

THREE-PHASE SYNCHRONOUS GENERATOR  
**MXB-E 160 MA 4**

4 POLES

CONTINUOUS DUTY

50 Hz-1500 min<sup>-1</sup> / 60 Hz-1800 min<sup>-1</sup>

AMBIENT TEMPERATURE	40°C	WINDING DATA									
TEMPERATURE RISE	H	Winding code		MO							
INSULATION CLASS	H	Number of leads		12							
POWER FACTOR	0,8	Winding pitch		2/3							
FREQUENCY	Hz	50				60					
VOLTAGE	Star series	V	380	400	415	440	380	416	440	460	480
	Star parallel		190	200	208	220	190	208	220	230	240
RATING	kVA		16,6	17,5	17,5	16,0	17,5	19,0	20,1	21,0	21,9
	kW		13,3	14,0	14,0	12,8	14,0	15,2	16,0	16,8	17,5
EFFICIENCY (%) @ 0,8 p.f.	4/4		82,7	82,7	82,8	82,9	82,7	83,6	84,0	84,3	84,3
	3/4		85,0	85,1	85,0	84,5	84,9	85,7	86,1	86,2	86,3
	2/4		86,9	86,8	86,5	85,3	86,7	87,2	87,4	87,5	87,5
EFFICIENCY (%) @ 1,0 p.f.	4/4		87,2	87,6	88,0	88,5	86,5	87,5	88,0	88,4	88,7
	3/4		89,2	89,4	89,6	89,6	88,6	89,3	89,7	90,0	90,2
	2/4		90,7	90,7	90,6	89,8	90,1	90,6	90,8	91,0	91,1
STAND-BY RATING (163/27)	kVA		18,3	19,3	19,3	17,6	19,3	20,9	22,1	23,1	24,1
STAND-BY EFFICIENCY (%) @ 0,8 p.f.			81,7	81,8	81,9	82,3	81,8	82,8	83,2	83,5	83,6
SHORT CIRCUIT RATIO (referred to class H rating)			0,52	0,55	0,59	0,73	0,41	0,46	0,48	0,50	0,53
REACTANCES (%) (referred to class H rating)											
Direct axis synchronous	x <sub>d</sub>		297	282	262	213	375	339	321	307	294
Quadrature axis synchronous	x <sub>q</sub>		129	123	114	93	163	148	140	133	128
Direct axis transient	x' <sub>d</sub>		20,9	19,8	18,4	15,0	26,4	23,9	22,6	21,6	20,7
Direct axis subtransient	x'' <sub>d</sub>		11,4	10,9	10,1	8,2	14,4	13,0	12,3	11,8	11,3
Quadrature axis subtransient	x'' <sub>q</sub>		12,6	11,9	11,1	9,0	15,9	14,3	13,6	13,0	12,4
Negative sequence	x <sub>2</sub>		12,0	11,4	10,6	8,6	15,1	13,7	12,9	12,4	11,9
Zero sequence	x <sub>0</sub>		9,8	9,3	8,6	7,0	12,3	11,1	10,5	10,1	9,7

TIME CONSTANTS [s]

Open circuit (T' <sub>do</sub> )	0,418	Subtransient (T'' <sub>d</sub> )	0,008
Transient (T' <sub>d</sub> )	0,047	Armature (T <sub>a</sub> )	0,007

MECHANICAL CHARACTERISTICS

D-end bearing/Lubrication	-
N-end bearing/Lubrication	6207 2RS C3 / Prelubricated
Weight [kg]	102
Inertia (J) [kgm <sup>2</sup> ]	0,12
Overspeed [min <sup>-1</sup> ]	2250
Method of cooling	IC 01
Cooling air required [m <sup>3</sup> /s] @ 50/60 Hz	0,11 / 0,13
Degree of protection	IP 23
Type of construction available	B2
Direction of rotation	CW

OTHER DATA

Phase resistance [Ω] @ 20 °C - Star series	0,613
Overloads	10% for 1 hour
3-phase short circuit current	>= 300% (3 I <sub>n</sub> ) with aux. winding or PMG
Voltage regulation accuracy	+/- 0,5 % (@ rated load, balanced and non-distorting, p.f. 0,8)
Radio interference	EN 55011 Class B Group 1
Wave form THF	< 2%
Total harmonic content	< 2% (at no load)

STANDARDS

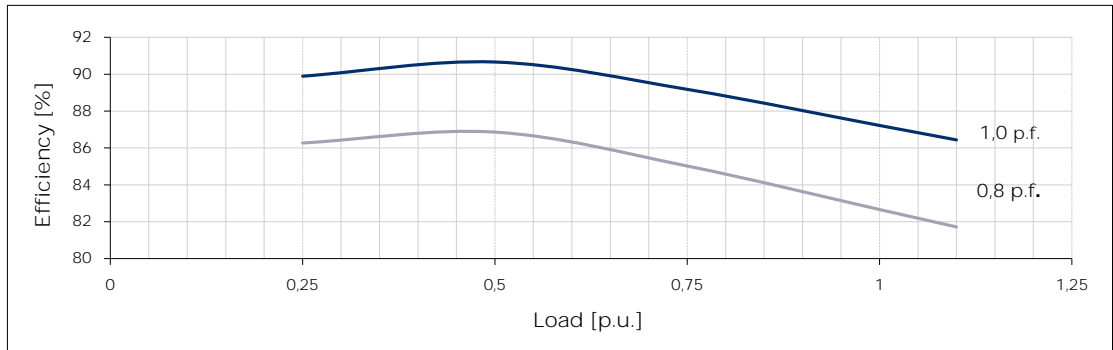
IEC 60034-1; BS 4999-5000; NEMA MG 1.32.
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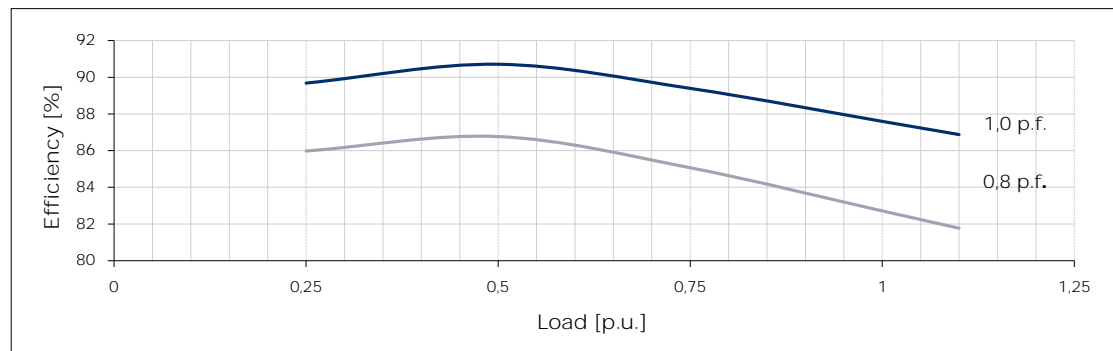
Typical efficiency curves

50 Hz - 1500 min<sup>-1</sup>

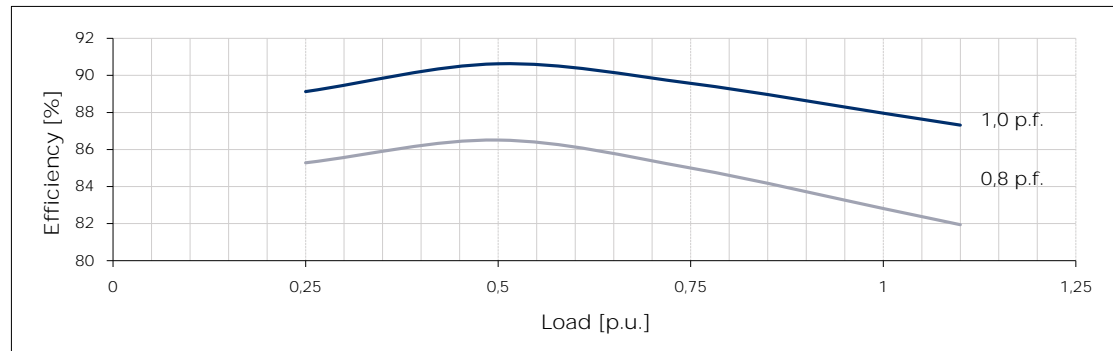
380 V



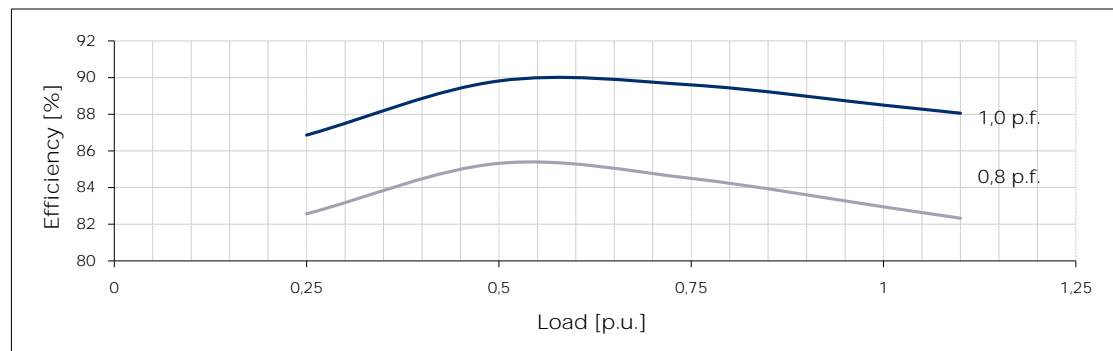
400 V



415 V



440 V

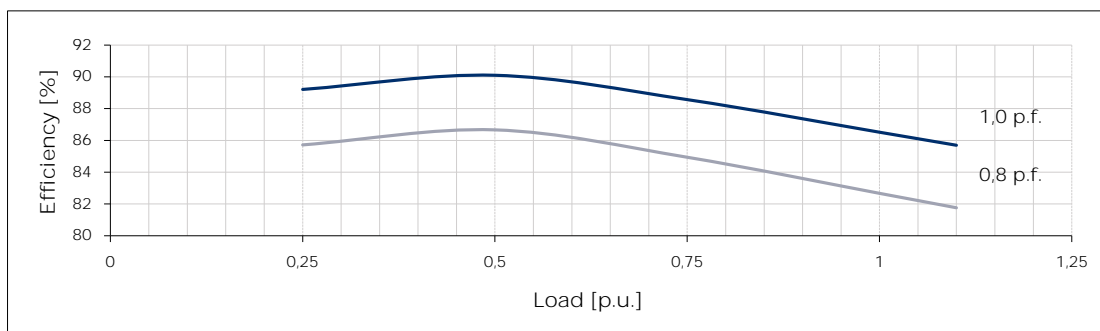


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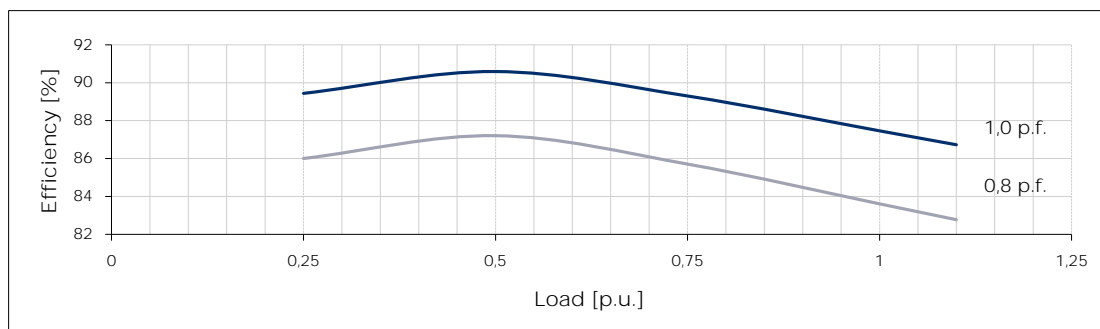
Typical efficiency curves

60 Hz - 1800 min<sup>-1</sup>

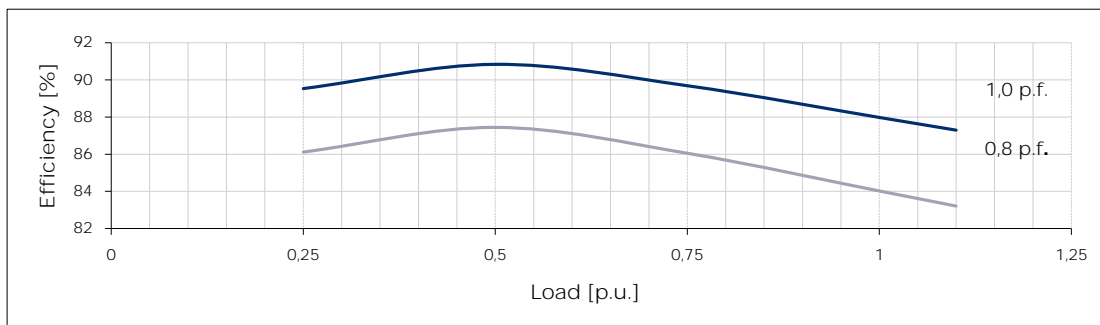
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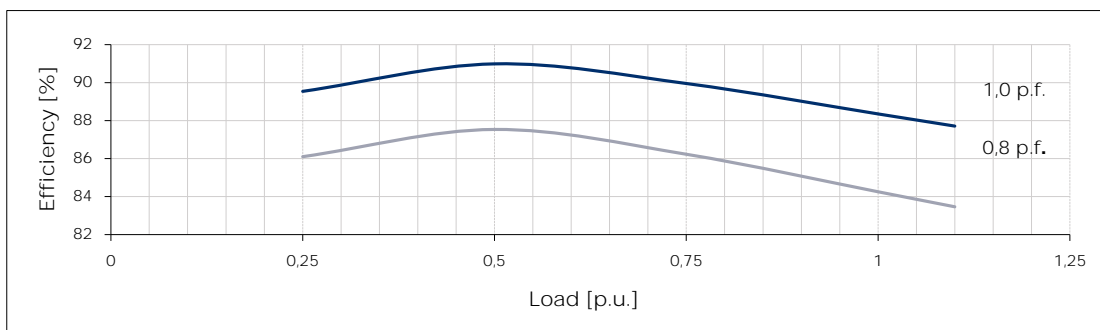
416 V



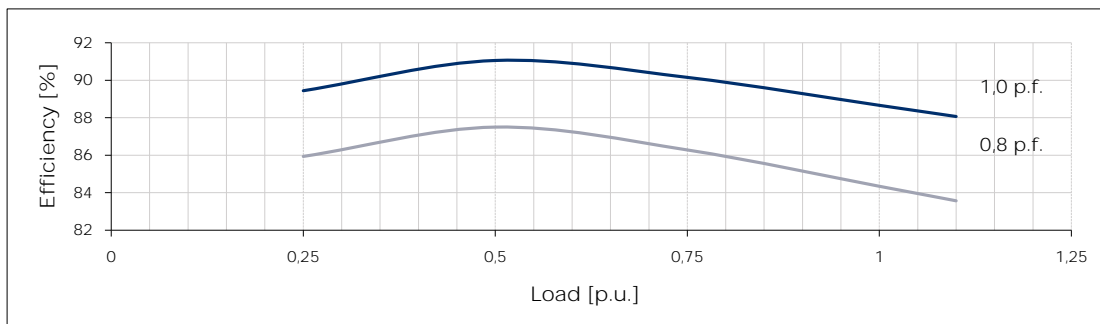
440 V



460 V



480 V





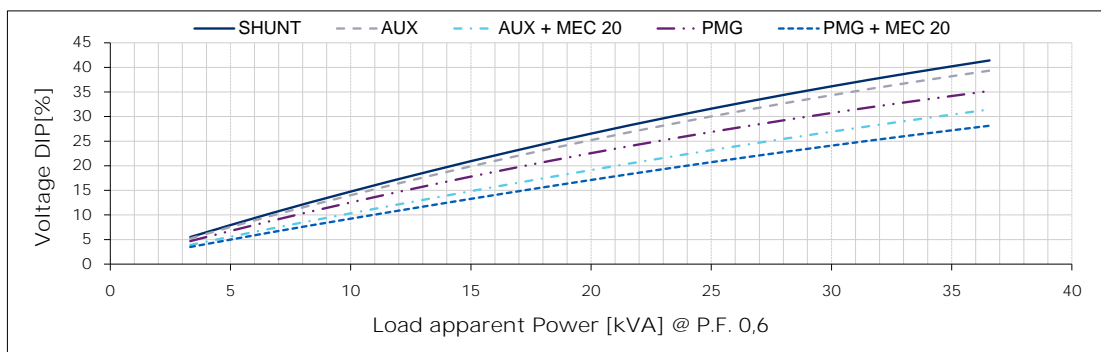
MarelliMotori  
Inspired solutions

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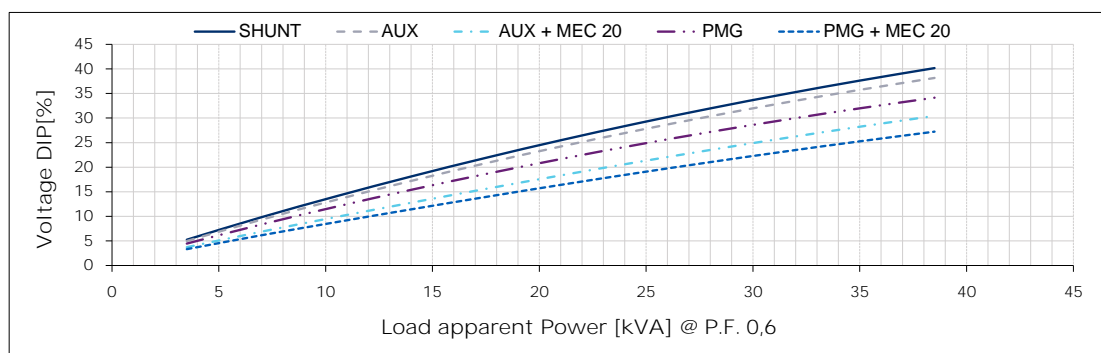
Typical voltage DIP curves

50 Hz - 1500 min<sup>-1</sup>

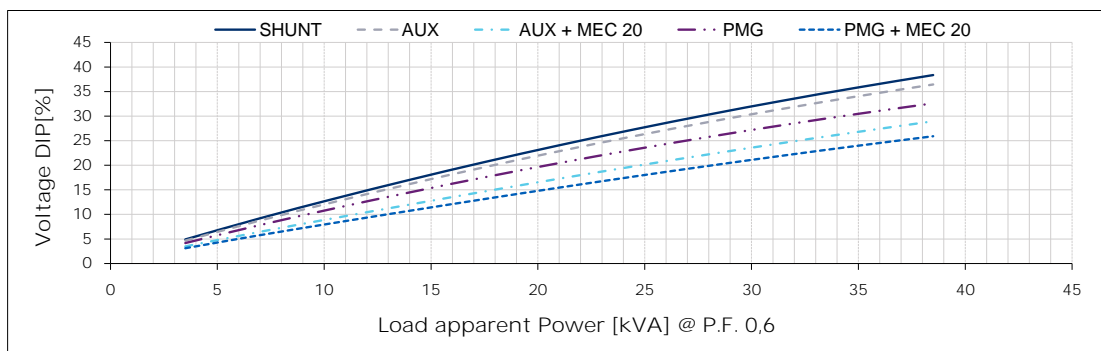
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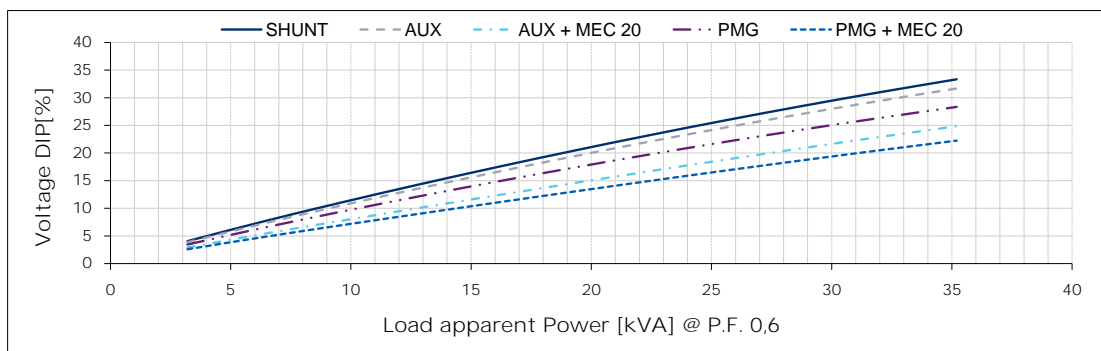
400 V



415 V



440 V





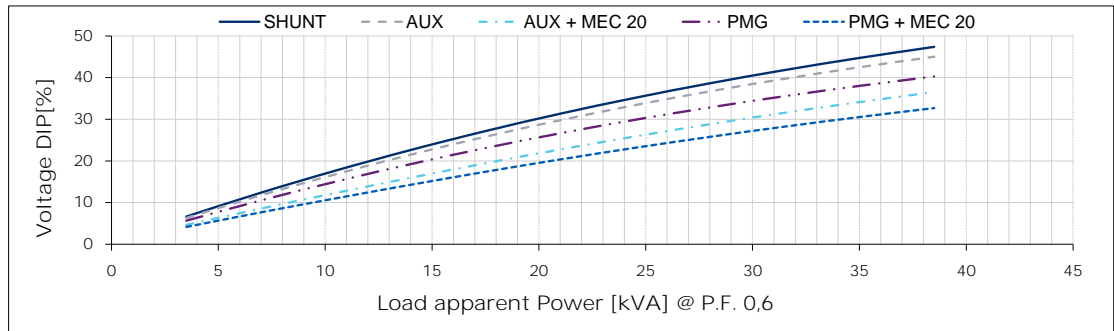
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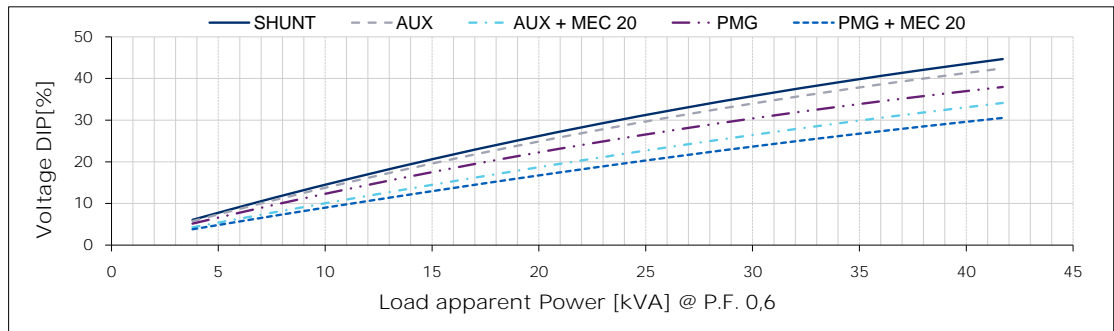
Typical voltage DIP curves

60 Hz - 1800 min<sup>-1</sup>

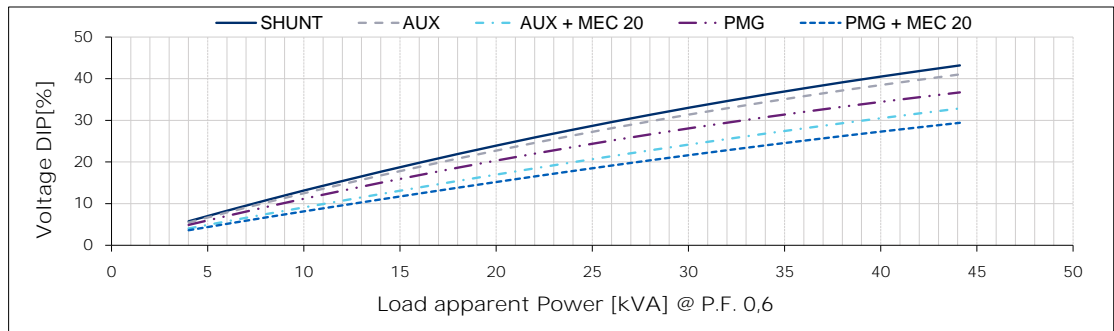
380 V



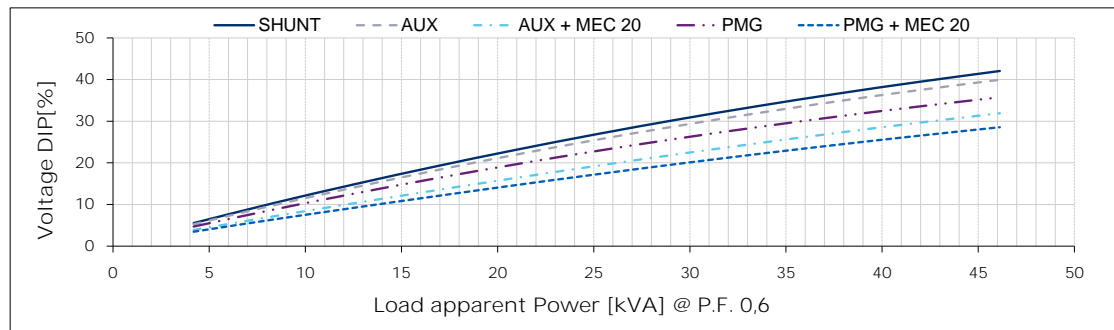
416 V



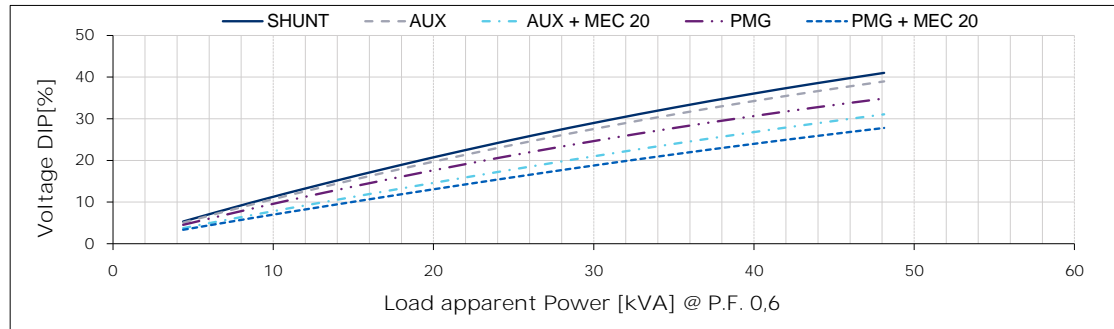
440 V



460 V



480 V



For P.F. different from 0,6 the following simplified formula can be used:  $\Delta V @ P.F. = \Delta V @ 0,6 \cdot \sin(\arccos(P.F.)) / 0,8$



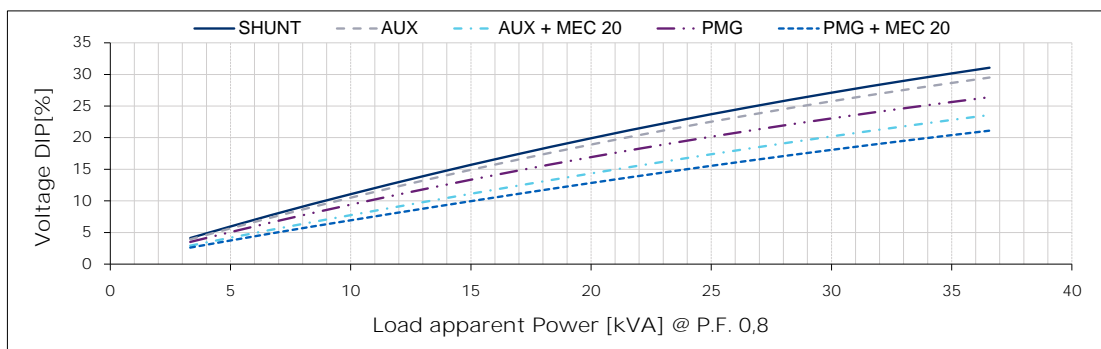
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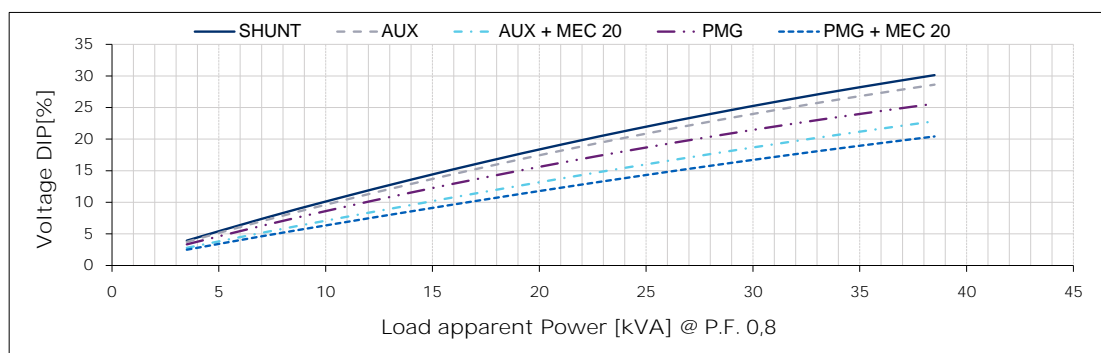
Typical voltage DIP curves

50 Hz - 1500 min<sup>-1</sup>

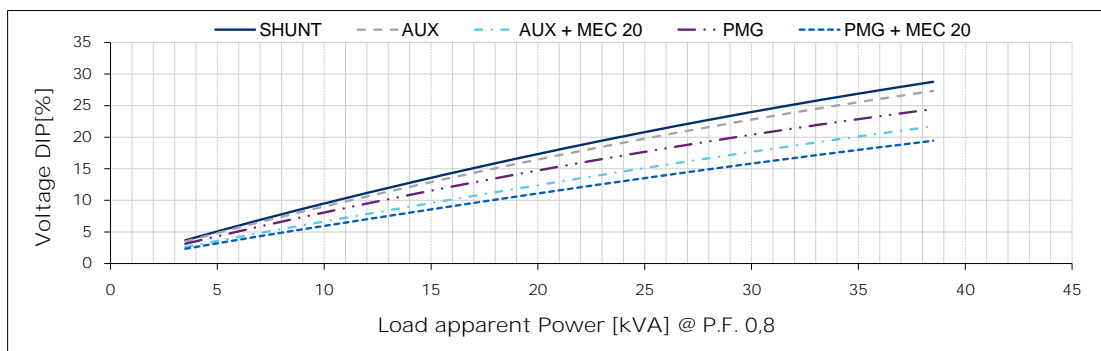
380 V



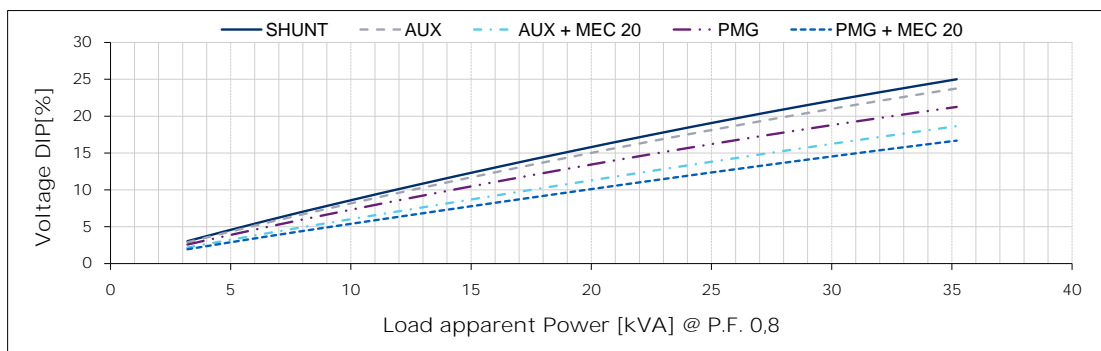
400 V



415 V



440 V





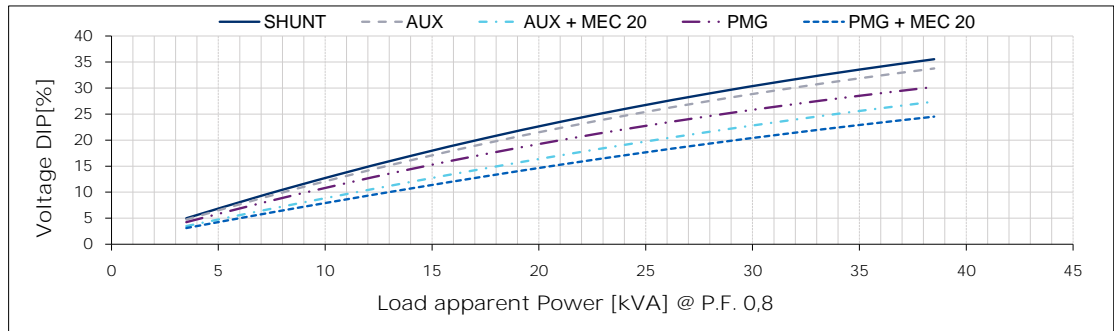
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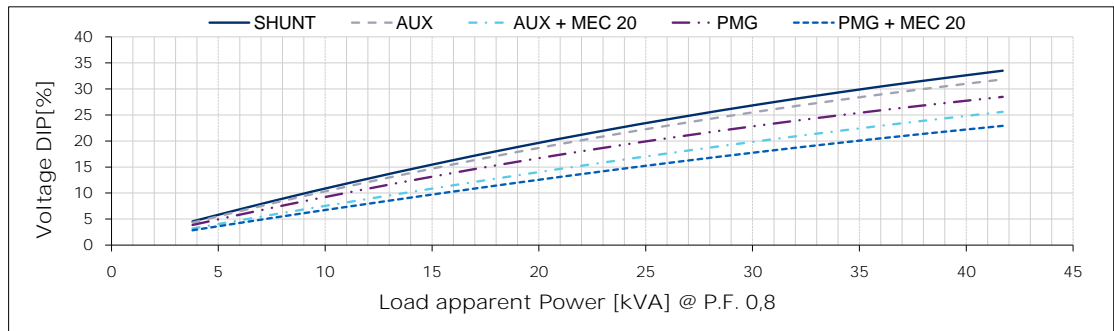
Typical voltage DIP curves

60 Hz - 1800 min<sup>-1</sup>

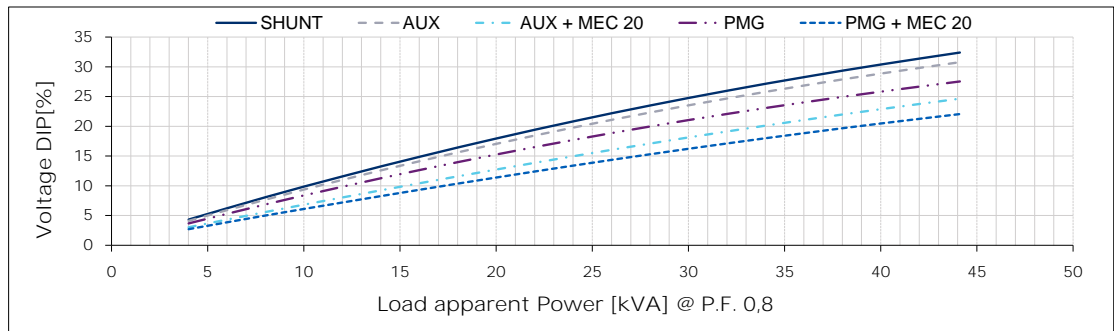
380 V



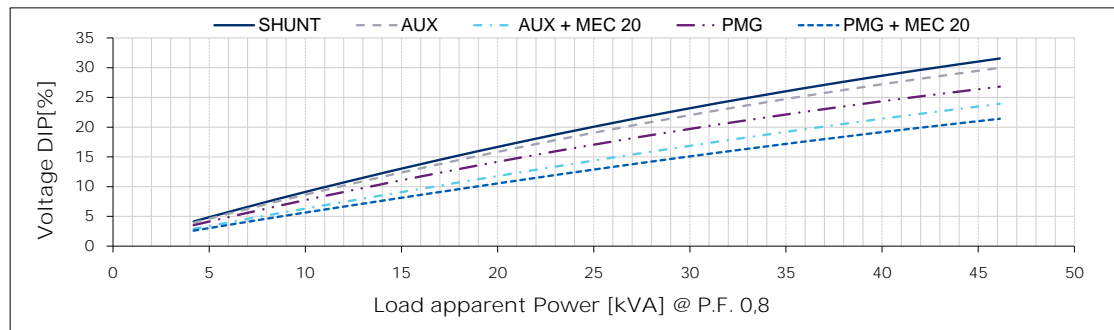
416 V



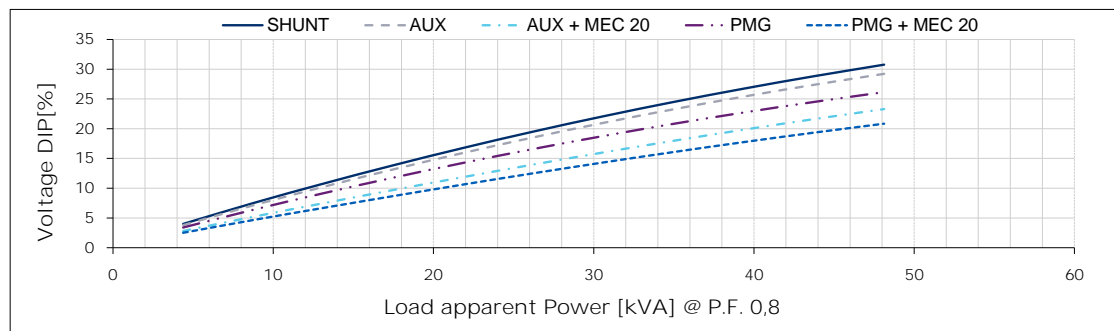
440 V



460 V



480 V

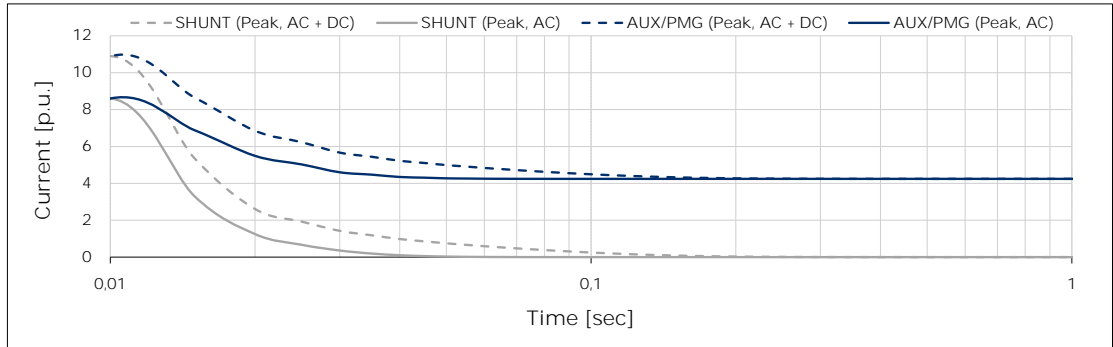


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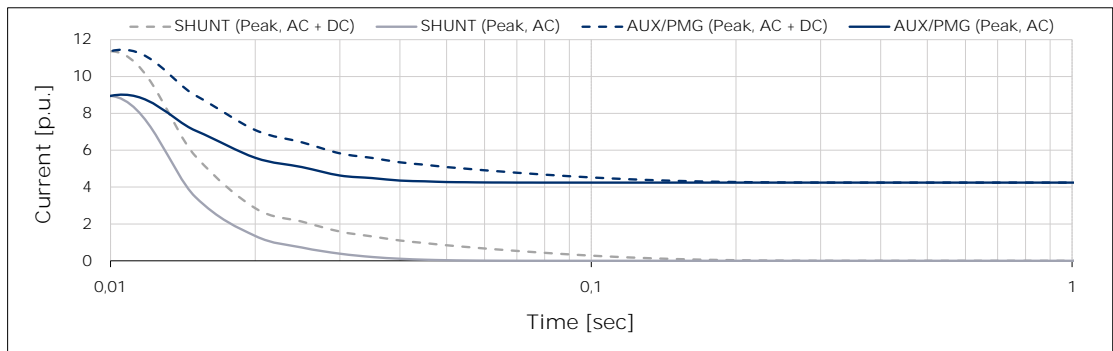
Typical 3-phase short circuit decrement curves

50 Hz - 1500 min<sup>-1</sup>

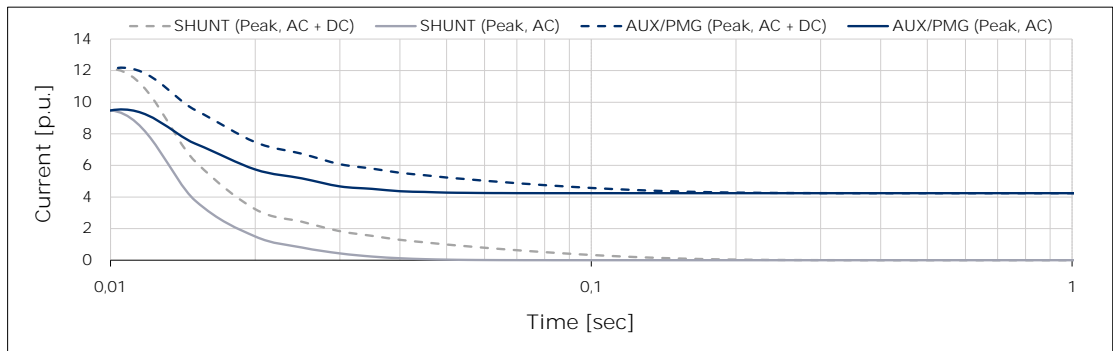
380 V



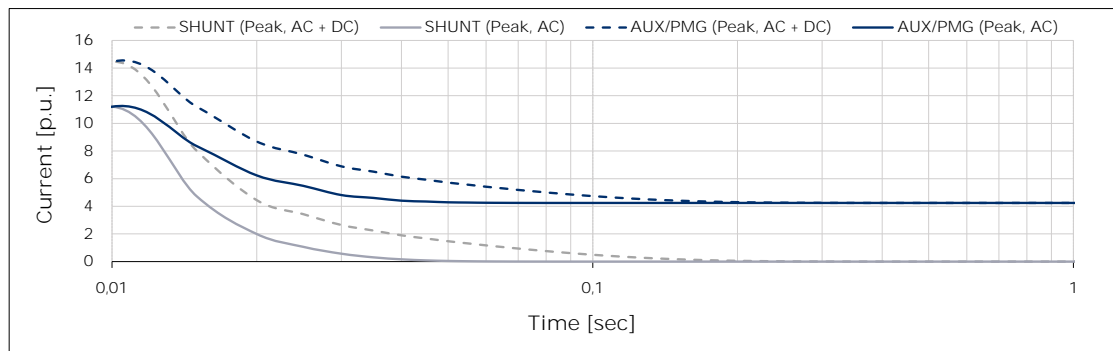
400 V



415 V



440 V

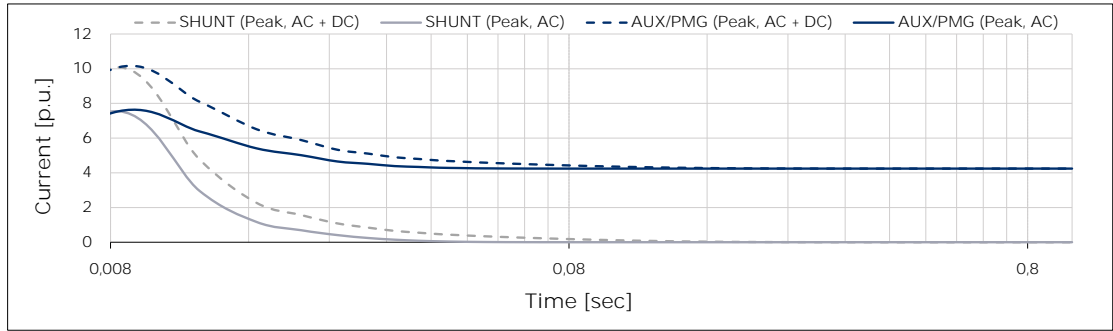




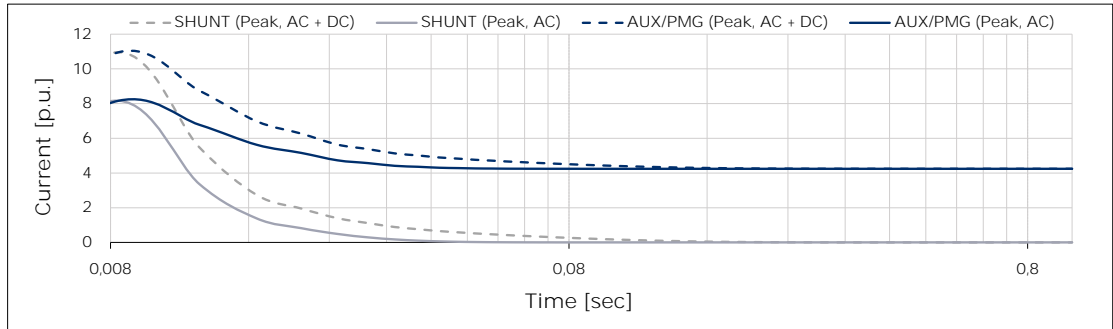
Typical 3-phase short circuit decrement curves

60 Hz - 1800 min<sup>-1</sup>

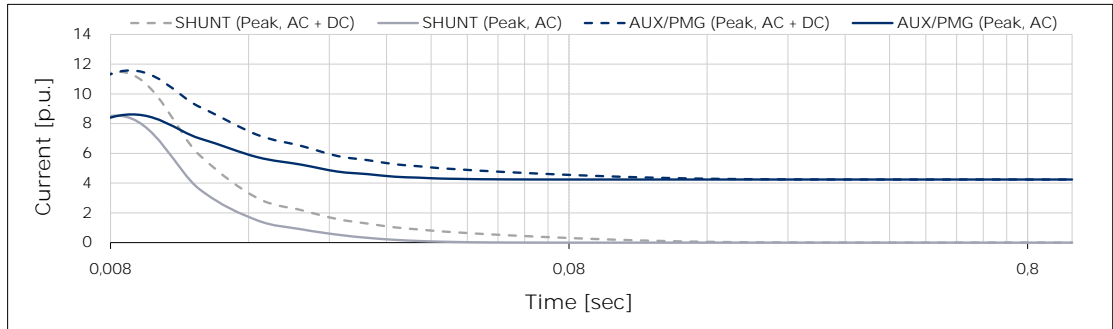
380 V



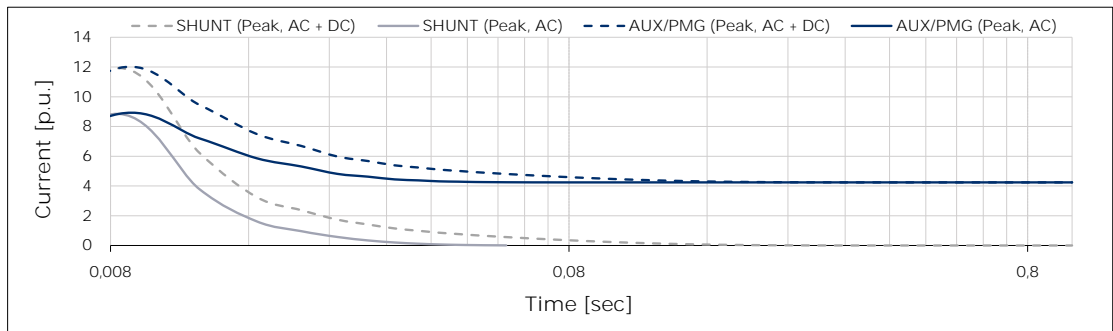
416 V



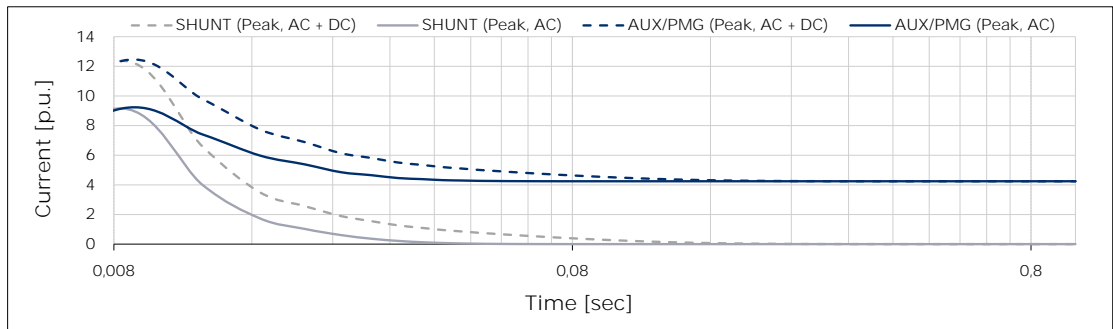
440 V



460 V



480 V



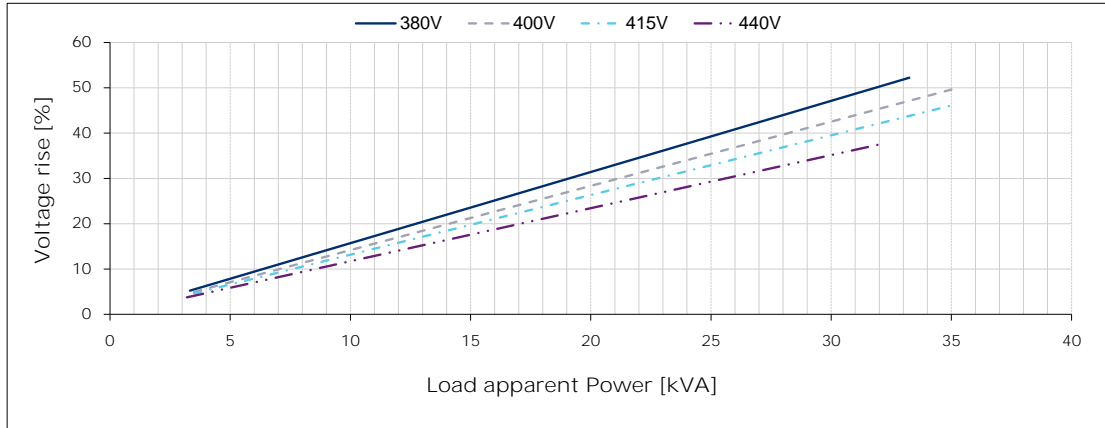
Above curves are based on a three-phase short circuit  
For other type of short circuit use the following multiplication factors

	2 phase	1 phase
Instantaneous (max)	0,99	1,19
Continuous	1,50	1,83

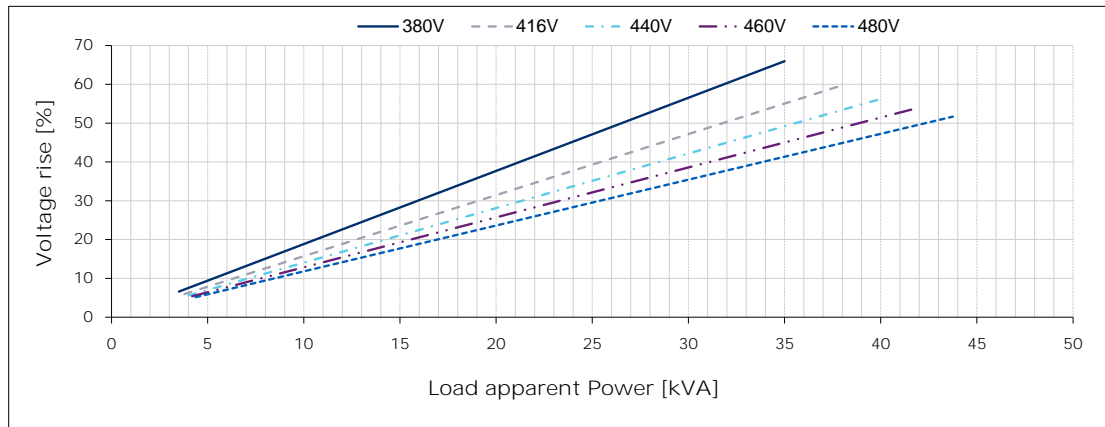
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Typical load rejection curves

50 Hz - 1500 min-1



60 Hz - 1800 min-1



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