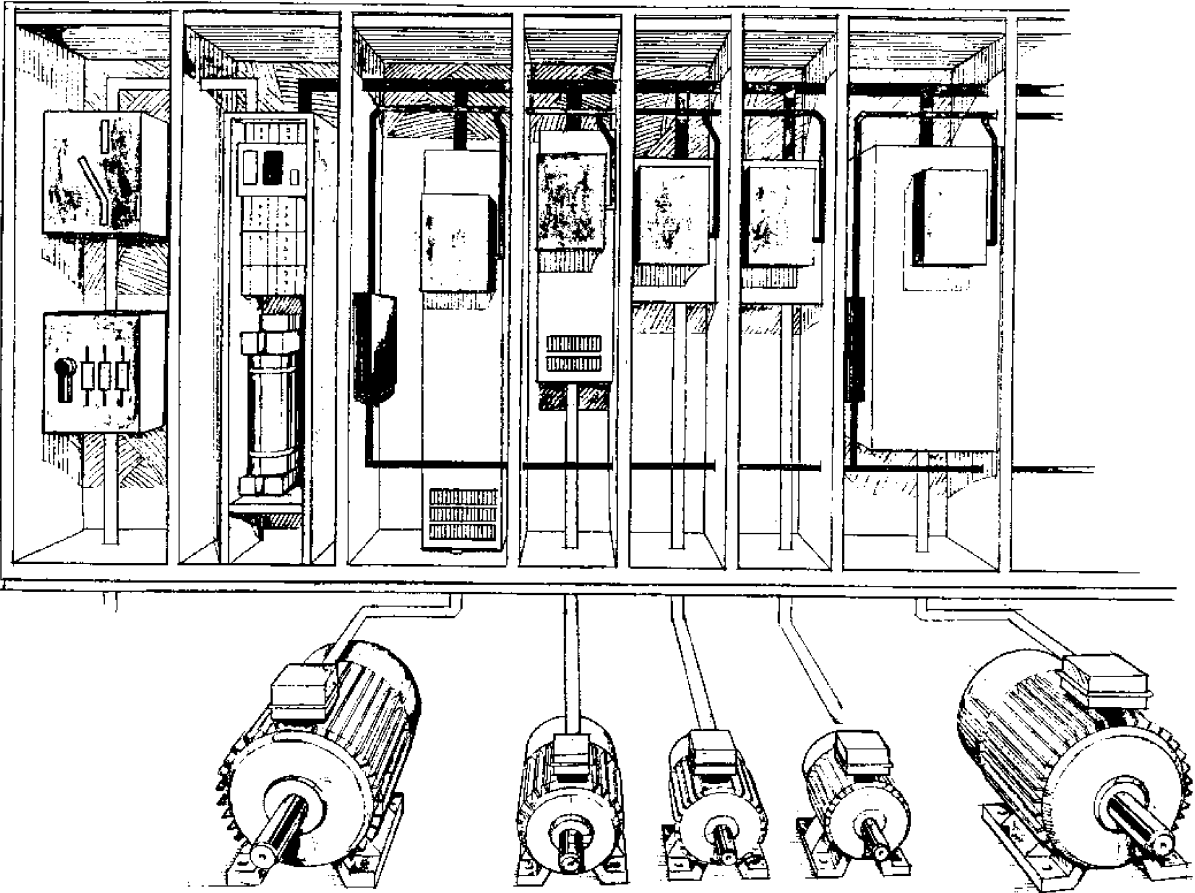


ACV 700 Frequency Converters



Following table shows the modules used in the ACV 703 diode in-comer sections.

Type Designation 400V (380, 415V)	ACV 709S	SAFUL	SAFUC	SAFUD	SAFUB
ACV 703-0040-3M	0040-3				
ACV 703-0063-3M	0063-3				
ACV 703-0100-3M	0100-3				
ACV 703-0160-3M	0160-3				
ACV 703-0250-3M		250F415	500F500		
ACV 703-0400-3M		400F415	500F500		
ACV 703-0630-3M		630F415	800F500		
ACV 703-0630-3MB		630F415	800F500		400F415
ACV 703-1000-3M			1250F500		
ACV 703-1000-3MB			1250F500		630F415
ACV 703-1600-3M			2000F500		
ACV 703-1600-3MB			2000F500		2x630F415
500V (440, 460V)	ACV 709S	SAFUL	SAFUC	SAFUD	SAFUB
ACV 703-0050-5M	0050-5				
ACV 703-0080-5M	0080-5				
ACV 703-0125-5M	0125-5				
ACV 703-0200-5M	0200-5				
ACV 703-0315-5M		315F500	500F500		
ACV 703-0500-5M		500F500	500F500		
ACV 703-0500-5MB		500F500	500F500		315F500
ACV 703-0800-5M		800F500	800F500		
ACV 703-0800-5MB		800F500	800F500		500F500
ACV 703-1250-5M			1250F500		
ACV 703-1250-5MB			1250F500		800F500
ACV 703-2000-5M			2000F500		
ACV 703-2000-5MB			2000F500		2x800F500
690V (575, 660V)	SAFUS	SAFUL	SAFUC	SAFUD	SAFUB
ACV 703-0160-6MB	160F660				
ACV 703-0250-6MB		250F660		250F660	
ACV 703-0400-6MB		400F660	400F660		250F660
ACV 703-0630-6MB		630F660	630F660		400F660
ACV 703-1000-6MB		1000F660	1000F660		630F660
ACV 703-1600-6MB			1600F660		1000F660
ACV 703-2500-6MB			2500F660		2x1000F660

Regenerative Supply Sections

Depending on the power, the regenerative supply section may include from two to five units. The regenerative supply section consists of the contactor / breaker unit, the thyristor braking unit (X), and a required number (0 - 2) of capacitor bank units (B). The large sections also include a separate DC-choke unit (M).

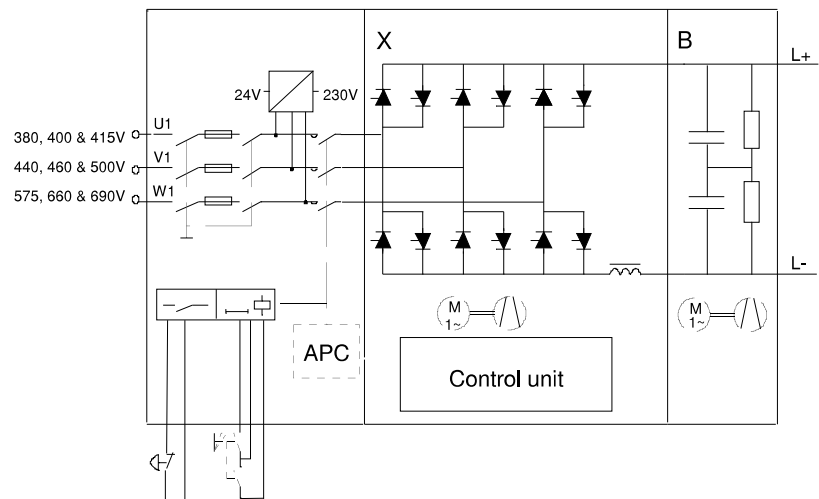


Figure 3 - 2 Block diagram of the regenerative supply section (61133615.drw).

Type Designation	Motoring Power [kW]	Regen. Power [kVA]	Cooling Air Flow [l/s]	Heat Loss [kW]	Cubicle Width [mm]	Weight [kg]
400 V (380, 415 V)						
ACV 704-0250-3-M	225	200	250	2.50	600+600+600	460
ACV 704-0400-3-M	360	320	250	4.50	600+600+600	480
ACV 704-0630-3-M	570	500	290	7.80	600+600+600	560
ACV 704-1000-3-M	900	810	1000	10.00	600+600+800+400	1090
ACV 704-1600-3-M	1440	1300	1290	14.40	600+600+800+600	1250
ACV 704-0630-3-MB	570	500	290	8.80	800+600+400	620
ACV 704-1000-3-MB	900	810	1000	11.60	600+600+800+800	1250
ACV 704-1600-3-MB	1440	1300	1290	17.50	600+600+800+800+400	1410
500 V (440, 460 V)						
ACV 704-0315-5-M	283	252	290	2.50	600+600+600	460
ACV 704-0500-5-M	450	400	290	4.50	600+600+600	500
ACV 704-0800-5-M	720	640	290	7.80	600+600+600	560
ACV 704-1250-5-M	1120	1010	1000	10.00	600+600+800+400	1090
ACV 704-2000-5-M	1800	1620	1370	14.40	600+600+800+600	1250
ACV 704-0500-5-MB	450	400	290	5.30	600+600+800	560
ACV 704-0800-5-MB	720	640	290	9.10	600+600+600+400	620
ACV 704-1250-5-MB	1120	1010	1000	12.00	600+600+800+800	1250
ACV 704-2000-5-MB	1800	1620	1370	18.40	600+600+800+800+400	1410
690 V (575, 660 V)						
ACV 704-0400-6-MB	360	320	290	3.10	600+600+800	460
ACV 704-0630-6-MB	570	510	290	5.50	600+600+800	560
ACV 704-1000-6-MB	900	800	290	9.40	600+600+600+400	620
ACV 704-1600-6-MB	1440	1300	1000	12.50	600+600+800+800	1250
ACV 704-2500-6-MB	2230	1980	1370	19.40	600+600+800+800+400	1410

Following table shows the modules used in the ACV 704 thyristor inverter sections.

Type Designation 400 V (380, 415 V)	Contactor / Breaker Unit	SAFUX	SAFUB	SAFUM
ACV 704-0250-3M		315F500		
ACV 704-0400-3M	always	500F500		

ACV 704-0630-3M	consist of discrete components	800F500	400F415	2000F660 2000F660 2500F660 2500F660
ACV 704-0630-3MB		800F500		
ACV 704-1000-3M		2000F/A500	630F415	
ACV 704-1000-3MB		2000F/A500		
ACV 704-1600-3M		2000F/A500	2x630F415	
ACV 704-1600-3MB		2000F/A500		
500 V (440, 460 V)				
ACV 704-0315-5M	always consist of discrete components	315F500	315F500	2000F660 2000F660 2500F660 2500F660
ACV 704-0500-5M		500F500		
ACV 704-0500-5MB		500F500		
ACV 704-0800-5M		800F500		
ACV 704-0800-5MB		800F500		
ACV 704-1250-5M		2000F/A500	800F500	
ACV 704-1250-5MB		2000F/A500		
ACV 704-2000-5M		2000F/A500	2x800F500	
ACV 704-2000-5MB		2000F/A500		
690 V (575, 660 V)				
ACV 704-0400-6MB	always consist of discrete components	400F660	250F660	2000F660 2500F660
ACV 704-0630-6MB		630F660	400F660	
ACV 704-1000-6MB		1000F660	630F660	
ACV 704-1600-6MB		2500F/A660	1000F660	
ACV 704-2500-6MB		2500F/A660	2x1000F660	

Resistor Braking Sections

A standard supply section can brake only by using losses of the ACV 700 and the motor. The braking power can be increased by means of a Resistor Braking Section. The Resistor Braking Section is composed of the Braking Chopper Unit (K) and the Braking Resistor Unit (R), if specified. R in the type designation indicates that the resistor unit is included in the resistor braking section.

The Braking Chopper Unit is protected against short circuit by fuses. The fuses should be of UR-type. The nominal voltage for the fuses should be 660 V for 500 V chopper, and 1000 V for 690 V chopper.

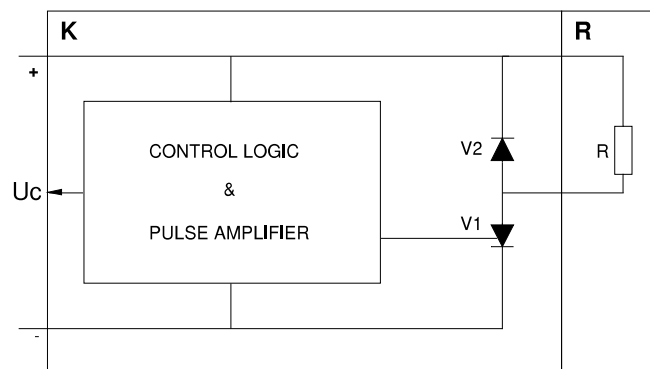


Figure 3 - 3 Block diagram of the Resistor Braking Section (61133623.drw)

Resistor Braking Sections						
Type Designation	SAFUK	SAFUR	Resistance [Ω]	Maximum Braking Power [kW]	Fuse [A]	Cubicle Width [mm]

400 V (380, 415 V)				380V	400V	415V		
ACV 702-0063-3-MR	80F500	63F380	4.00	63	63	63	100	400
ACV 702-0100-3-MR	125F500	100F380	2.67	100	100	100	160	400
ACV 702-0160-3-MR	200F500	160F380	1.78	160	160	160	250	400
ACV 702-0063-3-M	80F500	-	4.00 ⁽¹⁾	63 ⁽¹⁾	63 ⁽¹⁾	63 ⁽¹⁾	100	400
ACV 702-0100-3-M	125F500	-	2.67 ⁽¹⁾	100 ⁽¹⁾	100 ⁽¹⁾	100 ⁽¹⁾	160	400
ACV 702-0160-3-M	200F500	-	1.78 ⁽¹⁾	160 ⁽¹⁾	160 ⁽¹⁾	160 ⁽¹⁾	250	400
500 V (440, 460 V)				440V	460V	500V		
ACV 702-0080-5-MR	80F500	80F500	6.00	70	75	80	100	400
ACV 702-0125-5-MR	125F500	125F500	4.00	110	115	125	160	400
ACV 702-0200-5-MR	200F500	200F500	2.67	175	180	200	250	400
ACV 702-0080-5-M	80F500	-	6.00 ⁽¹⁾	70 ⁽¹⁾	75 ⁽¹⁾	80 ⁽¹⁾	100	400
ACV 702-0125-5-M	125F500	-	4.00 ⁽¹⁾	110 ⁽¹⁾	115 ⁽¹⁾	125 ⁽¹⁾	160	400
ACV 702-0200-5-M	200F500	-	2.67 ⁽¹⁾	175 ⁽¹⁾	180 ⁽¹⁾	200 ⁽¹⁾	250	400
690 V (575, 660 V)				575V	660V	690V		
ACV 702-0100-6-MR	100F660	2x63F380	8.00	90	100	110	100	400
ACV 702-0160-6-MR	160F660	2x100F380	5.33	140	160	165	160	400
ACV 702-0250-6-MR	250F660	2x160F380	3.56	210	250	260	250	400+400
ACV 702-0100-6-M	100F660	-	8.00 ⁽¹⁾	90 ⁽¹⁾	100 ⁽¹⁾	110 ⁽¹⁾	100	400
ACV 702-0160-6-M	160F660	-	5.33 ⁽¹⁾	140 ⁽¹⁾	160 ⁽¹⁾	165 ⁽¹⁾	160	400
ACV 702-0250-6-M	250F660	-	3.56 ⁽¹⁾	210 ⁽¹⁾	250 ⁽¹⁾	260 ⁽¹⁾	250	400

⁽¹⁾ With suitable braking resistor

Description of the Supply Units

Line Supply Unit (S)

The Line Supply Unit (S) includes equipment for connecting the drive to the mains: disconnecter, fuses, main contactor, auxiliary voltage supply, and auxiliary contactor and charging resistors. The contactor unit control and supervision card SAFT 136 CTS controls the contactor.

A diode bridge and a DC-choke are also included.

Type Designation	Unit Dimensions (without cubicle)				
	Power [kVA]	Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
400 V (380, 415V)					
ACV 709S-0040-3	40	290	380	1030	56
ACV 709S-0063-3	63	290	380	1030	62
ACV 709S-0100-3	100	290	380	1030	84
ACV 709S-0160-3	160	340	485	1515	125
500 V (440, 460V)					
ACV 709S-0050-5	50	290	380	1030	56
ACV 709S-0080-5	80	290	380	1030	62
ACV 709S-0125-5	125	290	380	1030	84
ACV 709S-0200-5	200	340	485	1515	125
690 V (575, 660V)					
SAFUS 160F660	160	340	485	1515	125

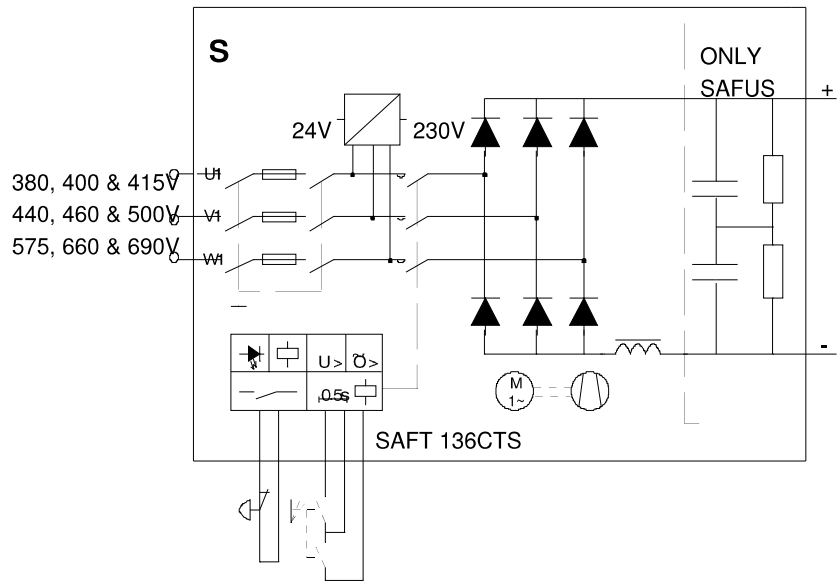


Figure 3 - 4 Block diagram of the Line Supply Unit (S).(61134085.drw)

Contactor Unit (L)

The Contactor Unit (L) includes equipment for connecting the drive to the distributing mains: disconnector, fuses, main contactor, auxiliary voltage supply, and auxiliary contactor and charging resistors. The contactor unit control and supervision card SAFT 136 CTS controls the charging and main contactor.

Type Designation	Unit Dimensions (without cubicle)				
	Power [kVA]	Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
400V (380, 415V)					
SAFUL 250F415	250	445	485	1700	75
SAFUL 400F415	400	445	485	1800	100
SAFUL 630F415	630	744	500	1800	195
SAFUL 1000F415	1000	1)	1)	1)	1)
SAFUL 1600F415	1600	1)	1)	1)	1)
500V (440, 460V)					
SAFUL 315F500	315	445	485	1700	75
SAFUL 500F500	500	445	485	1800	100
SAFUL 800F500	800	744	500	1800	195
SAFUL 1250F500	1250	1)	1)	1)	1)
SAFUL 2000F500	2000	1)	1)	1)	1)
690V (575, 660V)					
SAFUL 250F660	250	445	485	1700	75
SAFUL 400F660	400	445	485	1700	75
SAFUL 630F660	630	445	485	1800	100
SAFUL 1000F660	1000	744	500	1800	195
SAFUL 1600F660	1600	1)	1)	1)	1)
SAFUL 2500F660	2500	1)	1)	1)	1)

1) Not a module

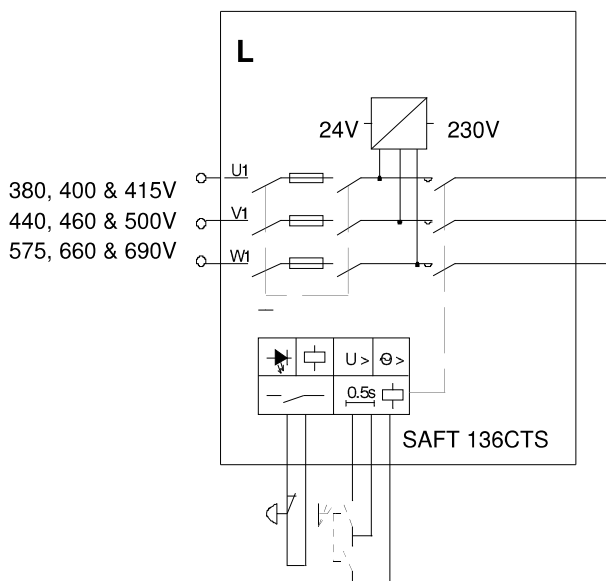


Figure 3 - 5 Block diagram of the Contactor Unit (L). (61134239.drw)

Line Converter Unit (C)

The Line Converter Unit (C) and the electrical mains form the d.c. source of the frequency converter. The d.c. source is connected to the intermediate circuit through a d.c. choke. The diode bridge is equipped with single-side cooled press-pack diodes for the 250 - 400 kVA power range. Larger units have double-side cooled press-pack diodes.

The Line Converter Units (C) can be used either in 6-pulse or 12-pulse configuration. Twelve-pulse configuration consists of a pair of 6-pulse units (supply or line converter unit) with a 30° phase difference at the input generated by means of a special transformer or by means of two separate transformers.

Six-Pulse Diode Rectifier

Type Designation	Unit Dimensions (without cubicle)				
	Power [kVA]	Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
500 V (440, 460 V) 1)					
SAFUC 500F500	500	230	498	1770	112
SAFUC 800F500	800	230	498	1770	112
SAFUC 1250F500	1250	270	498	1770	135
SAFUC 2000F500	2000	400	575	1770	320
690 V (575, 660 V)					
SAFUC 250F660	250	230	583	1825	92
SAFUC 400F660	400	230	498	1770	105
SAFUC 630F660	630	270	498	1770	135
SAFUC 1000F660	1000	270	498	1770	135
SAFUC 1600F660	1600	270	498	1770	135
SAFUC 2500F660	2500	400	575	1770	340

1) 500 V units are also used in 400 V sections.

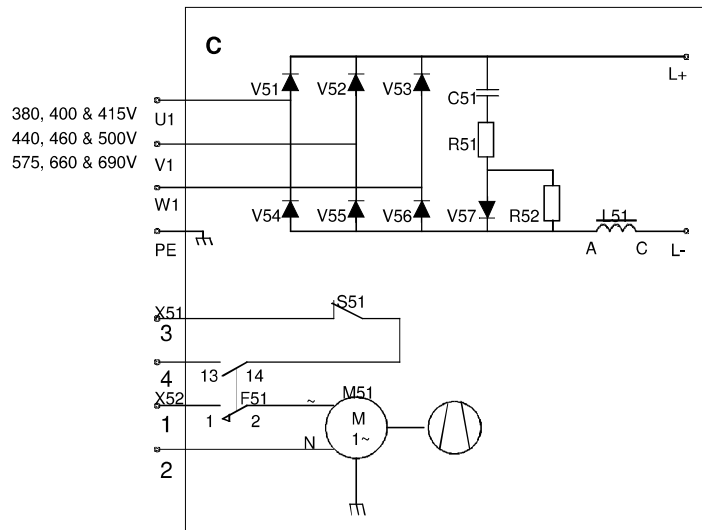


Figure 3 - 6 Block diagram of the Line Converter Unit (C) (61134247.drw).

Twelve-Pulse Diode Rectifier

Benefits of a 12-pulse Line Converter Unit compared to a 6-pulse Line Converter Unit:

- Reduced harmonics, e.g. the fifth and seventh harmonics are not present.
- Compared to the 6-pulse, the power output is doubled by using the same diodes in a 12-pulse connection.

Type Designation (rectifier id)	Rectifier Power [kVA]	Width [mm]	Unit Dimensions (without cubicle)		
			Depth [mm]	Height [mm]	Weight [kg]
400 V (380, 415 V)					
2xACV 709S-0063-3	2x63	2x290	380	1030	2x62
2xACV 709S-0100-3	2x100	2x290	380	1030	2x84
2xACV 709S-0160-3	2x160	2x340	485	1515	2x125
500 V (440, 460 V)					
2xACV 709S-0080-5	2x80	2x290	380	1030	2x62
2xACV 709S-0125-5	2x125	2x290	380	1030	2x84
2xSAFUC 500F500	2x500	2x230	498	1770	2x112
2xSAFUC 800F500	2x800	2x230	498	1770	2x112
2xSAFUC 1250F500	2x1250	2x270	498	1770	2x135
690 V (575, 660 V)					
2xSAFUC 250F660	2x250	2x230	583	1825	2x92
2xSAFUC 400F660	2x400	2x230	498	1770	2x105
2xSAFUC 630F660	2x630	2x270	498	1770	2x135
2xSAFUC 1000F660	2x1000	2x270	498	1770	2x135
2xSAFUC 1600F660	2x1600	2x270	498	1770	2x135

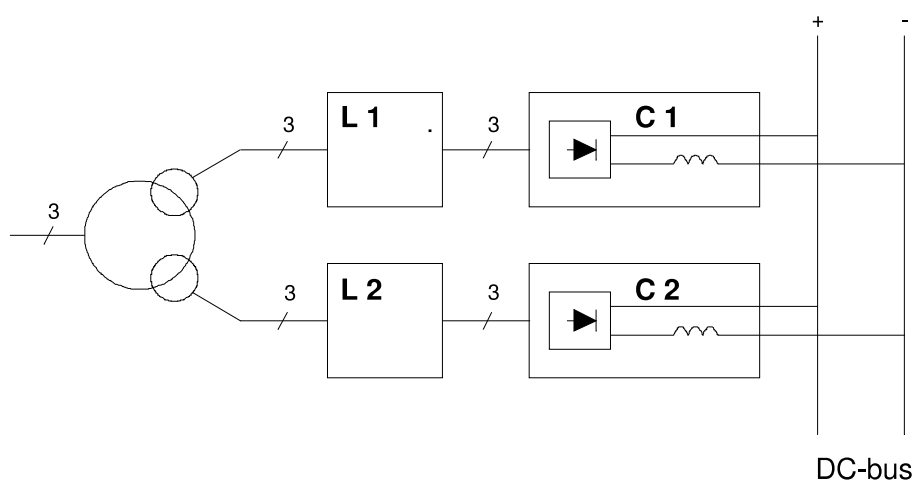


Figure 3 - 7 Block diagram of the 12-pulse Line Converter Unit (61135537.drw).

Thyristor Braking Unit (X)

The Thyristor Braking Unit (X) includes two anti-parallel 6-pulse thyristor bridges with control circuits. Modules up to 800 kVA at 500 V and 1000 kVA at 690 V include a d.c. choke. The larger SAFUX units are to be equipped with SAFUM DC-Choke Unit (M). The Thyristor Braking Unit is used to implement regenerative braking and it then replaces the Line Converter Unit (C).

Type Designation	Power [kVA]	Unit Dimensions (without cubicle)			
		Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
500 V (440,460 V) 2)					
SAFUX 315F500	315	400	492	1770	160
SAFUX 500F500	500	400	492	1770	160
SAFUX 800F500	800	400	492	1770	175
SAFUX 2000F/A500	2000	1)	1)	1)	1)
690 V (575, 660 V)					
SAFUX 400F660	400	400	492	1770	160
SAFUX 630F660	630	400	492	1770	190
SAFUX 1000F660	1000	400	492	1770	190
SAFUX 2500F/A660	2500	1)	1)	1)	1)

1) Not supplied as a module

2) 500 V units are also used in 400 V sections

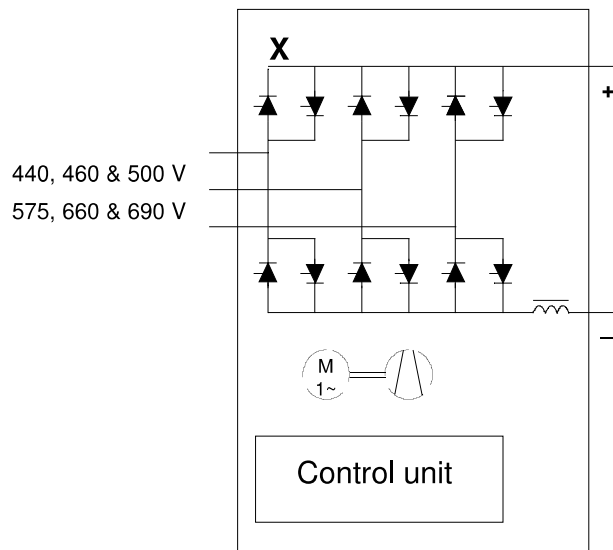


Figure 3 - 8 Block diagram of the Thyristor Braking Unit (X) (61135758.drw).

DC-Choke Unit (M)

Type Designation	Unit Dimensions (without cubicle)			
	Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
690 V (575, 660V) 1)				
SAFUM 2000F660	400	575	1750	290
SAFUM2500F660	400	575	1750	310

1) 690 V units are also used in 400 V and 500 V sections

Capacitor Bank Unit (B)

The Capacitor Bank Unit (B) includes 3.3 mF/350V or 4.7 mF/350V electrolytic capacitors connected in series and in parallel, balancing resistors and a supervision card SAFT 132 CBS. At ratings over 400 kVA, capacitors have specific fuses. The Capacitor Bank Unit (B) is designed to smooth the d.c. voltage after rectification and inversion of the motor voltage.

If the drive sections are of the IGBT-type (capacitors included), the capacitor bank unit is not needed in the supply section.

Type Designation	Unit Dimensions (without cubicle)			
	Width [mm]	Depth [mm]	Height [mm]	Weight [kg]
400 V (380, 415 V)				
SAFUB 250F415	240	501	1825	60
SAFUB 400F415	240	501	1825	70
SAFUB 630F415	240	501	1825	81
500 V (440, 460 V)				
SAFUB 315F500	240	501	1825	60
SAFUB 500F500	240	501	1825	70
SAFUB 800F500	240	501	1825	90
690 V (575, 660 V)				
SAFUB 250F660	240	501	1825	60
SAFUB 400F660	240	501	1825	70