

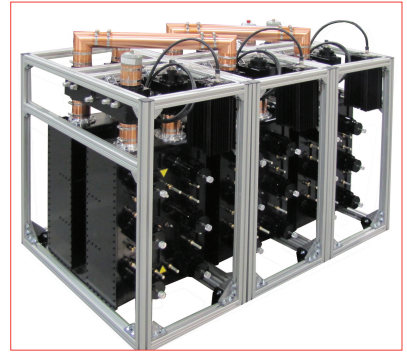
UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Product Description

These series of constant impedance UHF combiner modules are designed for multichannel digital and analogue TV applications. These balanced UHF TV combiners are ideal when optimum performance specifications are required. They are all very compact for their ratings, as well as temperature stable and suitable for a wide range of applications. RFS combiners are usable for all known standards and applications, however this guide focuses on the standard indicated above.

Each balanced combiner module consists of two 3dB couplers, separated by bandpass filters, whether they be coaxial or waveguide depends upon the series, where CA is coaxial, and CW waveguide. A separate data sheet detailing the directional waveguide operation of our CW series is also available.

The narrowband input corresponds to the bandpass resonant frequency, whereas the wideband input can be any other channels in the applicable UHF band. Modules are connected together to provide a multi-channel combiner. The order (number of poles) of the filters will determine the channel spacing required for given channels, and also the mask, if any that may be provided.



Features/Benefits

- Compact design, small footprint
- Modular design with integrated frames
- Rack mountable (smaller systems wall and ceiling mountable also)
- Wideband, high performance couplers for plug and play style expandability and flexibility
- Highest power rating for size/class
- Lowest loss for size/class in all sizes
- Temperature stabilized
- All global standards/applications available
- Tunable over full frequency range
- Integrated mask filtering
- Multiple stage 3dB couplers for unsurpassed wideband responses.
- PeakPower™ technology
- Three mask variants depending upon transmitter intermodulation.

- Options:
- Various input connector sizes
 - Monitoring or test ports via directional couplers
 - Monitoring systems
 - By-pass patching systems

Specifications

MASK ETSI Non Critical (TXIM <-36dB)

	CA6PXX45E	CA5P50E	CA6P50E	CA6PPXX80E	CA6PPXX110E
Combined Output Rating, kW					
45E Series	1				
50E Series		1.8	1.8		
With 1-5/8" coupler				5.6	5.6
With 3-1/8" coupler				12	12
With 4-7/8" coupler					
With waveguide output					
NB Input Power Rating, kW					
@ fc = 474MHz (≤ 40° rise)	NA	0.63	0.93	2.20	5.40
@ fc = 666MHz (≤ 40° rise)	NA	0.55	0.81	1.80	4.50
@ fc = 858MHz (≤ 40° rise)	NA	0.47	0.69	1.40	3.60
@ fc = 474MHz (≤ 30° rise)	0.30	0.47	0.70	1.65	4.05
@ fc = 666MHz (≤ 30° rise)	0.30	0.41	0.61	1.35	3.38
@ fc = 858MHz (≤ 30° rise)	0.30	0.35	0.52	1.05	2.70
NB Input Power Rating with single adjacent of equal power in WB input, kW					
@ fc = 474MHz (≤ 30° rise)	0.16	0.38	0.39	1.24	2.34
@ fc = 666MHz (≤ 30° rise)	0.16	0.33	0.34	1.11	2.09
@ fc = 858MHz (≤ 30° rise)	0.16	0.28	0.28	0.98	1.84
a) NB Insertion Loss for a single nonadjacent, dB					
@ fc = 474MHz	0.72	0.75	1.08	0.46	0.38
@ fc = 666MHz	0.72	0.80	1.18	0.51	0.43
@ fc = 858MHz	0.72	0.85	1.28	0.54	0.47
NB Insertion Loss Variation wrt fc, dB					
@ fc±3.8MHz non adjacent = 666MHz	1.35	2.40	1.85	0.95	0.85
@ fc±3.8MHz adjacent = 666MHz	3.20	2.40	2.90	2.40	2.20
@ fc±3.8MHz non adjacent = 858MHz	1.35	2.90	2.90	1.10	0.96
@ fc±3.8MHz adjacent = 858MHz	3.20	2.90	3.50	2.60	2.4
Attenuation wrt fc, dB					
@ fc ± 4.2MHz	4.0	4.0	4.0	4.0	4.0
@ fc ± 6.0MHz	20	22.5	22.5	20	20
@ fc ± 12MHz	41	50	50	41	41
Group Delay wrt fc, ns					
@ fc ± 3.8MHz nonadjacent edge	400	240	300	400	400
@ fc ± 3.8MHz adjacent edge	600	390	500	600	600
b) WB Input Insertion loss at fc for a single module (non adjacent),dB	0.15	0.13	0.13	0.1	0.1
c) Additional NB Insertion loss at fc per adjacent channel on its WB, dB	0.1	0.07	0.06	0.06	0.05
d) Insertion loss per additional module, dB	0.1	0.1	0.08	0.06	0.05
WB Input insertion loss at Nth module (where 1st module is at output)	= b + d x (N-1), non adjacent				
NB Insertion loss at Nth Module, for N >= 2	= b + d x (N-1) + c per adjacent channel, for WB channels adjacent to NB channels				
	= a + d x (N-1) + c per adjacent channel on its WB input only				
Return Loss, dB:					
NB, across fc +/- 3.8MHz	>26				
WB, for adjacent channels	>26, depending upon configuration				
WB, for non-adjacent channels	>30, depending upon configuration, otherwise >26				
Isolation, dB ; across fc +/- 3.8MHz					
NB to NB for adjacent channels	>35+/-5				
NB to NB for non-adjacent channels	>70+/-10				
NB to WB for adjacent channels	>35+/-5				
WB to NB for non-adjacent channels	>Attenuation wrt fc @ fc +/- 12MHz				

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UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Specifications MASK ETSI Non Critical (TXIM <-35dB)

	CA6PPXX160E Air Cooled	CA6PPXX161E Liquid Cooled	CA6PPXX200E Air Cooled	CA6PPXX201E Liquid Cooled	CA6PPXX270E Air Cooled	CA6PPXX271E Liquid Cooled	CW6PX Air Cooled
Combined Output Rating, kW							
45E Series							
50E Series							
With 1-5/8" coupler							
With 3-1/8" coupler	15	15	18	18			
With 4-7/8" coupler	35	35	35	35	42	42	
With 6-1/8" coupler			80	80	100	100	
With waveguide output							240
NB Input Power Rating, kW							
@ fc = 474MHz (≤ 40° rise)	10.0	15.0	26.0	60.0	(474) 29.8	(474) 59.6	60.0
@ fc = 666MHz (≤ 40° rise)	8.5	13.3	22.0	44.0	(586) 27.8	(586) 55.6	44.0
@ fc = 858MHz (≤ 40° rise)	7.0	11.6	18.0	28.0	≤698MHz	≤698MHz	28.0
@ fc = 474MHz (≤ 30° rise)	7.5	11.3	26.0	45.0			45.0
@ fc = 666MHz (≤ 30° rise)	6.4	10.0	22.0	33.0			33.0
@ fc = 858MHz (≤ 30° rise)	5.3	8.7	18.0	21.0	≤698MHz	≤698MHz	21.0
NB Input Power Rating with single adjacent of equal power in WB input, kW							
@ fc = 474MHz (≤ 30° rise)	6.0	10.0	14.0	40.0			40.0
@ fc = 666MHz (≤ 30° rise)	5.4	9.0	11.8	23.6			23.6
@ fc = 858MHz (≤ 30° rise)	4.7	8.0	9.7	10.8	≤698MHz	≤698MHz	10.8
a) NB Insertion Loss for a single nonadjacent, dB							
@ fc = 474MHz	0.30	0.28	0.27	0.27	(474) 0.20	(474) 0.20	0.24
@ fc = 666MHz	0.34	0.31	0.32	0.32	(586) 0.22	(586) 0.22	0.27
@ fc = 858MHz	0.37	0.33	0.35	0.35	≤698MHz	≤698MHz	0.30
NB Insertion Loss Variation wrt fc, dB							
@ fc±3.8MHz non adjacent = 666MHz	0.70	0.60	0.65	0.65	0.43	0.43	0.55
@ fc±3.8MHz adjacent = 666MHz	1.78	1.78	1.70	1.70	1.5	1.5	1.35
@ fc±3.8MHz non adjacent = 858MHz	0.75	0.87	0.70	0.70	0.45	0.45	0.75
@ fc±3.8MHz adjacent = 858MHz	1.85	1.85	1.75	1.75	≤698MHz	≤698MHz	1.45
Attenuation wrt fc, dB							
@ fc ± 4.2MHz	4.0	4.0	4.0	4.0	4.0	4.0	5.2
@ fc ± 6.0MHz	20	20	20	20	20	20	20
@ fc ± 12MHz	41	41	41	41	41	41	42
Group Delay wrt fc, ns							
@ fc ± 3.8MHz nonadjacent edge	400	400	400	400	350	350	400
@ fc ± 3.8MHz adjacent edge	600	600	600	600	600	600	600
b) WB Input Insertion loss at fc for a single module (non adjacent),dB							
	0.09	0.09	0.09	0.08	0.05	0.05	0.08
c) Additional NB Insertion loss at fc per adjacent channel on its WB, dB							
	0.04	0.03	0.03	0.03	0.03	0.03	0.02
d) Insertion loss per additional module, dB	0.05	0.05	0.05	0.05	0.05	0.05	0.025
WB Input insertion loss at Nth module (where 1st module is at output)							
	= b + d x (N-1), non adjacent						
	= b + d x (N-1) + c per adjacent channel, for WB channels adjacent to NB channels						
	= a + d x (N-1) + c per adjacent channel on its WB input only						
NB Insertion loss at Nth Module, for N >= 2							
Return Loss, dB:							
NB, across fc +/- 3.8MHz	>26						
WB, for adjacent channels	>26, depending upon configuration						
WB, for non-adjacent channels	>30, depending upon configuration, otherwise >26						
Isolation, dB ; across fc +/- 3.8MHz							
NB to NB for adjacent channels	>35+/-5						
NB to NB for non-adjacent channels	>70+/-10						
NB to WB for adjacent channels	>35+/-5						
WB to NB for non-adjacent channels	>Attenuation wrt fc @ fc +/- 12MHz						

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UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Specifications MASK ETSI Critical (TXIM 36, 37 & 40dB & Filter of >14, 25, 47dB at fc ± 4.2, 6 & 12MHz)

	CA6PXX45E	CA6PPXX80E	CA6PPXX110E	CA6PPXX160E	CA6PPXX200E	CA6PPXX201E Liquid Cooled
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Combined Output Rating, kW
45E Series

With 1-5/8" coupler	1	5.6	5.6			
With 3-1/8" coupler (≥ 3ch, 2ch)				12	12	12
With 3-1/8" high power coupler				20	20	20
With 4-7/8" coupler				35	50	50
With waveguide output						

NB Input Power Rating, kW

@ fc = 474MHz (≤ 40° rise)	NA	1.70	4.00	8.2	16.0	24.0
@ fc = 666MHz (≤ 40° rise)	NA	1.50	3.50	7.4	14.0	21.0
@ fc = 858MHz (≤ 40° rise)	NA	1.30	3.00	6.5	12.0	18.0
@ fc = 474MHz (≤ 30° rise)	0.30	1.28	3.00	6.2	12.0	18.0
@ fc = 666MHz (≤ 30° rise)	0.30	1.13	2.63	5.5	10.5	15.8
@ fc = 858MHz (≤ 30° rise)	0.30	0.98	2.25	4.9	9.0	13.5

NB Input Power Rating with single adjacent of equal power in WB input, kW

@ fc = 474MHz (≤ 30° rise)	0.16	1.24	2.34	6.0	10.0	14.0
@ fc = 666MHz (≤ 30° rise)	0.16	1.11	2.09	5.2	9.0	11.8
@ fc = 858MHz (≤ 30° rise)	0.16	0.98	1.84	4.4	8.0	9.7

a) NB Insertion Loss for a single nonadjacent, dB

@ fc = 474MHz	0.88	0.52	0.40	0.38	0.34	0.34
@ fc = 666MHz	0.88	0.56	0.45	0.41	0.37	0.37
@ fc = 858MHz	0.88	0.59	0.52	0.43	0.39	0.39

NB Insertion Loss Variation wrt fc, dB

@ fc ± 3.8MHz non adjacent = 666MHz	3.40	1.95	1.70	1.45	1.38	1.38
@ fc ± 3.8MHz adjacent = 666MHz	3.80	2.50	2.10	1.70	1.55	1.55
@t fc ± 3.8MHz non adjacent = 858MHz	3.40	2.30	1.95	1.60	1.48	1.48
@ fc ± 3.8MHz adjacent = 858MHz	3.80	2.70	2.35	1.90	1.65	1.65

Attenuation wrt fc, dB

@t fc ± 4.2MHz	14	14	14	14	14	14
@ fc ± 6.0MHz	25	25	25	25	25	25
@ fc ± 12MHz	47	47	47	47	47	47

Group Delay wrt fc, ns

@ fc ± 3.8MHz nonadjacent edge	495	540	550	580	590	590
@ fc ± 3.8MHz adjacent edge	695	725	745	765	790	790

b) WB Input Insertion loss at fc for a single module (non adjacent), dB

	0.15	0.1	0.1	0.09	0.09	0.08
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c) Additional NB Insertion loss at fc per adjacent channel on its output, dB

	0.12	0.064	0.055	0.042	0.035	0.035
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d) Insertion loss per additional module, dB

	0.1	0.06	0.05	0.05	0.05	0.05
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WB Input insertion loss at Nth module (where 1st module is at output)
 = b + d x (N-1) + c per adjacent channel, for WB channels adjacent to NB channels
 = b + d x (N-1), non adjacent
NB Insertion loss at Nth Module, for N >=2
 = a + d x (N-1) + c per adjacent channel on its output only

Return Loss, dB:

NB, across fc +/- 3.8MHz	>26
WB, for adjacent channels	>26, depending upon configuration
WB, for non-adjacent channels	>30, depending upon configuration, otherwise >26

Isolation, dB ; across fc +/- 3.8MHz

NB to NB for adjacent channels	>38+/-5
NB to NB for non-adjacent channels	>70+/-10
NB to WB for adjacent channels	>35+/-5
WB to NB for non-adjacent channels	>Attenuation wrt fc @ fc +/- 12MHz

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UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Specifications	MASK			ETSI Critical (TXIM <-35dB)				
	CA8PX50E	CA6PPXX80E	CA6PPXX110E	CA8PPXX160E	CA8PPXX200E	CA8PPXX201E Liquid Cooled	CA8PPXX271E Liquid Cooled	CW7PX
Combined Output Rating, kW								
50E Series	1.75							
With 1&5/8" coupler	5.6	5.6						
With 3&1/8" coupler	12	12		15	18			
With 4&7/8" coupler				35	40	40	40	
With 6&1/8" coupler					80	80	100	
With waveguide output								240
NB Input Power Rating, kW								
at fc = 474MHz (≤ 40° rise)	0.93	2.10	3.55	8.0	18.0	25.0	42.5	60.0
at fc = 666MHz (≤ 40° rise)	0.81	1.78	3.28	7.3	16.0	21.2	51.0	44.0
at fc = 858MHz (≤ 40° rise)	0.69	1.45	3.00	6.5	14.0	17.4	≤698MHz	28.0
at fc = 474MHz (≤ 30° rise)	0.70	1.58	2.66	6.0	13.5	18.8	32.0	45.0
at fc = 666MHz (≤ 30° rise)	0.61	1.33	2.46	5.4	12.0	15.9	38.0	33.0
at fc = 858MHz (≤ 30° rise)	0.52	1.09	2.25	4.9	10.5	13.1	≤698MHz	21.0
NB Input Power Rating with single adjacent of equal power in WB input, kW								
at fc = 474MHz (≤ 30° rise)	0.39	1.25	2.34	6.0	14.4	16.7	32.0	40.0
at fc = 666MHz (≤ 30° rise)	0.37	1.13	2.10	5.2	11.2	13.9	38.0	30.0
at fc = 858MHz (≤ 30° rise)	0.35	1.00	1.85	4.4	8.0	11.0	≤698MHz	15.0
a) NB Insertion Loss for a single nonadjacent, dB								
at fc = 474MHz	1.08	0.67	0.58	0.45	0.38	0.38	0.32	0.27
at fc = 666MHz	1.18	0.73	0.63	0.49	0.42	0.42	0.34	0.30
at fc = 858MHz	1.28	0.79	0.67	0.52	0.46	0.46	≤698MHz	0.33
NB Insertion Loss Variation wrt fc, dB								
at fc ± 3.8MHz non adjacent = 666MHz	2.55	1.90	1.65	1.25	1.20	1.20	1.1	0.90
at fc ± 3.8MHz adjacent = 666MHz	3.55	3.15	2.70	2.00	1.95	1.95	1.9	1.80
at fc ± 3.8MHz non adjacent = 858MHz	2.90	2.20	1.90	1.50	1.28	1.28	≤698MHz	1.00
at fc ± 3.8MHz adjacent = 858MHz	3.95	3.60	3.10	2.40	2.00	2.00	≤698MHz	1.90
Attenuation wrt fc, dB								
at fc ± 4.2MHz	15	15	15	15	15	15	15	15
at fc ± 6.0MHz	30	27	27	41	41	41	41	27
at fc ± 12MHz	60	52	52	56	56	56	56	52
Group Delay wrt fc, ns								
at fc ± 3.8MHz nonadjacent edge	550	625	625	625	625	625	625	625
at fc ± 3.8MHz adjacent edge	825	865	885	895	895	895	895	895
b) WB Input Insertion loss at fc for a single module (non adjacent), dB								
	0.13	0.1	0.1	0.09	0.09	0.09	0.09	0.08
c) Additional NB Insertion loss at fc per adjacent channel on its WB and output, dB								
	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02
d) Insertion loss per additional module, dB								
	0.08	0.06	0.05	0.05	0.05	0.05	0.04	0.025
WB Input insertion loss at Nth module (where 1st module is at output)								
	= b + d x (N-1), non adjacent							
NB Insertion loss at Nth Module, for N >= 2								
	= a + d x (N-1) + c per adjacent channel on its WB input and output.							
Return Loss, dB:								
NB, across fc +/- 3.8MHz	>26							
WB, for adjacent channels	>26, depending upon configuration							
WB, for non-adjacent channels	>30, depending upon configuration, otherwise >26							
Isolation, dB ; across fc +/- 3.8MHz								
NB to NB for adjacent channels	>38+/-5							
NB to NB for non-adjacent channels	>70+/-10							
NB to WB for adjacent channels	>35+/-5							
WB to NB for non-adjacent channels	>Attenuation wrt fc @ fc +/- 12MHz							

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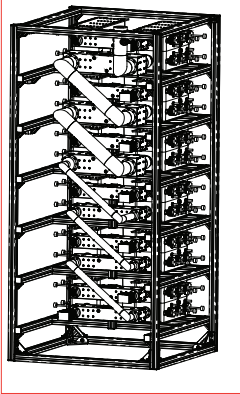
UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Combiner module

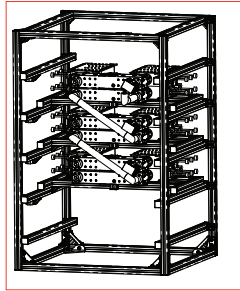
Combiner module stacked	CA6PPXX80E	CA6PPXX110E
WB Coupler	DC318EU	DC158EU
NB Coupler	DC158EU	DC158EU
frame width (mm)	950	950
frame height (mm)	1430*	1430*
frame depth (mm)	950	950
Weight per module, (kg)	34	53

* max height dependent on transport

@1430mm 4x110E & 5x80E units (within frame)



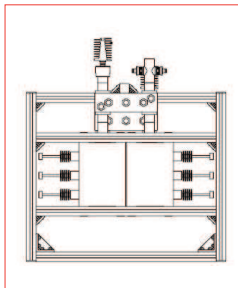
CA6PPXX80E-6



CA6PPXX80E-3

Combiner module

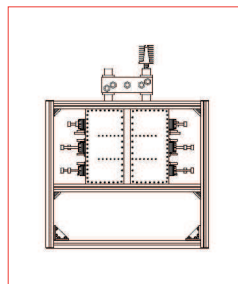
Combiner module	CA6PPXX80E	
WB Coupler	DC158EU	DC158EU
NB Coupler	DC158EU	DC158EU
frame width, (mm)	385	245
frame height, (mm)	787	577
frame depth, (mm)	890	890
Weight, (kg)	44	41



CA6PPXX80E-158

Combiner module

Combiner module	CA6PPXX110E			
WB Coupler	DC318EU	DC158EU	DC318EU	DC158EU
NB Coupler	DC158EU	DC158EU	DC158EU	DC158EU
frame width, (mm)	450	385	322	322
frame height, (mm)	865	767	865	577
frame depth (mm)	890	890	890	890
Weight, (kg)	69	63	66	60



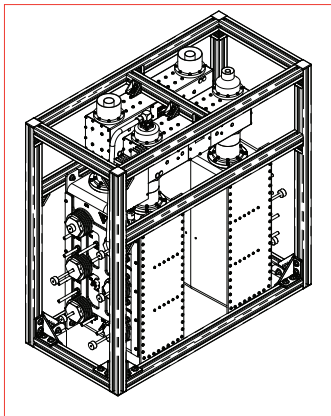
CA6PPXX110E-158

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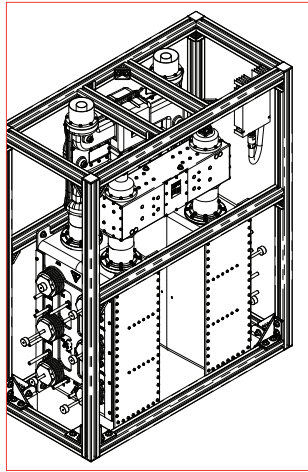
UHF Television Combiners, ETSI/DVB-T and T2, 8MHz channels

Combiner module

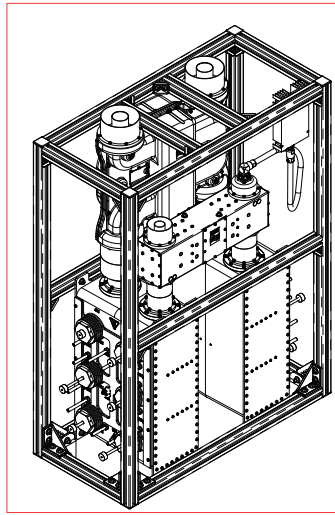
Combiner module	CA8PPXX160E				CA6PPXX160E					
	DC478EU-HP	DC318EU-HP	DC318EU	DC478EU-HP	DC318EU-HP	DC318EU	DC478EU-HP	DC318EU-HP	DC318EU	
WB Coupler	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	
NB Coupler	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	
Frame width, (mm)	500	450	450	414	414	414	500	450	450	
Frame height, (mm)	2160	1235	1050	2160	1235	1050	1190	1065	880	
Frame depth, (mm)	890	890	890	890	890	890	890	890	890	
Weight, (kg)	146	135	129	143	132	126	125	114	107	
Patch panel module										
PP158-4 (ht+385mm)	✓	✓	✓	-	-	-	✓	✓	-	-
PP318-4 (ht+425mm)	-	✓	✓	-	-	-	-	✓	✓	-
PP478-4 (ht+760mm)	✓	-	-	-	-	-	✓	-	-	-



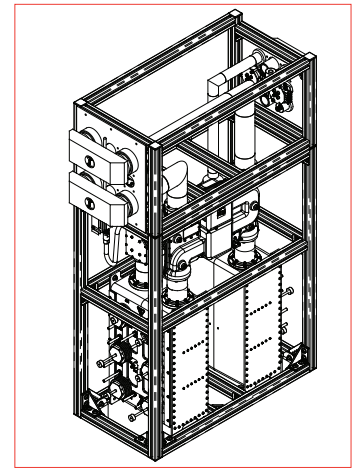
CA6PPXX160E-318



CA6PPXX160E-318HP



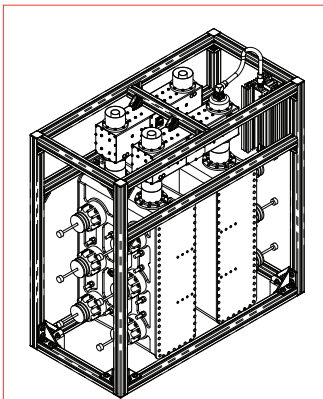
CA6PPXX160E-478HP



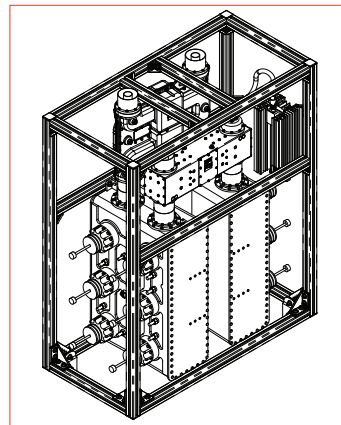
CA6PPXX160E-318HP / PP318-4 / PP158-4

Combiner module

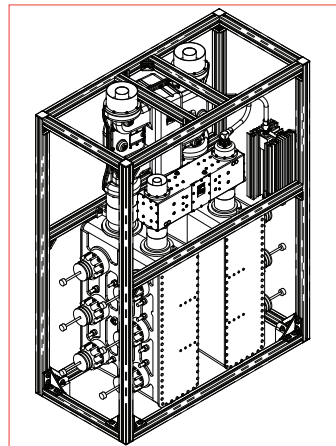
Combiner module	CA8PPXX201E		CA8PPXX200E		CA6PPXX201E		CA6PPXX200E		
	DC478EU-HP	DC318EU	DC478EU-HP	DC318EU	DC478EU-HP	DC318EU	DC478EU-HP	DC318EU	
WB Coupler	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	
NB Coupler	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	DC318EU	
Frame width, (mm)	500	500	500	500	500	500	500	500	
Frame height, (mm)	1546	1546	1416	1226	1330	1330	1200	1010	
Frame depth, (mm)	1014	1014	1014	1014	1014	1014	1014	1014	
Weight, (kg)	222	217	206	199	183	177	165	159	
Patch panel module									
PP158-4 (ht + 385mm)	✓	✓	✓	✓	✓	✓	✓	✓	
PP318-4 (ht + 425mm)	✓	✓	✓	✓	✓	✓	✓	✓	
PP478-4 (ht + 760mm)	✓	-	-	✓	✓	-	-	-	



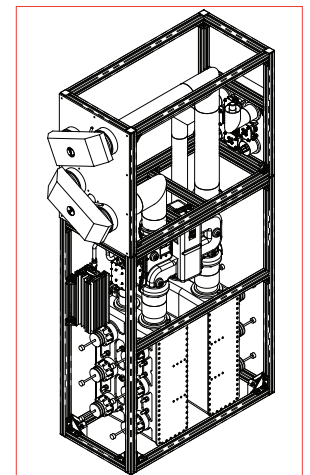
CA6PPXX200E-318



CA6PPXX200E-318HP



CA6PPXX200E-478HP



CA6PPXX200E-478HP / PP478-4 / PP318-4

All information contained in the present brochure is subject to confirmation at time of ordering