

TDBU Series Dynamic brake unit user manual

Thank you for choosing TOPTEK's TDBU series dynamic brake unit. TDBUs are applied to absorb the motor regeneration energy when the three-phase induction motor stops by deceleration. With TDBU, the regeneration energy will be dissipated in dedicated braking resistors. To prevent mechanical or human injury, please refer to this instruction sheet before wiring. TDBUs are suitable for TOPTEK AC Motor Drives TOPVERT Series 230V/460V. TDBUs need to be used in conjunction with TDBR series braking resistors to provide the optimum braking characteristics. The content of this instruction sheet may be revised without prior notice. Please consult our distributors or download the latest version at <http://www.toptek.biz>.

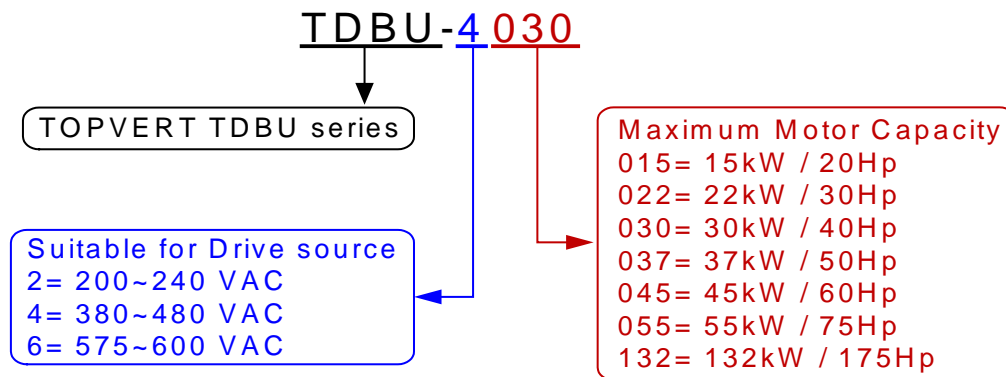
CHAPTER 1 RECEIVING AND INSPECTION

1-1 Nameplate Information

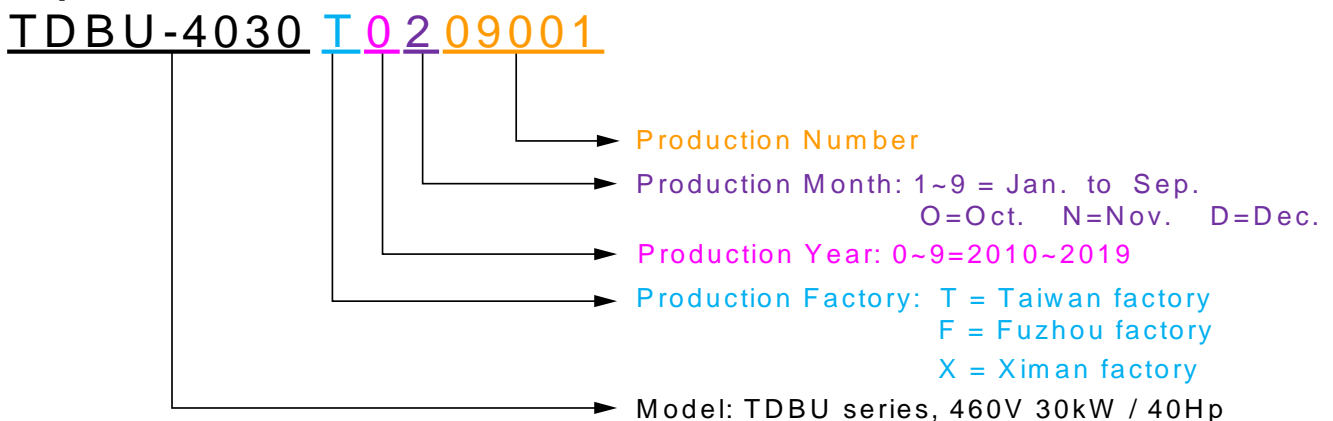
Example for TDBU-4030.



1-2 Model Explanation



1-3 Explanation of Production control data



● Please contact the dealers immediately should any discrepancy occurred.

CHAPTER 2 STORAGE AND INSTALLATION

2-1 Storage

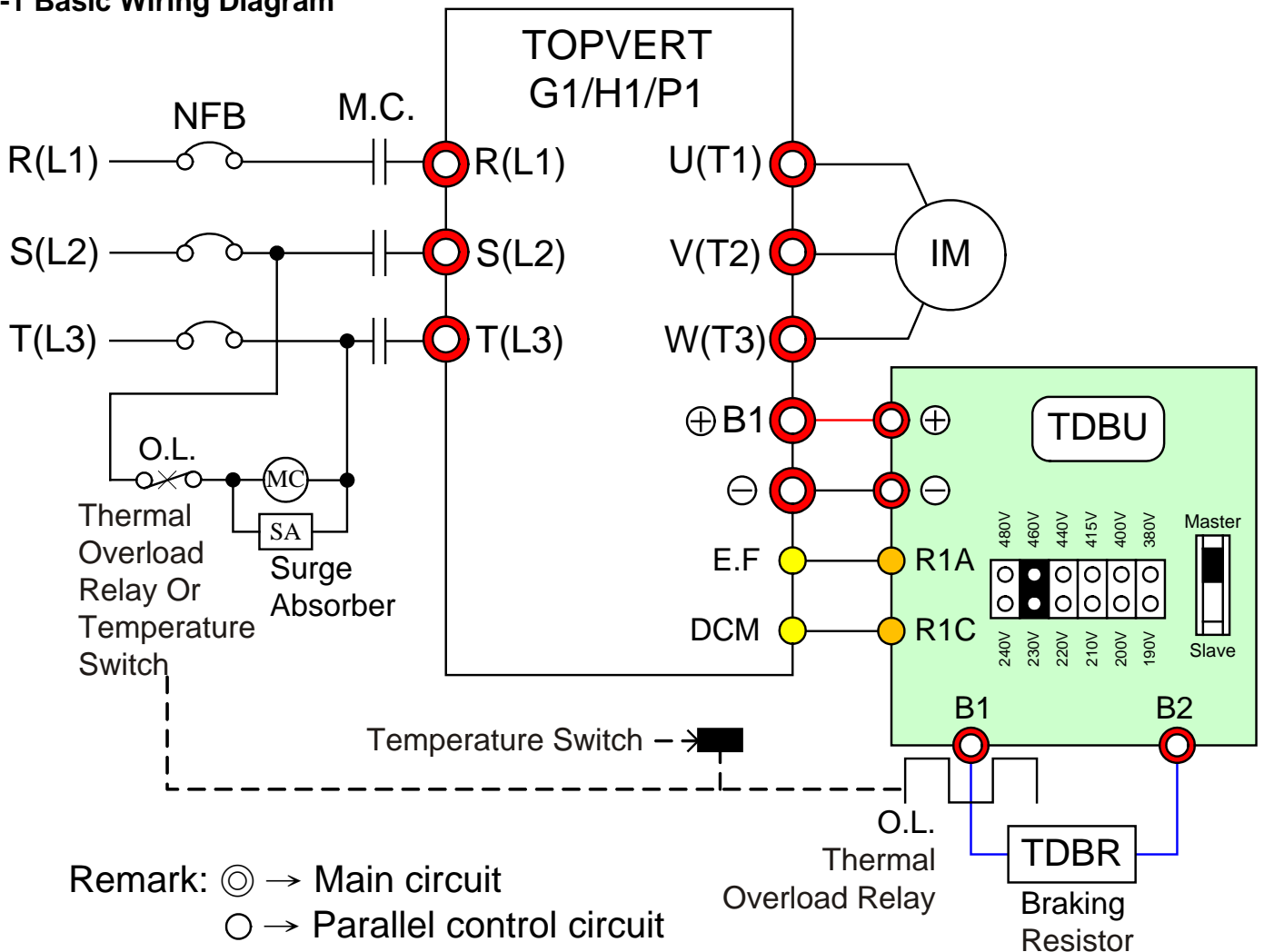
The TDBU should be kept in the shipping carton before installation. In order to retain the warranty coverage, the TDBU should be stored properly when it is not to be used for an extended period of time.

Ambient Conditions:

Operation	Atmosphere pressure: 86 to 106 kPa Installation Site Altitude: below 1000m Vibration: 9.8 m/s ² (1G) under 20Hz 2 m/s ² (0.2G) at 20Hz to 50Hz
Storage	Temperature: -20°C to +60°C (-4°F to 140°F) Relative Humidity: Less than 90%, no condensation allowed Atmosphere pressure: 86 to 106 kPa
Transportation	Temperature: -20°C to +60°C (-4°F to 140°F) Relative Humidity: Less than 90%, no condensation allowed Atmosphere pressure: 86 to 106 kPa Vibration: 9.8 m/s ² (1G) under 20Hz 2 m/s ² (0.2G) at 20Hz to 50Hz
Pollution Degree 2:	good for a factory type environment.

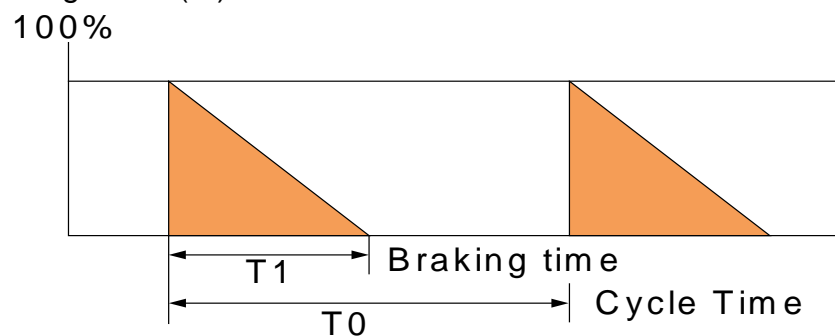
2-2 Installation

2-2-1 Basic Wiring Diagram



Operation Explanation:

1. For safety consideration, install an overload relay between the TDBU and the braking resistor. In conjunction with the magnetic contactor (M.C.) prior to the drive, it can perform complete protection against abnormality.
2. The purpose of installing the thermal overload relay is to protect the braking resistor from damage due to frequent braking, or due to TDBU keeping operating resulted from unusual high input voltage. Under such circumstance, just turn off the power to prevent damaging the braking resistor.
3. Please refer to the specification of the thermal overload relay.
4. The alarm output terminals (R1A, R1B, R1C) of the TDBU will be activated when the temperature of the heat sink exceeds 90°C. It means that the temperature of the installation environment may exceed 50°C, or the braking duty may exceed 10% E.D. With this kind of alarm, please install a fan to force air-cooling or reduce the environment temperature. If the condition not due to the temperature, the control circuit or the temperature sensor may have been damaged. At this time, please send the TDBU back to the manufacturer or agency for repair.
5. The AC Motor drive and TDBU will be electrified at the same time while turning on the NFB (No-fuse breaker). For the operation/stop method of the motor, please refer to the user manual of the AC Motor drive TOPVERT Series. The TDBU will detect the inner DC voltage of the AC motor drive when it stops the motor by deceleration. The extra regeneration will be dissipated away rapidly by the braking resistor in the form of heat. It can ensure the stable deceleration characteristic.
6. Besides using thermal overload relay to be the protection system and braking resistor, temperature switch can be installed on braking resistor side as the protection. The temperature switch must comply with the braking resistor specification or contact your dealer.
7. Definition for Braking Usage E.D. (%)



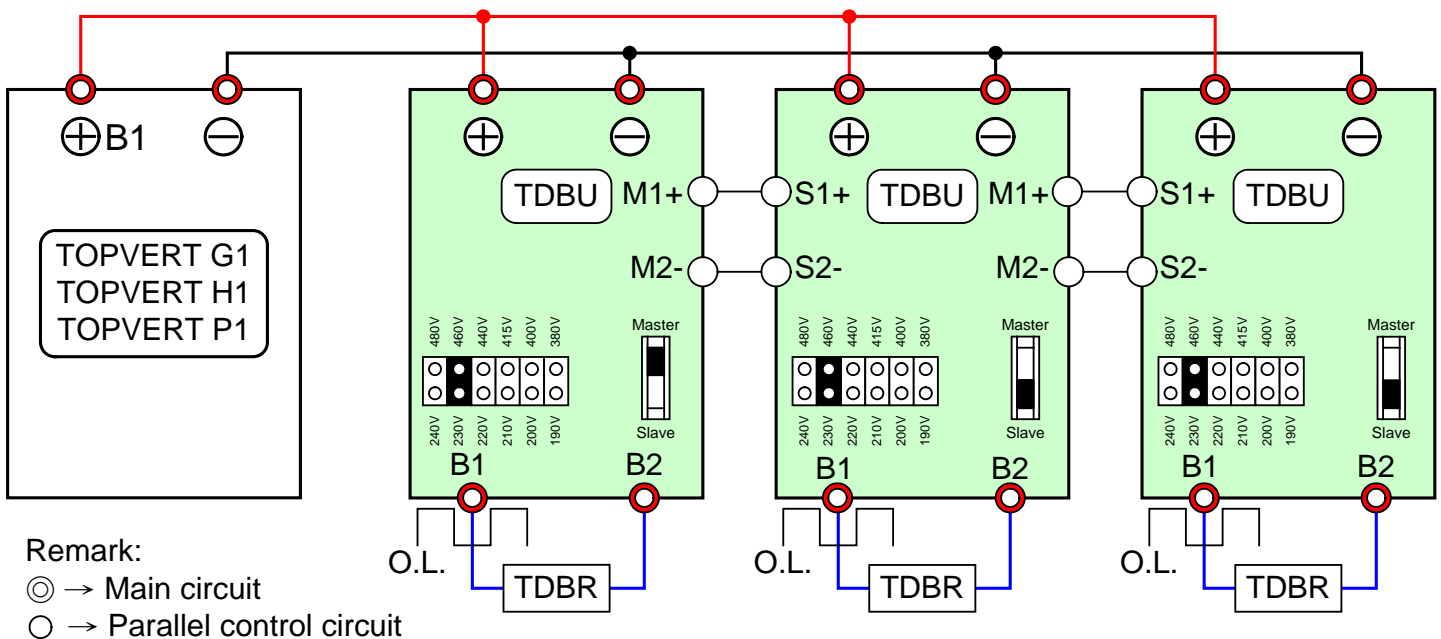
Definition for Braking Usage : $ED\% = T1/T0 \times 100(\%)$

The definition of the barking usage E.D. (%) is for assurance of enough time for the TDBU and braking resistor to dissipate away heat generated by braking. When the braking resistor heats up, the resistance would increase with temperature, and braking torque would decrease accordingly.

2-2-2 The Settings

Master/Slave setting:

The Master/Slave jumper is set “Master” as factory setting. The “Slave” setting is applied to two or more TDBU in parallel, making these TDBU be enabled/disabled synchronously. Then the power dissipation of each unit will be equivalent so that they can perform the braking function completely.



The Slave braking application of three TDBU is shown as the above diagram. After wiring, the jumper of first unit shall be set as “Master” and that of others must be set as “Slave” to complete the system installation.

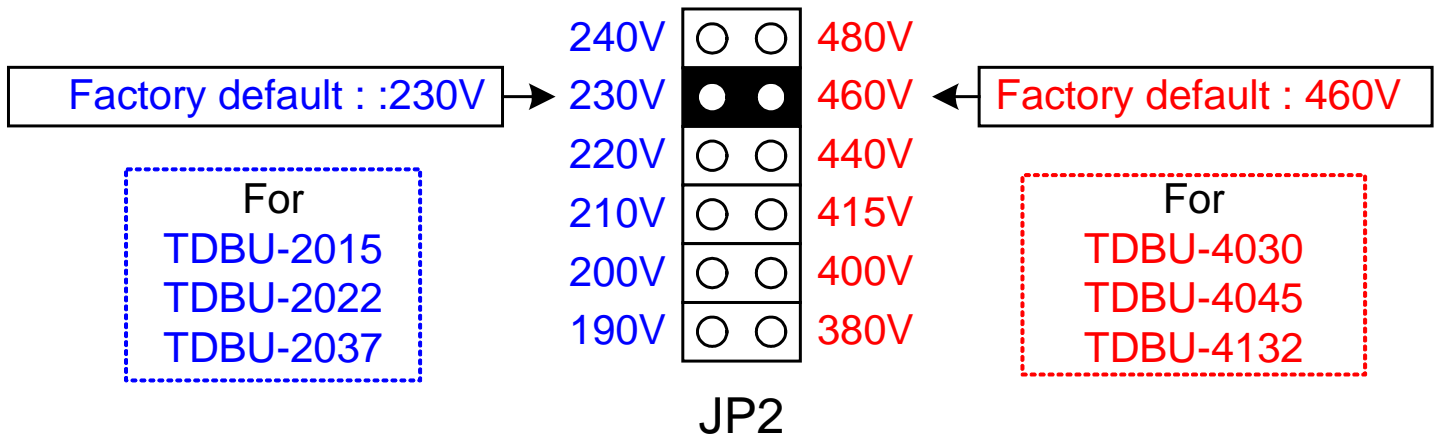
Power voltage setting:

The power source of the TDBU is DC voltage from ⊕B1、⊖ terminals of the AC motor drive. It is very important to set the power voltage of the TDBU based on the input power of the AC motor drive before operation. The setting has a great influence on the potential of the operation voltage for the TDBU. Please refer to the table below.

230V class TDBU-2xxx AC Power Voltage	Braking Start-up voltage (DC bus voltage, ⊕、⊖)	460V class TDBU-4xxx AC Power Voltage	Braking Start-up voltage (DC bus voltage, ⊕、⊖)
190 VAC	330 VDC	380 VAC	660 VDC
200 VAC	345 VDC	400 VAC	690 VDC
210 VAC	360 VDC	415 VAC	720 VDC
220 VAC	380 VDC	440 VAC	760 VDC
230 VAC	400 VDC	460 VAC	800 VDC
240 VAC	415 VDC	480 VAC	830 VDC

NOTE: Input power with tolerance ±10%

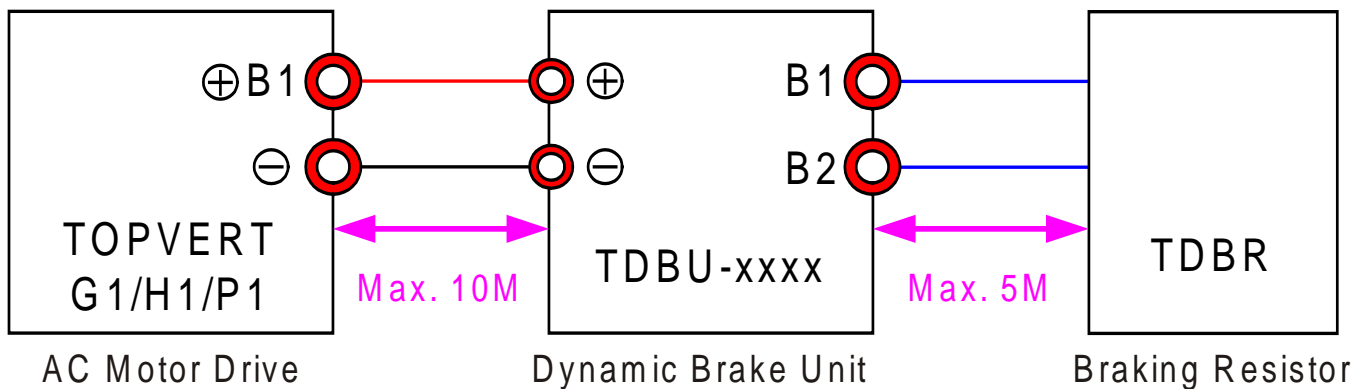
AC power voltage setting



Before setting the power voltage, make sure the power has been turned off. Please set power voltage as the possible highest voltage for unstable power system. Take 380VAC power system for example. If the voltage may be up to 410VAC, 415VAC should be set.

2-2-3 Wiring Notice

- Do not proceed with wiring while power is applied to the circuit.
- The wiring gauge and distance must comply with the electrical code.
- The \oplus 、 \ominus terminals of the AC motor drive (TOPVERT G1/H1/P1 Series), connected to the brake unit (TDBU), must be confirmed for correct polarity lest the TDBU and the TDBU be damaged when power on.
- When the TDBU performs braking, the wires connected to \oplus 、 \ominus , B1 and B2 would generate a powerful electromagnetic field for a moment due to high current passing through. These wires should be wired separately from other low voltage control circuits lest they make interference or mis-operation.
- Inflammable solids, gases or liquids must be avoided at the location where the braking resistor is installed. The braking resistor had better be installed in individual metallic box with forced air-cooling.
- Connect the ground terminal to the Earth Ground. The ground lead must be at least the same gauge wire as leads \oplus 、 \ominus .
- Please install the braking resistor with forced air-cooling or the equivalent when frequent deceleration braking is performed (over 10% E.D.).
- The ring terminals are suggested to be used for main circuit wiring. Make sure the terminals are fastened before power on.
- Wiring distance



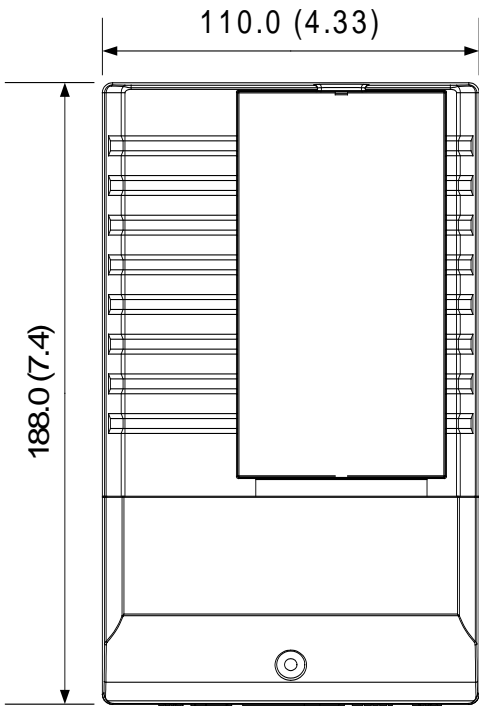
To prevent personal injury, do not connect/disconnect wires or perform the setting of the TDBU while power on. Do not touch the terminals of related wiring and any component on P.C.B. lest users be damaged by extreme dangerous DC high voltage.

2-3 Dimensions

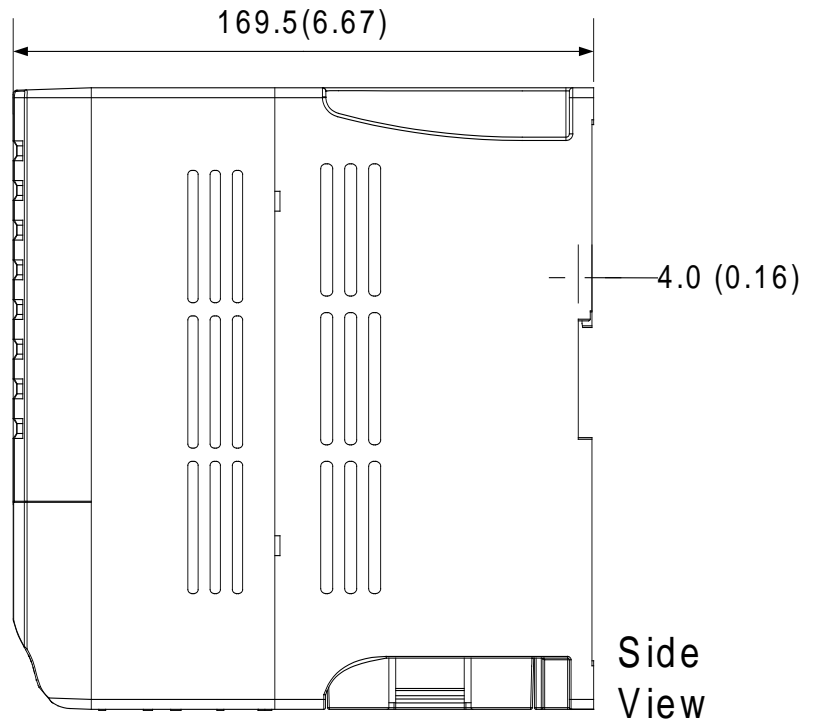
2-3-1 Frame DBU-A --(wall-mounted strengthened plastic enclosure):

Maximum Motor Capacity	200~240VAC / 200~400VDC	380~480VAC / 400~800VDC
15kW / 20Hp	TDBU-2015	TDBU-4030
22kW / 30Hp	TDBU-2022	TDBU-4030
30kW / 40Hp	TDBU-2037	TDBU-4030
37kW / 50Hp	TDBU-2037	TDBU-4045
45kW / 60Hp		TDBU-4045

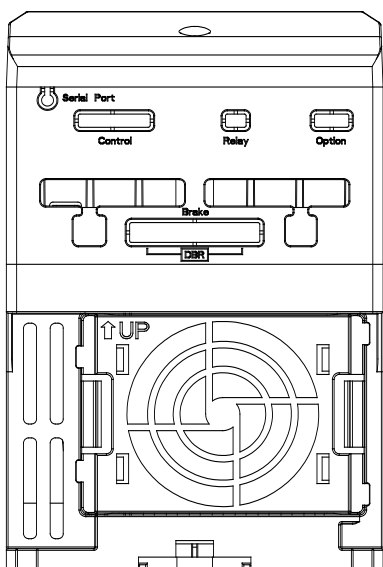
Unit: mm(inch)



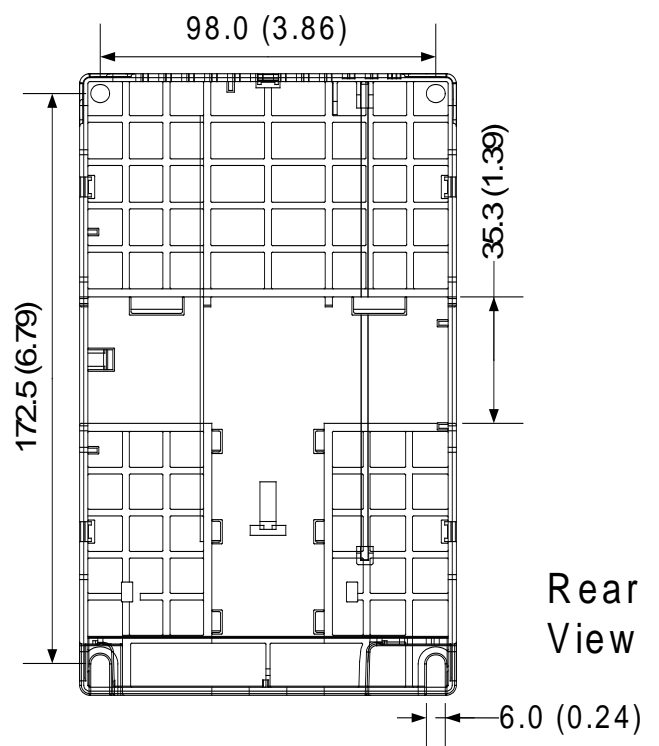
Front View



Side View

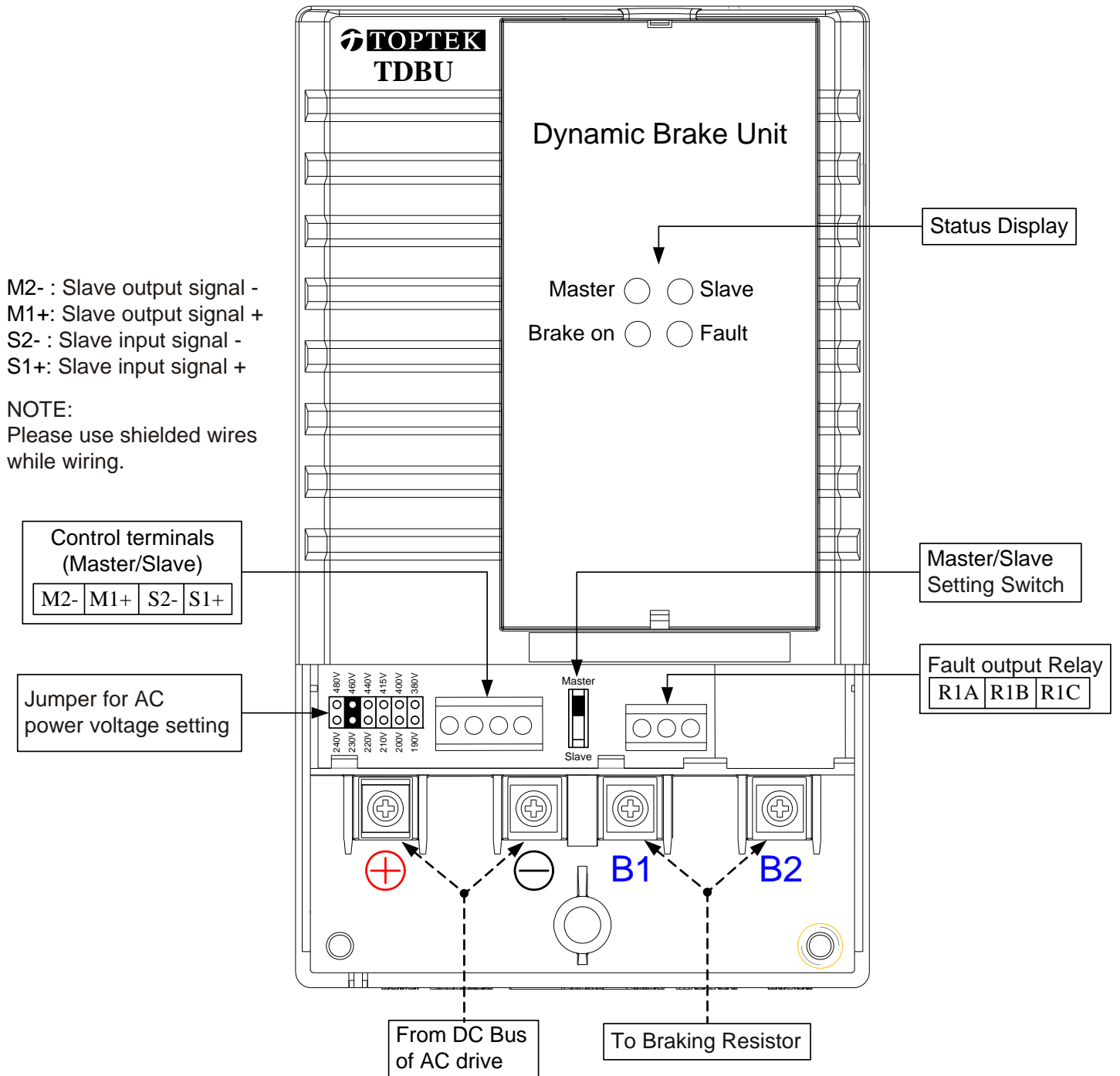


Bottom View



Rear View

2-4 Component Explanations



Terminal Wire Gauge

Circuit	Terminal Mark	Wire Gauge: AWG(mm ²)	Screw	Torque
DC Power Input Circuit	⊕ , ⊖	10~12 (3.5~5.5)	M4	18kgf-cm (15.6in-lbf)
Braking Resistor	B1 , B2			
Slave Circuit	Output M1+ , M2-	18~20 (0.25~0.75) (with shielded wires)	M2	4kgf-cm (3in-lbf)
	Input S1+ , S2-			
Fault Circuit	R1A , R1B , R1C	18~20 (0.25~0.75)		

CHAPTER 3 CONFIGURATION

3-1 The Braking function design of Topvert G1, H1 and P1 series

Dynamic Brake is built-in as standard in all models with Frame code A and B. Other models can be built-in as an option.

Source Voltage	Drive Model		Brake unit		Recommend Braking Resistor Braking Torque =125%, E.D.=10%				Connectable Min. Resistance value of each drive	
	G1- xxxxx H1- xxxxx	P1- xxxxx	Model: TDBU- xxxx	Q'ty	Diagram (refer to 3-1-1)	Equivalent resistor specification of each drive	Braking Resistor to be use			Wiring (refer to 3-1-2)
							Specification	Q'ty		
230V class	230P4	230P	Built-in (can be connect to an external Brake unit)		A,B	80W 200Ω	80W 200Ω	1	1p	82Ω
	230P7	231P			A,B	80W 200Ω	80W 200Ω	1		82Ω
	231P5	232P			A,B	300W 100Ω	300W 100Ω	1		82Ω
	232P2	233P			A,B	300W 100Ω	300W 100Ω	1		82Ω
	233P7	235P			A,B	400W 40Ω	400W 40Ω	1		33Ω
	235P5	237P			A,B	500W 30Ω	500W 30Ω	1		30Ω
	237P5	23011			A,B	1000W 20Ω	1000W 20Ω	1		20Ω
	23011	23015	2015	1	A*,B	2400W 13.6Ω	1200W 6.8Ω	2	2s	13.6Ω
	23015	23018	2015	1	A*,B	3000W 10Ω	1500W 5Ω	2		10Ω
	23018	23022	2022	1	A*,B	4800W 8.0Ω	1200W 8Ω	4	2s2p	8.0Ω
	23022	23030	2022	1	A*,B	4800W 6.8Ω	1200W 6.8Ω	4		6.8Ω
	23030	23037	2015	2	A*,C	6000W 5.0Ω	1500W 5Ω	4	2s3p	5.0Ω
	23037	23045	2037	1	A*,B	7200W 4.5Ω	1200W 6.8Ω	6		4.0Ω
	23045	23055	2022	2	A*,C	9600W 4.0Ω	1200W 8Ω	8		3.4Ω
	23055	23075	2037	2	A*,C	12000W 2.5Ω	1500W 5Ω	8	x2	2.5Ω
23075	23090	2037	2	A*,C	14400W 2.3Ω	1200W 6.8Ω	12	2s3p	1.7Ω	
460V class	430P7	431P	Built-in (can be connect to an external Brake unit)		A,B	80W 750Ω	80W 750Ω	1	1p	160Ω
	431P5	432P			A,B	300W 400Ω	300W 400Ω	1		160Ω
	432P2	433P			A,B	300W 250Ω	300W 250Ω	1		160Ω
	433P7	435P			A,B	400W 150Ω	400W 150Ω	1		130Ω
	435P5	437P			A,B	500W 100Ω	500W 100Ω	1		91Ω
	437P5	43011			A,B	1000W 75Ω	1000W 75Ω	1		62Ω
	43011	43015			A,B	1000W 50Ω	1000W 50Ω	1		39Ω
	43015	43018	A,B	1500W 40Ω	1500W 40Ω	1	40Ω			
	43018	43022	4030	1	A*,B	4800W 32Ω	1200W 8Ω	4	4s	32Ω
	43022	43030	4030	1	A*,B	4800W 27.2Ω	1200W 6.8Ω	4		27.2Ω
	43030	43037	4030	1	A*,B	6000W 20Ω	1500W 5Ω	4	4s2p	20Ω
	43037	43045	4045	1	A*,B	9600W 16Ω	1200W 8Ω	8		16Ω
	43045	43055	4045	1	A*,B	9600W 13.6Ω	1200W 6.8Ω	8		13.6Ω
	43055	43075	4030	2	A*,C	12000W 10Ω	1500W 5Ω	8	4s x2	10Ω
	43075	43090	4045	2	A*,C	19200W 6.8Ω	1200W 6.8Ω	16	4s2p	6.8Ω
	43090	43110	4132	1	A*,B	28800W 4.5Ω	1200W 6.8Ω	24	4s6p	4.5Ω
	43110	43132	4132	1	A*,B	33600W 3.9Ω	1200W 6.8Ω	28	4s7p	3.9Ω
	43132	43160	4132	1	A*,B	38400W 3.4Ω	1200W 6.8Ω	32	4s8p	3.4Ω
	43160	43185	4132	2	A*,C	48000W 2.7Ω	1200W 6.8Ω	40	4s5p	2.7Ω
43185	43220	4132	2	A*,C	57600W 2.3Ω	1200W 6.8Ω	48	4s6p	2.3Ω	
43220	43280	4132	2	A*,C	67200W 2.0Ω	1200W 6.8Ω	56	4s7p	2.0Ω	
43280	43315	4132	3	A*,D	86400W 1.5Ω	1200W 6.8Ω	24	4s6p	1.5Ω	
43315	43400	4132	3	A*,D	100.8kW 1.3Ω	1200W 6.8Ω	84	4s7p	1.3Ω	

* : Only for models which Dynamic Brake is built-in as an option.

3-1-1 Wiring of Dynamic brake unit

*1: Refer to 9-1-2 for wiring of Braking resistor

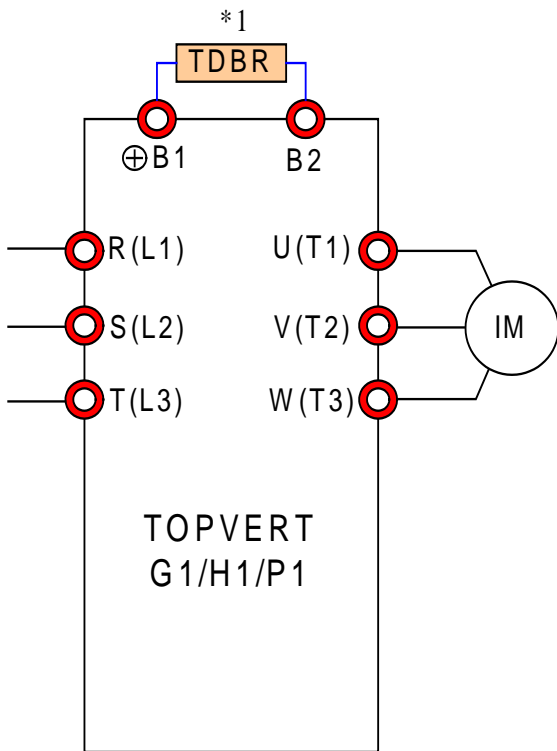


Diagram A

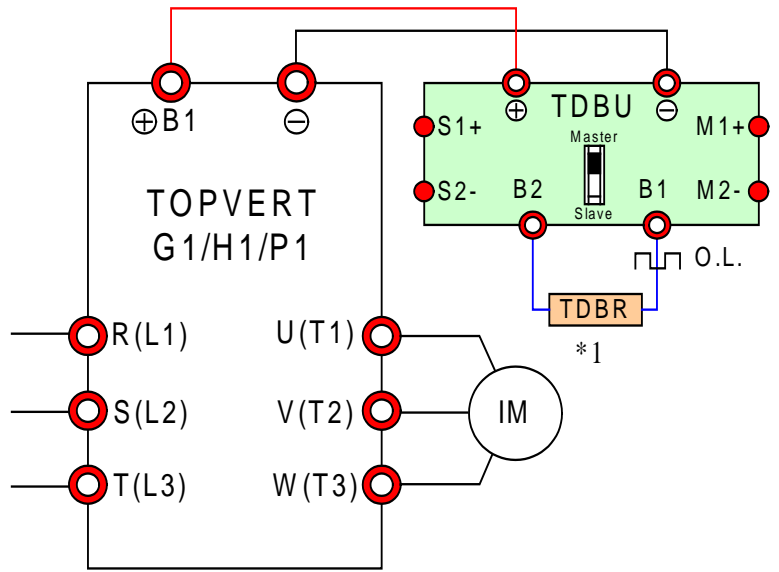


Diagram B

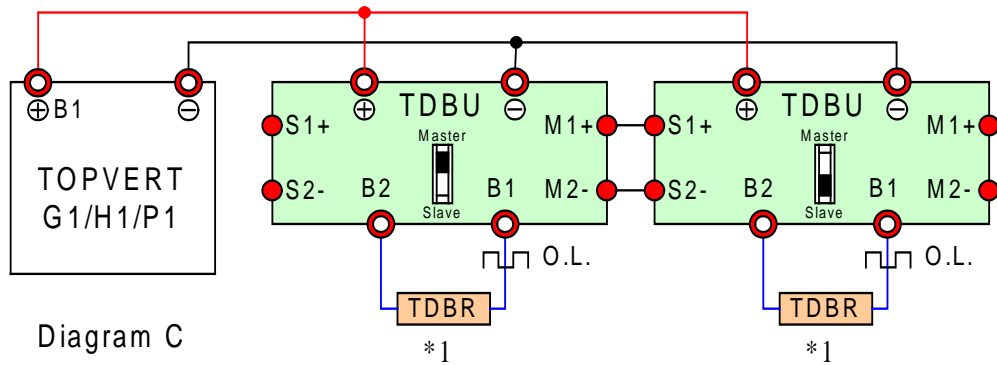


Diagram C

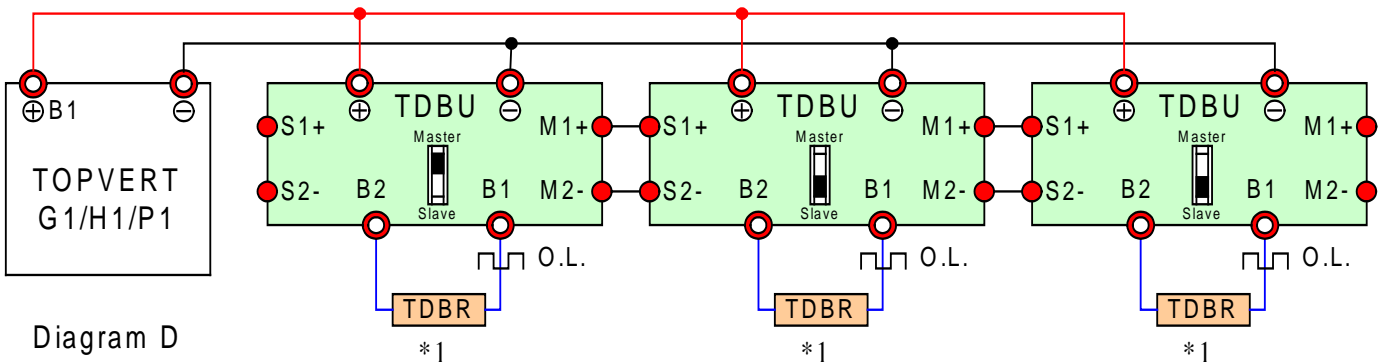
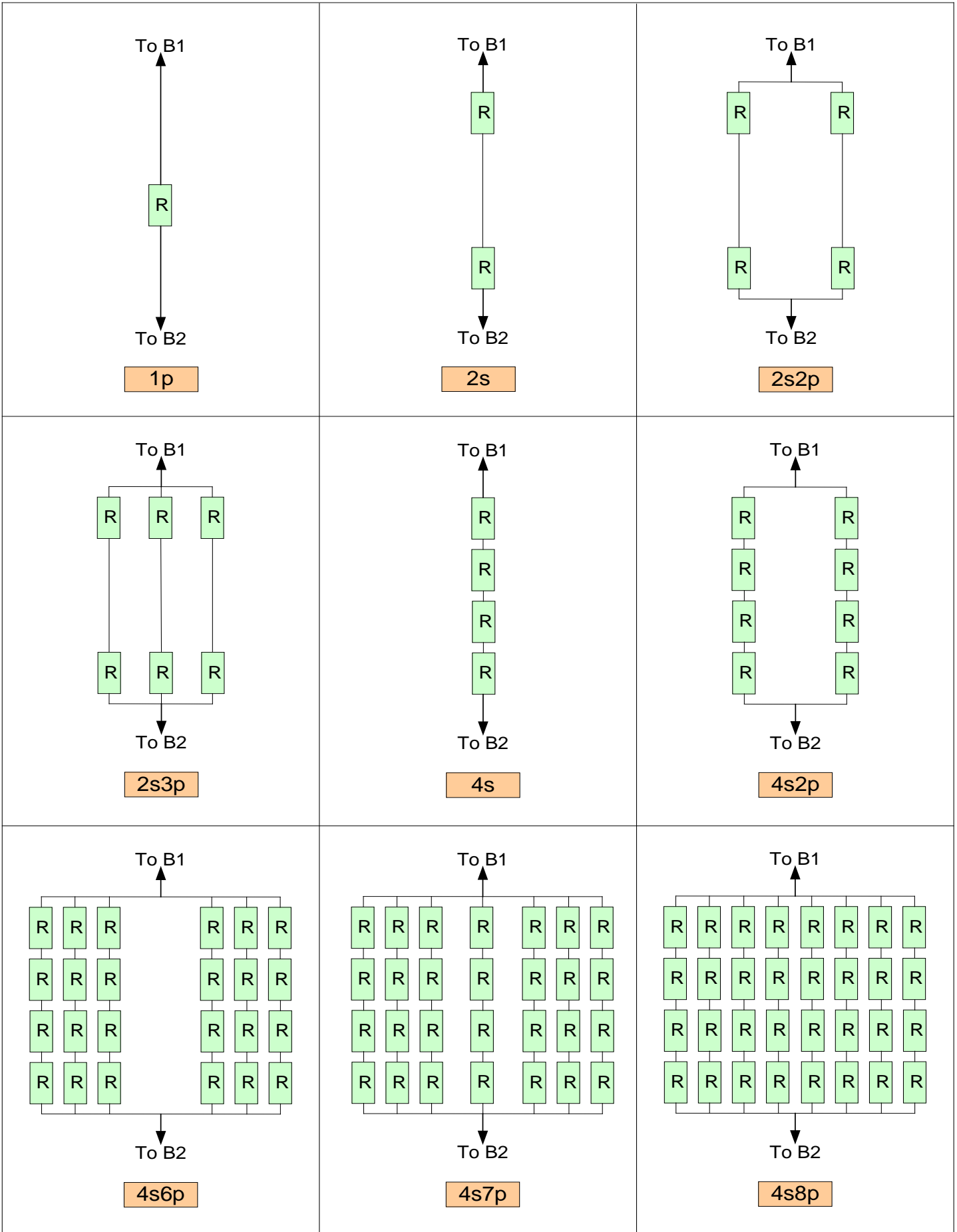


Diagram D

3-1-2 Wiring of Braking resistor

S= in Series connection, P= in Parallel connection



3-2 Dynamic brake unit (TDBU series)

All models in Topvert G1, H1 and P1 series can be connect to an external Dynamic brake unit, in case of braking function is needed but have not select built-in Dynamic Brake while ordering, user still can connect an external Dynamic brake unit (TDBU series).

TDBU brake units are suitable for all of Toptek's Topvert family AC Motor Drives 380V/460V/575V class. TDBU brake units need to be used in conjunction with TDBR series braking resistors to provide the optimum braking characteristics.

Model (TDBU-xxxx)		2015	2022	2037	4030	4045	4132	6055
Maximum Motor Capacity (kW/Hp)		15/20	22/30	37/50	30/40	45/60	132/175	55/75
Suitable for Drive source (VAC)		200 to 240			380 to 480			575 to 600
Power Input Rating (VDC)		200 to 400			400 to 800			607 to 1000
Output Rating	Max. Discharge Current (Amp. peak) 10% ED	40	60	100	40	60	240	60
	Continuous Discharge Current (Amp.)	15	20	33	15	18	75	20
	Connectable Minimum resistance for Each Brake unit	10Ω	6.8Ω	4Ω	20Ω	13.6Ω	3.4Ω	15.8Ω
Braking Start-up Voltage (VDC)		330/345/360/ 380/400/415 ±3V, Selectable			660/690/720/ 760/800/830 ±6V, Selectable			950 ±8V
Protection	Heat Sink Overheat	Temperature over +90°C (194 °F)						
	Alarm Output	Relay contact, 5A120VAC/28VDC (RA, RB, RC)						
	Power Charge Display	Lit on when DC bus voltage is above 50VDC						
Environment	Installation Location	Indoor (no corrosive gases, metallic dust)						
	Operating Temperature	-10°C ~ +50°C (14 °F to 122 °F)						
	Storage Temperature	-20°C ~ +60°C (-4 °F to 140 °F)						
	Humidity	90% Non-condensing						
	Vibration	9.8m/s ² (1G) under 20Hz, 2m/s ² (0.2G) at 20~50Hz						
Mechanical Configuration		Wall-mounted enclosed type IP20 (NEMA 1)						
Frame code		DBU-A				DBU-B	DBU-A	

3-3 Braking Resistor (TDBR series)

	Specifications		Ordering information (TDBR-xxxxxxx)	
	Power rating (W)	Resistance (Ω)	Ribbon wire-wound round type	Aluminum-clad cube type
1	80	750	TDBR-C080W750	TDBR-A080W750
2		200	TDBR-C080W200	TDBR-A080W200
3	300	400	TDBR-C300W400	TDBR-A300W400
4		250	TDBR-C300W250	TDBR-A300W250
5		100	TDBR-C300W100	TDBR-A300W100
6	400	150	TDBR-C400W150	TDBR-A400W150
7		40	TDBR-C400W040	TDBR-A400W040
8	500	100	TDBR-C500W100	TDBR-A500W100
9		30	TDBR-C500W030	TDBR-A500W030
10	1000	75	TDBR-C1K0W075	TDBR-A1K0W075
11		50	TDBR-C1K0W050	TDBR-A1K0W050
12		20	TDBR-C1K0W020	TDBR-A1K0W020
13	1200	8	TDBR-C1K2W008	TDBR-A1K2W008
14		6.8	TDBR-C1K2W6P8	TDBR-A1K2W6P8
15	1500	40	TDBR-C1K5W040	TDBR-A1K5W040
16		5	TDBR-C1K5W005	TDBR-A1K5W005

Note:

1. Please select the factory default resistance value (Watt) and the duty cycle (E.D. %).
2. For an application with large regenerative power such hoisting, the braking torque or other items may exceed the capacity of a brake unit with a braking resistor in a standard combination (and result in capacity overload). Contact your Toptek representatives when the braking torque or any other item exceeds the value in the table.
3. If damage resulted in the inverter or other equipments due to the fact that the braking resistors and the brake unit in use are not provided by Toptek, the warranty will be void.
4. Take into consideration the safety of the environment when installing the braking resistors.
5. If the minimum resistance value is to be utilized, consult local dealers for the calculation of the Watt figures.
6. Please select thermal relay trip contact to prevent resistor over load.
7. When using more than 2 brake units, equivalent resistor value of parallel brake unit can't be less than the value in the column "**Minimum resistance for each drive**".