2	3-2/10	4	4-1/2	6-1/4	10	12	17-1/2	25		
220	3/16	3/10	1/2	3/4	1-1/8	1-1/2	1-8/10	2-1/4	2-1/2	3-1/2	5-6/10	7-1/2	10	12	17-1/2	30
230	15/100	3/10	1/2	6/10	1	1-4/10	1-8/10	2	2-1/2	3-1/2	5	7	10	12	17-1/2	30
240	15/100	3/10	1/2	6/10	1	1-4/10	1-6/10	2	2-1/4	3-2/10	5	6-1/4	10	12	17-1/2	30

Primary Voltage	VA RATING															
	25	50	75	100	150	200	250	300	350	500	750	1000	1500	2000	3000	5000
115	1/2	1	1-6/10	2	3-2/10	4	5	6-1/4	7-1/2	10	15	20	30	--	--	--
120	1/2	1	1-1/2	2	3	4	5	6-1/4	7	10	15	20	30	--	--	--
200	3/10	6/10	8/10	1-1/4	1-8/10	2-1/2	3	3-1/2	4	6-1/4	9	12	17-1/2	25	--	--
208	3/10	6/10	8/10	1-1/8	1-8/10	2-1/4	3	3-1/2	4	6	9	12	17-1/2	20	--	--
220	1/4	1/2	8/10	1-1/8	1-6/10	2-1/4	2-8/10	3-2/10	3-1/2	5-6/10	8	10	15	20	30	--
230	1/4	1/2	8/10	1	1-6/10	2	2-1/2	3-2/10	3-1/2	5	8	10	15	20	30	--
240	1/4	1/2	3/4	1	1-1/2	2	2-1/2	3	3-1/2	5	7-1/2	10	15	20	30	--
277	2/10	4/10	6/10	8/10	1-1/4	1-8/10	2-1/4	2-1/2	3	4-1/2	6-1/4	9	12	17-1/2	25	--
380	15/100	3/10	4/10	6/10	8/10	1-1/4	1-6/10	1-8/10	2-1/4	3-2/10	4-1/2	6-1/4	9	12	17-1/2	30
400	15/100	3/10	4/10	6/10	8/10	1-1/4	1-1/2	1-8/10	2	3	4-1/2	6-1/4	9	12	17-1/2	30
415	15/100	3/10	4/10	6/10	8/10	1-1/8	1-1/2	1-8/10	2	3	4-1/2	6	9	12	17-1/2	30
440	1/8	1/4	4/10	1/2	8/10	1-1/8	1-4/10	1-6/10	1-8/10	2-8/10	4	5-6/10	8	10	15	25
460	1/8	1/4	4/10	1/2	8/10	1	1-1/4	1-6/10	1-8/10	2-1/2	4	5	8	10	15	25
480	1/8	1/4	3/10	1/2	3/4	1	1-1/4	1-1/2	1-8/10	2-1/2	3-1/2	5	7-1/2	10	15	25
550	1/10	2/10	3/10	4/10	6/10	8/10	1-1/8	1-1/4	1-1/2	2-1/4	3-2/10	4-1/2	6-1/4	9	12	20
575	1/10	2/10	3/10	4/10	6/10	8/10	1	1-1/4	1-1/2	2	3-2/10	4	6-1/4	8	12	20
600	1/10	2/10	3/10	4/10	6/10	8/10	1	1-1/4	1-4/10	2	3	4	6-1/4	8	12	20

- If the rated secondary current is less than 9 amps, the secondary rating of overcurrent protection is 167% maximun of rated secondary current.
- If the rated secondary current is 9 amps or greater, the secondary rating of overcurrent protection is 125% maximun of rated secondary current
- Primary rating of overcurrent protection is 250% maximun of rated primary current when secondary is protected by overcurrent protection.

Reference: NEC 450.3(B)

Rev 9/3/10

ImperviTRAN™ PRODUCT SELECTION GUIDE

GENERAL SPECIFICATIONS: ALL ARE 50/60 Hz RATED

BUILDING STYLE:

Series 2 IMPERVITRA — IMPERVITRAN (non-Series 2) highlighted in blue

APPROVALS: UL/cUL File #E46323 — APPROVALS: UL File #E46323/CSA File #LR27533

TERMINAL TIGHTENING TORQUE (ALL IMPERVITRAN STYLES): ≤30A: 20 lb/in; >30A: 30 lb/in

TERMINAL NUMBER: Column "T" denotes terminal count needed to select terminal cover kits
Sold as 10-Paks. TPTC-2001 fits all 4-terminal designs; TPTC-2002 fits all 6-terminal designs.

TEMPERATURE CLASS:
Two letter suffix denotes Temp Class 105°C
Three letter suffix ending in "F" denotes Temp Class 130°C
Three letter suffix ending in "H" denotes Temp Class 180°C

PART NUMBER DESCRIPTORS:

Alpha-numeric

B150BTZ13JKF

B = Impervitran construction
150 = VA rating (Kva = *K*ie: 3K0)
BT = Primary voltage rating
Z = Triple rated ±5% around nominal voltage
13 = Secondary voltage
JK = installed accessories
F = 130°C construction

Serialized

B150-2004-GAF

B = Impervitran construction
150 = VA rating
2004 = Assigned by engineering
GA = GlobalTran EN61558-2-2
F = 130°C construction

COMMON PRIMARY VOLTAGES

120 = L	277 = Q	460 = T
208 = M	380 = R	480 = U
230 = B	400 = F	575 = W
240 = P	415 = D	±5% = Z

COMMON SECONDARY VOLTAGES

5 = 12	19 = 240
7 = 24	34 = 110 X 220
13 = 115	37 = 95, 115
15 = 120	

SUFFIX DESCRIPTION:

"J" in suffix denotes jumpers necessary for operation
"K" in suffix denotes installed secondary fuse clips for 13/32 x 1-1/2 fuse
"-1" in suffix denotes installed secondary fuse clips (serialized P/Ns)
"-3" in suffix denotes no fuse clips on unit (serialized P/Ns)
"R" in suffix denotes installed Class "CC" primary fuse block
"-8 or -5" in suffix denotes installed Class "CC" primary fuse block (serialized P/Ns)
"X" in suffix is a place holder. The letter it replaces is not available on that unit

EXAMPLE:

B100BTZ13**JK** >>> B100BTZ13**RB**
B150MBT13**XKF** >>> B150MBT13**RKF**

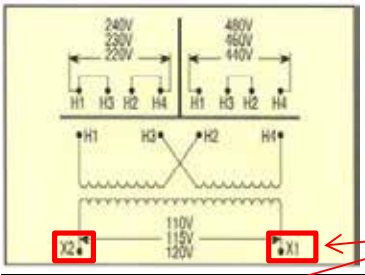
Blue not Series 2

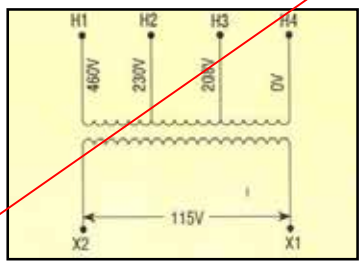
Pertinent agency and mechanical data

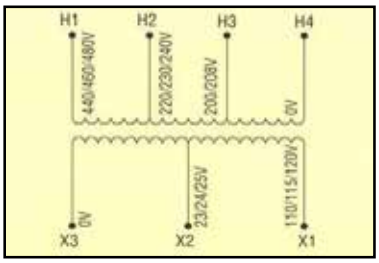
Number of terminals

Transformer Full Load Amps

Terminal designators







Primary: 220 x 440, 230 x 460, 240 x 480 Secondary: 110/115/120			
T	F.L.A.	VA	CATALOG NUMBER
4	0.43	50	B050BTZ13JK
4	0.65	75	B075BTZ13JK
4	0.87	100	B100BTZ13JK
4	1.30	150	B150BTZ13JKF
4	1.74	200	B200BTZ13JKF
4	2.17	250	B250BTZ13JKF
4	2.61	300	B300BTZ13JKF
4	3.04	350	B350BTZ13JKF
6	4.35	500	B500BTZ13JKF
6	6.52	750	B750BTZ13JKF
6	8.70	1000	B1K0BTZ13JKF
6	13.04	1500	B1K5BTZ13JKF
6	17.39	2000	B2K0BTZ13JKH
6	26.09	3000	B3K0BTZ13JXH
6	43.48	5000	B5K0BTZ13JXH

Primary: 208, 230, 460 Secondary: 115			
T	F.L.A.	VA	CATALOG NUMBER
4	0.43	50	B050MBT13XK
4	0.65	75	B075MBT13XK
4	0.87	100	B100MBT13XK
4	1.30	150	B150MBT13XKF
4	1.74	200	B200MBT13XKF
4	2.17	250	B250MBT13XKF
4	2.61	300	B300MBT13XKF
4	3.04	350	B350MBT13XKF
6	4.35	500	B500MBT13XKF
6	6.52	750	B750MBT13XKF
6	8.70	1000	B1K0MBT13XKF
6	13.04	1500	B1K5MBT13XKF
6	17.39	2000	B2K0MBT13XKH
6	26.09	3000	B3K0MBT13XXH
6	43.48	5000	B5K0MBT13XXH

Primary: 208/230/460 Secondary: 24/115			
T	F.L.A.	VA	CATALOG NUMBER
4	2.08/0.44	50	B050-2000-1
4	3.13/0.65	75	B075-2001-1
4	4.17/0.87	100	B100-2002-1
4	6.25/1.30	150	B150-2003-1F
4	8.33/1.74	200	B200-2004-1F
4	10.42/2.17	250	B250-2005-1F
6	12.50/2.61	300	B300-2006-1F
6	14.58/3.04	350	B350-2007-1F
6	20.84/4.35	500	B500-2008-1F
6	31.30/6.50	750	B750-2009-1F
6	41.70/8.70	1000	B1K0-2010-1F

Blue is not Series 2