

Non-Segregated Phase Bus—
Bus Run Section



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Application Description

Eaton's non-segregated phase bus runs are designed for use on circuits whose importance requires greater reliability than power cables provide. Typical of such applications are the connections from transformers to switchgear assemblies in unit substations, connections from switchgear assemblies to rotating apparatus, and tie connections between switchgear assemblies. Non-segregated phase bus is an assembly of bus conductors with associated connections, joints and insulating supports confined within a metal enclosure without interphase barriers. The conductors are adequately separated and insulated from each other and ground by insulating bus supports. Each conductor for 1058 V service and above is insulated with a fluidized bed epoxy coating throughout that reduces the possibility of corona and electrical tracking.

Features, Benefits and Functions**Ease of Installation**

Because of its compact dimensions, relative light weight and user-friendly design, non-segregated phase bus is easily installed. The inherent rigidity of the design permits hanging rods to be spaced at a maximum of 15 ft (4572 mm) and within 4 ft (1219 mm) of elbows and terminations for indoor bus runs, and allows supporting frames to be spaced approximately every 12 ft (3658 mm) for outdoor runs. Standard length of bus run sections is 9.5 ft (2896 mm) or less.

Short-Circuit Force Withstand Ability

Non-segregated phase bus runs in 635 V, 5 kV, 15 kV and 38 kV are designed to withstand three-phase and phase-to-ground short-circuit current in accordance with IEEE® standard C37.23.

Construction

Enclosures are fabricated from extruded aluminum side members with 11- or 14-gauge aluminum covers. Enclosure heights above 14 inches are welded for maximum rigidity. 11- and 14-gauge steel and stainless steel enclosure options are also available. Removable covers are secured with bolts for ease of access when making joints and subsequent and periodic inspection.

Enclosures are painted with a baked-on polyester powder coat paint system resulting in a very durable finish with uniform thickness and gloss. This cosmetically pleasing finish minimizes the risk of problems in harsh environments. The standard color is ANSI-61 light gray, and special paint colors are available upon request. Standard hardware is grade 5 plated. Stainless steel and silicon bronze hardware options are available.

Expansion joints are supplied in all straight bus runs exceeding 80 ft (24,384 mm) for indoor applications and 60 ft (18,288 mm) for outdoor to allow for the expected expansion when the conductors are energized and are carrying rated current.

A variety of terminations is available to accommodate most termination requirements.

Conductors

Standard conductors are 110 copper rated at 98% per IACS. Aluminum conductor bars are also available. Consult factory for maximum amperages. Bus joints are made by solidly bolting the bus bars together with splice plates on each side. All joint surfaces are silver-plated to ensure maximum conductivity through the joint. Tin-plating is also available. After bolting, each standard joint is covered by a preformed, flame-retardant insulating boot, providing full insulation for bus conductors. These boots are easily removable for inspection of the joints at any future time.

Temperature Rise

The bus will be capable of carrying rated current continuously without exceeding a conductor temperature rise of 65 °C above an outside ambient temperature of 40 °C, as required by ANSI C37.23.

Standards and Certifications

The metal-enclosed bus runs are designed for 600 V, 5 kV, 15 kV and 38 kV service in accordance with ANSI C37.23. Also, standard 635 V, 5 kV and 15 kV bus designs are available with a cULus listing.



Tests

The design of non-segregated bus runs has been tested per ANSI C37.23. Certification of momentary current testing, impulse testing and heat rise are available upon request.

Seismic Application

Bus run assemblies can be designed to meet Uniform Building Code (UBC), International Building Code (IBC), California Building Code (CBC)[OSP-022-10], ASCE7-16 and IEEE 693.

Additional Information

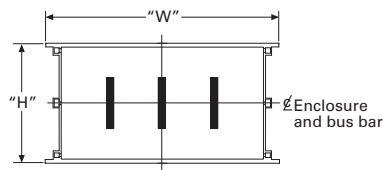
Product, Storage, Installation and Maintenance manual MN017001EN

Technical Data and Specifications

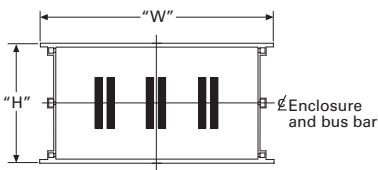
Available Non-Segregated Phase Bus Ratings per ANSI/IEEE Standard C37.23-2015

Rated Maximum Voltage kV rms	Rated Power Frequency Hz	Power Frequency Withstand (kV rms) Dry (1 min)	Lightning Impulse Withstand (kV Peak)	Rated Continuous Current Amperes	Rated Short-Time Withstand Current (kA rms Symmetrical)		Rated Short-Circuit Withstand Current or Momentary Withstand Current 10 Cycle	
					2 sec	1 sec	kA rms Asym.	kA Peak
1.058	60	3	—	1200	—	42	56	97
				1600				
				2000				
				2500				
				3000				
				3200				
				4000				
				5000				
				6000				
				6000				
1.058	60	3	—	1200	—	65	86	150
				1600				
				2000				
				2500				
				3000				
				3200				
				4000				
				5000				
				6000				
				6000				
1.058	60	3	—	1200	—	85	113	196
				1600				
				2000				
				2500				
				3000				
				3200				
				4000				
				5000				
				6000				
				6000				
4.76	60	19	60	1200	50	—	78	130
				2000				
				3000				
				4000				
				5000				
				6000				
4.76	60	19	60	1200	63	—	98	164
				2000				
				3000				
				4000				
				5000				
				6000				
15	60	36	95	1200	50	—	78	130
				2000				
				3000				
				4000				
				5000				
				6000				
15	60	36	95	1200	63	—	98	164
				2000				
				3000				
				4000				
				5000				
				6000				
38	60	80	150	1200	40	—	62	104
				2000				
				2500				
				3000				

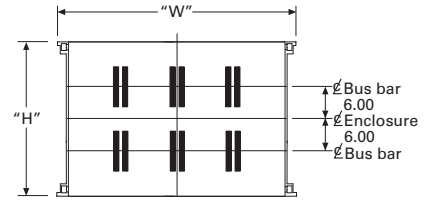
Non-Segregated Phase Bus—Standard Configurations—635 V



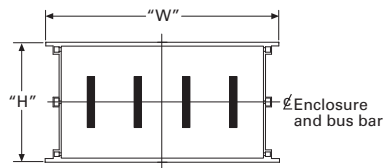
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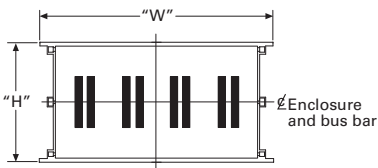
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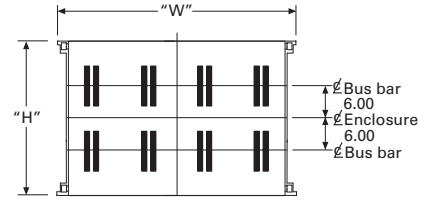
Layout 3



Layout 4



Layout 5



Layout 6

Wire Type	Rated Maximum Voltage (kV) ①	Rated Cont. Current Amperes	Rated Short-Time Withstand Current (kA rms Symmetrical) (1 sec)	Layout	Enclosure Material		Enclosure Size (Inches)		Number of Bars Ph/N and Size, Cu (Inches)	Insulating Supports ②		Optional Ground Bus, Cu (Inches) ③	Approx. Average Weight per Foot Lb (kg)	Listing
					Std.	Opt.	H	W		Std.	Opt.			
3	0.635/1.058	1200	42/65	1	Aluminum	Steel/Stainless Steel	8	21	(1) 3/8 x 3	GPO-3 Glass Polyester	—	0.25 x 3	29	Yes
	0.635/1.058	1600	42/65	1	Aluminum	Steel/Stainless Steel	8	21	(1) 1/2 x 3	GPO-3 Glass Polyester	—	0.25 x 3	33	Yes
	0.635/1.058	2000	42/65	1	Aluminum	Steel/Stainless Steel	10	21	(1) 5/8 x 4	GPO-3 Glass Polyester	—	0.25 x 3	47	Yes
	0.635/1.058	2500	42/65/85	1	Aluminum	Stainless Steel	14	21	(1) 1/2 x 6	GPO-3 Glass Polyester	—	0.25 x 3	54	Yes
	0.635/1.058	3200	42/65/85/100	2	Aluminum	Stainless Steel	14	27	(2) 3/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	75	Yes
	0.635/1.058	4000	42/65/85/100	2	Aluminum	Stainless Steel	14	36	(2) 5/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	111	Yes
	0.635/1.058	5000	42/65/85/100	2	Aluminum	Stainless Steel	24	42	(2) 1/2 x 8	GPO-3 Glass Polyester	—	0.25 x 3	131	Yes
	0.635/1.058	6000	42/65/85/100	3	Aluminum	Stainless Steel	28	42	(4) 3/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	147	Yes
4	0.635/1.058	1200	42/65	4	Aluminum	Steel/Stainless Steel	8	21	(1) 3/8 x 3	GPO-3 Glass Polyester	—	0.25 x 3	29	Yes
	0.635/1.058	1600	42/65	4	Aluminum	Steel/Stainless Steel	8	21	(1) 1/2 x 3	GPO-3 Glass Polyester	—	0.25 x 3	33	Yes
	0.635/1.058	2000	42/65	4	Aluminum	Steel/Stainless Steel	10	21	(1) 5/8 x 4	GPO-3 Glass Polyester	—	0.25 x 3	47	Yes
	0.635/1.058	2500	42/65	4	Aluminum	Stainless Steel	14	21	(1) 1/2 x 6	GPO-3 Glass Polyester	—	0.25 x 3	54	Yes
	0.635/1.058	3200	42/65	5	Aluminum	Stainless Steel	14	27	(2) 3/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	75	Yes
	0.635/1.058	4000	42/65	5	Aluminum	Stainless Steel	14	36	(2) 5/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	111	Yes
	0.635/1.058	5000	42/65	5	Aluminum	Stainless Steel	24	42	(2) 1/2 x 8	GPO-3 Glass Polyester	—	0.25 x 3	131	Yes
	0.635/1.058	6000	42/65	6	Aluminum	Stainless Steel	28	42	(4) 3/8 x 6	GPO-3 Glass Polyester	—	0.25 x 3	147	Yes

Notes

① All phase conductors above 1058 V are fully insulated with epoxy insulation for the rated maximum voltage. Epoxy insulation is available at 635 V as an option.

② Optional bracing supports are available. Consult factory.

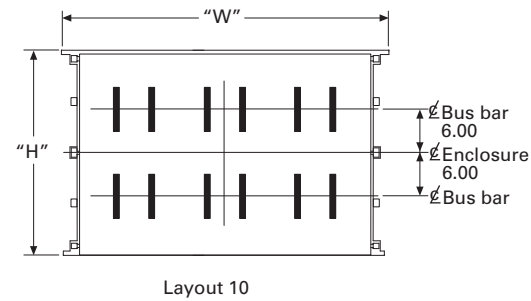
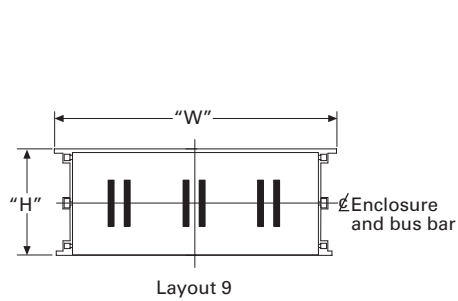
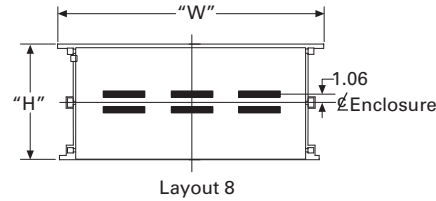
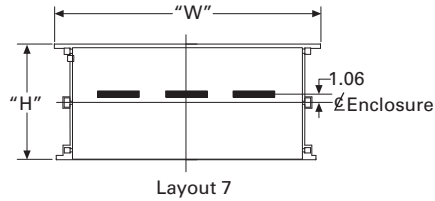
③ Standard ground bus is 0.25 x 2; 0.25 x 3 ground bus is required for UL listed bus runs.

For dimensions in mm, multiply inches by 25.4.

Non-Segregated Phase Bus

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Non-Segregated Phase Bus—Standard Configurations—5 kV and 15 kV



Wire Type	Rated Maximum Voltage (kV)	Rated Cont. Current Amperes	Rated Short-Time Withstand Current (kA rms Symmetrical) (2 sec)	Layout	Enclosure Material		Enclosure Size (Inches)		Number of Bars Ph and Size, Cu (Inches)	Insulating Supports ①		Optional Ground Bus, Cu (Inches) ②	Approx. Average Weight per Foot Lb (kg)	Listing cULus
					Std.	Opt.	H	W		Std.	Opt.			
3	5/15	1200	32/40/50	7	Aluminum	Steel/Stainless Steel	14	27	(1) 1/4 x 3	Polyester	—	0.25 x 3	34	Yes
	5/15	1600	32/40/50	7	Aluminum	Steel/Stainless Steel	14	27	(1) 1/2 x 3	Polyester	—	0.25 x 3	41	Yes
	5/15	2000	32/40/50	7	Aluminum	Steel/Stainless Steel	14	30	(1) 5/8 x 4	Polyester	—	0.25 x 3	55	Yes
	5/15	2500	32/40/50	7	Aluminum	Stainless Steel	14	36	(1) 1/2 x 6	Polyester	—	0.25 x 3	64	Yes
	5/15	3200	32/40/50	8	Aluminum	Stainless Steel	14	36	(2) 3/8 x 6	Polyester	—	0.25 x 3	85	Yes
	5/15	4000	32/40/50	9	Aluminum	Stainless Steel	14	36	(2) 5/8 x 6	GPO-3 ③	—	0.25 x 3	125	Yes
	5/15	5000	32/40/50	9	Aluminum	Stainless Steel	24	42	(2) 1/2 x 8	GPO-3 ③	—	0.25 x 3	143	Yes
	5/15	6000	32/40/50	10	Aluminum	Stainless Steel	28	42	(4) 3/8 x 6	GPO-3 ③	—	0.25 x 3	162	Yes

Notes

① Optional bracing supports are available. Consult factory.

② Standard ground bus is 0.25 x 2; 0.25 x 3 ground bus is required for UL listed bus runs.

③ Porcelain inserts are required if 15 kV rated maximum voltage is selected.

For dimensions in mm, multiply inches by 25.4.

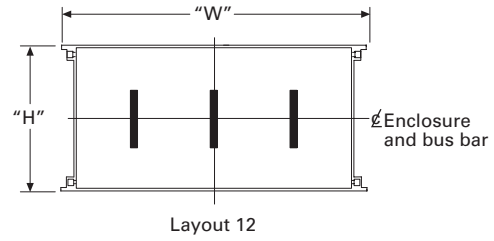
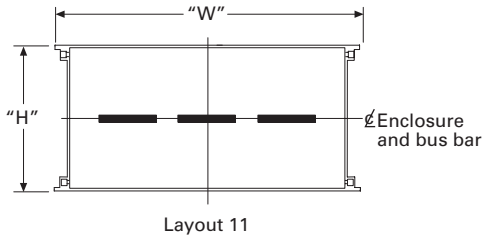
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Non-Segregated Phase Bus

Non-Segregated Phase Bus

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Non-Segregated Phase Bus—Standard Configurations—38 kV



Wire Type	Rated Maximum Voltage (kV)	Rated Cont. Current Amperes	Rated Short-Time Withstand Current (kA rms Symmetrical) (2 sec)	Layout	Enclosure Material		Enclosure Size (Inches)		Number of Bars Ph and Size, Cu (Inches)	Insulating Supports		Optional Ground Bus, Cu (Inches)	Approx. Average Weight per Foot Lb (kg)	Listing
					Std.	Opt.	H	W		Std.	Opt.			
3	38	1200	40	11	Aluminum	Steel/Stainless Steel	24	51	(1) 3/8 x 2	Porcelain	Epoxy	0.25 x 2	84	No
	38	1600	40	11	Aluminum	Steel/Stainless Steel	24	51	(1) 3/8 x 3	Porcelain	Epoxy	0.25 x 2	89	No
	38	2000	40	11	Aluminum	Steel/Stainless Steel	24	51	(1) 3/8 x 4	Porcelain	Epoxy	0.25 x 2	93	No
	38	2500	40	12	Aluminum	Stainless Steel	24	51	(1) 1/2 x 6	Porcelain	Epoxy	0.25 x 2	111	No
	38	3000	40	12	Aluminum	Stainless Steel	24	51	(1) 5/8 x 6	Porcelain	Epoxy	0.25 x 2	120	No

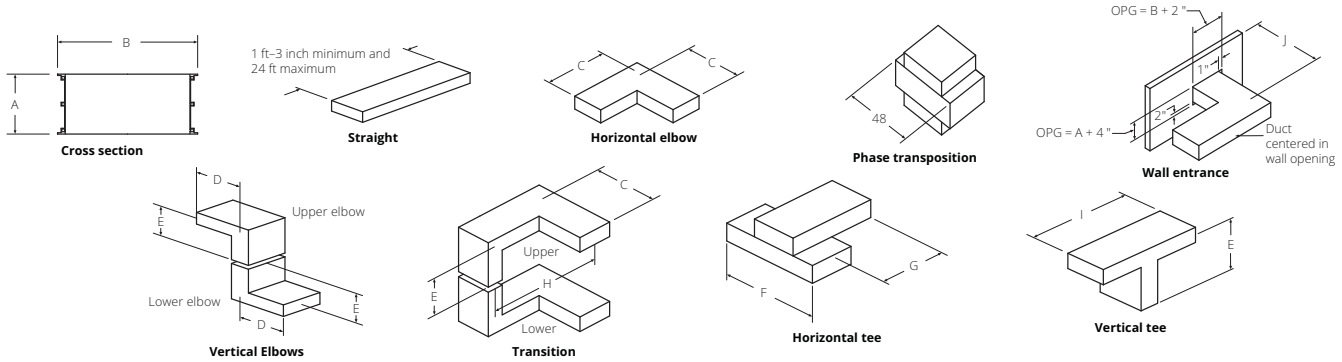
Note

For dimensions in mm, multiply inches by 25.4.

Non-Segregated Phase Bus

Non-Segregated Phase Bus Dimensional Info, Electrical Properties and Watt Loss Data

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Voltage and Material	Ampere Rating ^①	Wt/ft lb ^②	Dimensions in Inches ^②										Resistance Microhms per Phase per ft ^③	Watt Loss per Three-Phase per ft ^③	Reactance Microhms per ft	Impedance Microhms per ft ^③	Capacitance Microfarads per 1000 ft
			A	B	C	D	E	F	G	H	I	J					
600 Copper	1200	29	8	21	22	11.38	15	48	22	18.25	28	17	10.76	46	44.29	45.58	0.022
	1600	33	8	21	22	11.38	15	48	22	18.25	28	17	8.50	65	43.46	44.28	0.023
	2000	47	10	21	22	12.38	16	48	22	19.25	30	17	5.79	70	37.05	37.50	0.024
	2500	54	14	21	22	14.38	18	48	22	21.25	34	17	4.71	88	29.23	29.61	0.024
	3200	75	14	27	25	14.38	18	60	25	24.25	34	20	3.91	120	31.84	32.08	0.028
	4000	111	14	36	30	14.38	18	60	30	28.75	34	25	3.47	166	41.93	42.07	0.030
	5000	131	24	42	33	19.38	23	60	33	36.75	44	28	2.78	209	42.54	42.63	0.023
	6000	147	28	42	33	21.38	25	60	33	38.75	48	28	2.41	260	24.76	24.88	0.035
600 Aluminum	1200	21	8	21	22	11.38	15	48	22	18.25	28	17	13.41	58	43.46	45.48	0.023
	1600	26	10	21	22	12.38	16	48	22	19.25	30	17	8.76	67	37.05	38.07	0.024
	2000	32	14	21	22	14.38	18	48	22	21.25	34	17	6.16	74	28.79	29.44	0.025
	2500	37	14	27	25	14.38	18	60	25	24.25	34	20	5.61	105	31.84	32.33	0.028
	3000	47	14	27	25	14.38	18	60	25	24.25	34	20	4.10	126	41.93	42.13	0.029
5000 and 15,000 Copper	1200	34	14	27	25	14.38	18	60	25	24.25	34	20	15.09	65	56.50	58.48	0.015
	1600	41	14	27	25	14.38	18	60	25	24.25	34	20	8.50	65	54.37	55.03	0.016
	2000	55	14	30	27	14.38	18	60	27	25.75	34	22	5.79	70	51.20	51.53	0.019
	2500	64	14	36	30	14.38	18	60	30	28.75	34	25	4.71	88	48.76	48.98	0.024
	3000	85	14	36	30	14.38	18	60	30	28.75	34	25	4.03	109	42.88	43.07	0.030
	4000	125	14	36	30	14.38	18	60	30	28.75	34	25	3.47	166	41.93	42.07	0.030
	5000	143	24	42	33	19.38	23	60	33	36.75	44	28	2.78	209	42.54	42.63	0.023
	6000	162	28	42	33	21.38	25	60	33	38.75	48	28	2.41	260	24.76	24.88	0.034
5000 and 15,000 Aluminum	1200	30	14	27	25	14.38	18	60	25	24.25	34	20	13.41	58	54.37	56.00	0.016
	1600	34	14	30	27	14.38	18	60	27	25.75	34	22	8.76	67	51.20	51.95	0.019
	2000	41	14	36	30	14.38	18	60	30	28.75	34	25	6.16	74	48.32	48.71	0.024
	2500	44	14	30	27	14.38	18	60	27	25.75	34	22	5.68	107	42.52	42.89	0.025
	3000	55	14	36	30	14.38	18	60	30	28.75	34	25	4.32	117	41.93	42.15	0.030
38,000 Copper	600	84	24	51	37	24.00	23	84	37	45.88	48	33	15.44	17	76.79	78.50	0.011
	1200	84	24	51	37	24.00	23	84	37	45.88	48	33	15.44	67	76.79	78.50	0.011
	1600	89	24	51	37	24.00	23	84	37	45.88	48	33	10.76	83	68.89	69.73	0.012
	2000	93	24	51	37	24.00	23	84	37	45.88	48	33	8.37	100	62.93	63.48	0.014
	2500	111	24	51	37	24.00	23	84	37	45.88	48	33	4.68	88	53.83	54.03	0.017
	3000	120	24	51	37	24.00	23	84	37	45.88	48	33	3.99	108	53.39	53.54	0.017
38,000 Aluminum	600	78	24	51	37	24.00	23	84	37	45.88	48	33	25.46	27	76.97	81.07	0.011
	1200	79	24	51	37	24.00	23	84	37	45.88	48	33	17.23	74	68.89	71.01	0.012
	1600	81	24	51	37	24.00	23	84	37	45.88	48	33	13.41	58	68.06	69.36	0.013
	2000	82	24	51	37	24.00	23	84	37	45.88	48	33	11.33	136	62.28	63.30	0.014

Notes

① Ampere ratings are based upon a maximum conductor rise of 65 °C in a 40 °C ambient in compliance with the temperature limits of ANSI/IEEE C37.23.

② Weights and dimensions are for standard three-phase totally enclosed non-ventilated aluminum enclosures.

③ Resistance, watt loss and impedance values are calculated using a maximum conductor temperature rise of 65 °C and a normal 20 °C ambient.

For dimensions in mm, multiply inches by 25.4.