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THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

4 POLES

CONTINUOUS DUTY

50 Hz-1500 min^{-1} / 60 Hz-1800 min^{-1}

AMBIENT TEMPERATURE	40°C	WINDING DATA	
TEMPERATURE RISE	H	Winding code	M0
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	9,5	10,0	10,0	9,0	10,0	10,8	11,5	12,0	12,5
		kW	*7,6*	*8,0*	*8,0*	*7,2*	*8,0*	*8,6*	*9,2*	*9,6*	*10,0*
EFFICIENCY (%) @ 0,8 p.f.		4/4	79,6	79,0	78,3	76,6	80,5	81,3	81,5	81,5	81,1
		3/4	82,0	81,4	80,7	78,1	82,7	83,4	83,5	83,4	83,0
		2/4	83,5	82,8	81,8	78,6	84,0	84,5	84,6	84,4	84,0
EFFICIENCY (%) @ 1,0 p.f.		4/4	85,0	85,0	84,9	84,0	84,8	85,7	86,1	86,4	86,5
		3/4	86,9	86,8	86,5	85,0	86,7	87,5	87,8	87,9	87,9
		2/4	88,1	87,8	87,2	84,6	88,0	88,5	88,7	88,6	88,5
STAND-BY RATING (163/27)		kVA	10,5	11,0	11,0	9,9	11,0	11,9	12,7	13,2	13,8
STAND-BY EFFICIENCY (%) @ 0,8 p.f.			78,6	78,0	77,4	76,1	79,6	80,5	80,7	80,7	80,4
SHORT CIRCUIT RATIO (referred to class H rating)			0,78	0,82	0,88	1,10	0,62	0,68	0,72	0,75	0,79
REACTANCES (%) (referred to class H rating)											
Direct axis synchronous		xd	241	229	213	171	305	275	262	250	239
Quadrature axis synchronous		xq	106	101	94	75	134	121	115	110	105
Direct axis transient		x'd	17,3	16,5	15,3	12,3	21,9	19,7	18,8	17,9	17,2
Direct axis subtransient		x"d	11,5	10,9	10,1	8,1	14,5	13,1	12,4	11,9	11,3
Quadrature axis subtransient		x"q	12,6	12,0	11,1	8,9	15,9	14,4	13,7	13,0	12,5
Negative sequence		x_2	12,0	11,4	10,6	8,5	15,2	13,7	13,0	12,5	11,9
Zero sequence		x_0	8,7	8,3	7,7	6,2	11,0	9,9	9,5	9,0	8,6

TIME CONSTANTS [s]

Open circuit (T'do)	0,318	Subtransient (T"d)	0,008
Transient (T'd)	0,039	Armature (Ta)	0,005

MECHANICAL CHARACTERISTICS

D-end bearing/Lubrication	-
N-end bearing/Lubrication	6207 2RS C3 / Prelubricated
Weight [kg]	83
Inertia (J) [kgm^2]	0,09
Overspeed [min^{-1}]	2250
Method of cooling	IC 01
Cooling air required [m^3/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	1,179
Overloads	10% for 1 hour
3-phase short circuit current	>= 300% (3 In) 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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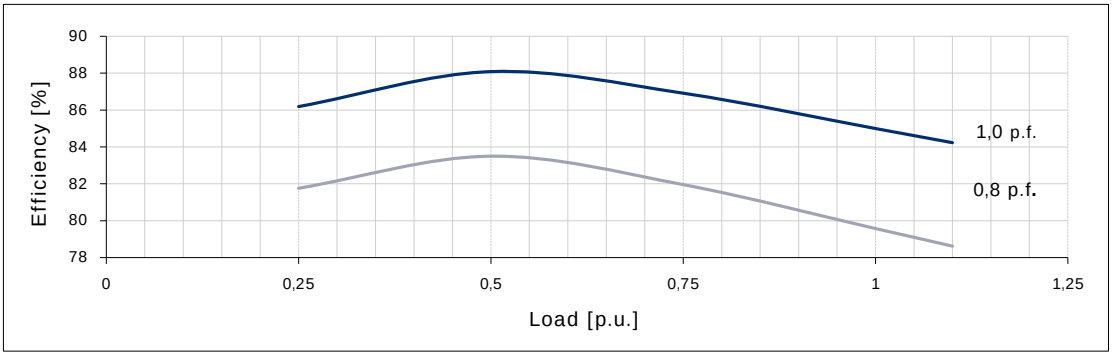
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

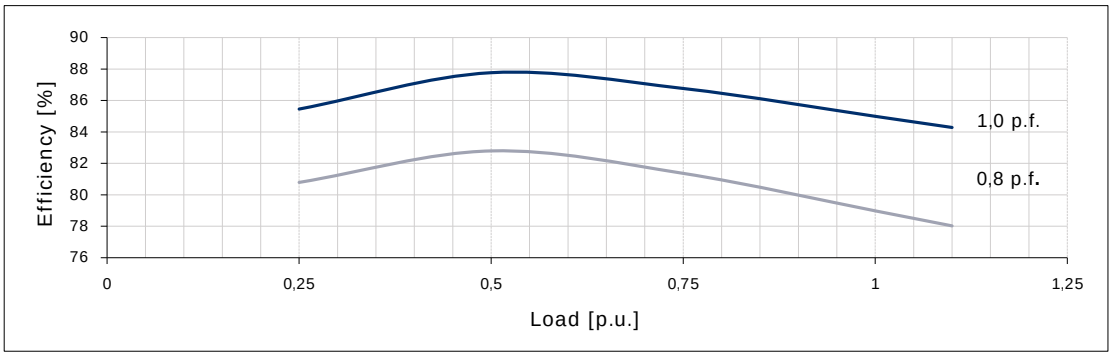
Typical efficiency curves

50 Hz - 1500 min^{-1}

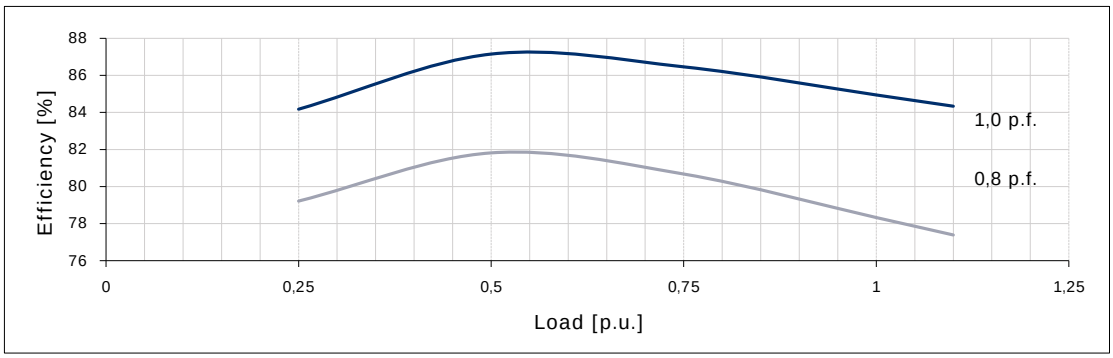
380 V



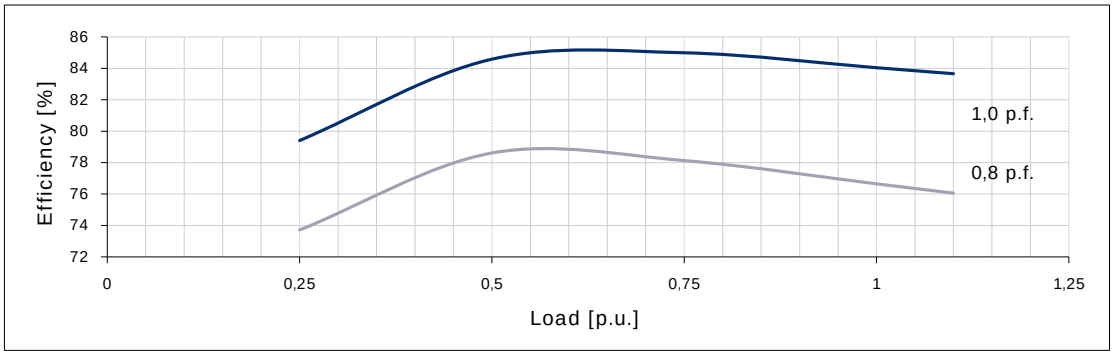
400 V



415 V



440 V



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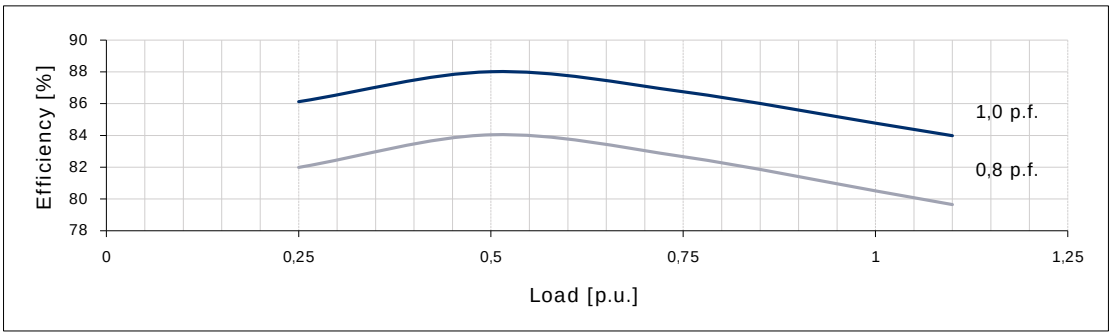
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

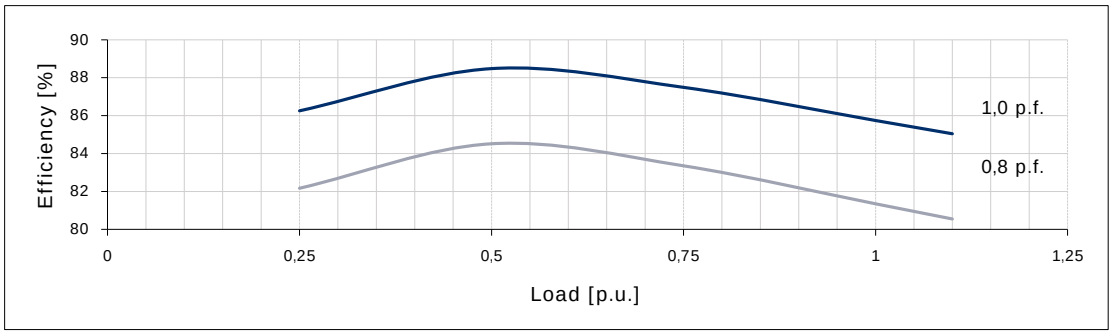
Typical efficiency curves

60 Hz - 1800 min^{-1}

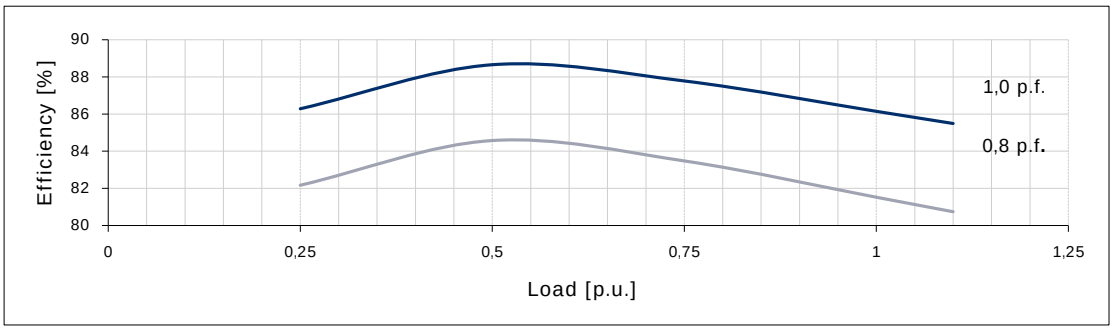
380 V



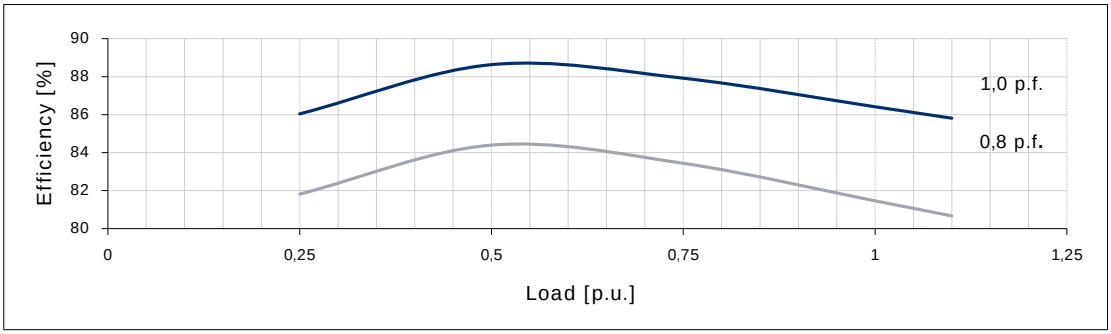
416 V



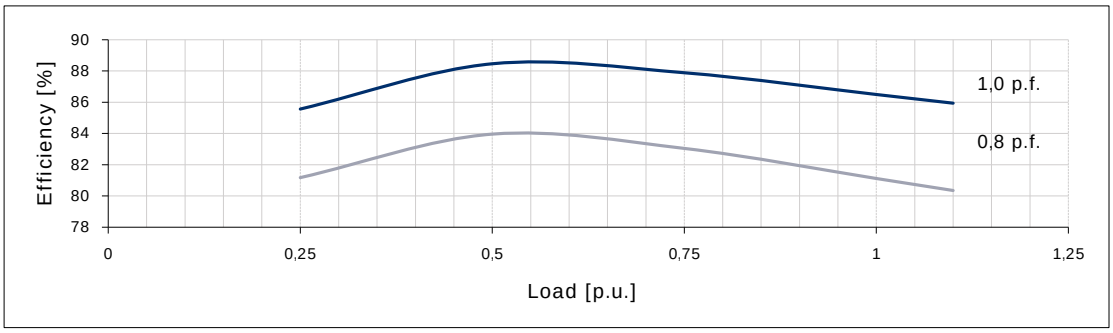
440 V



460 V



480 V



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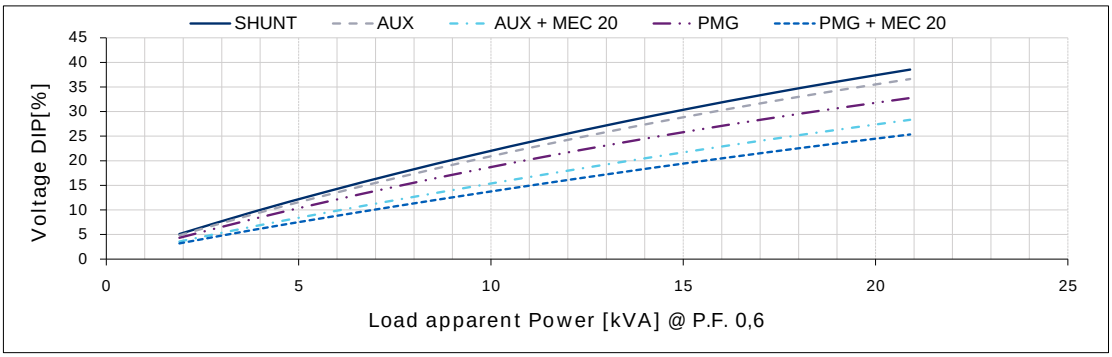
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

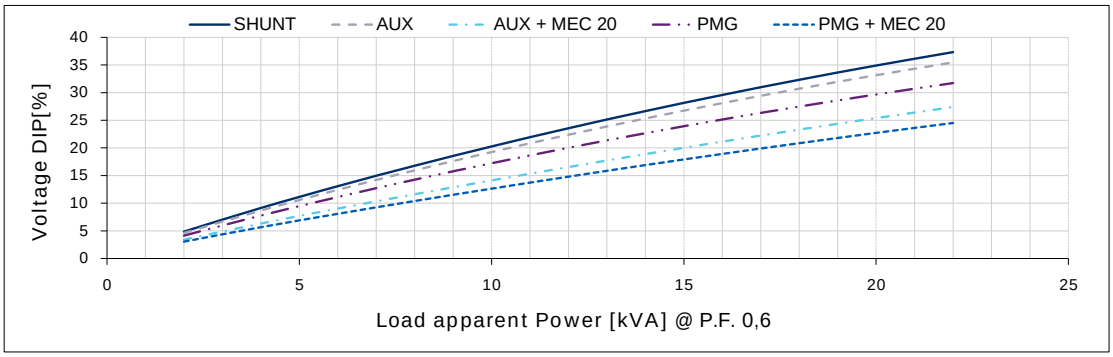
Typical voltage DIP curves

50 Hz - 1500 min^{-1}

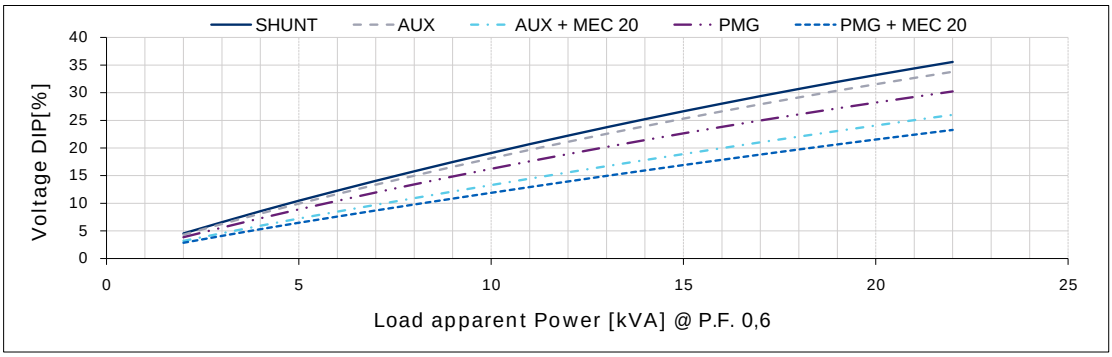
380 V



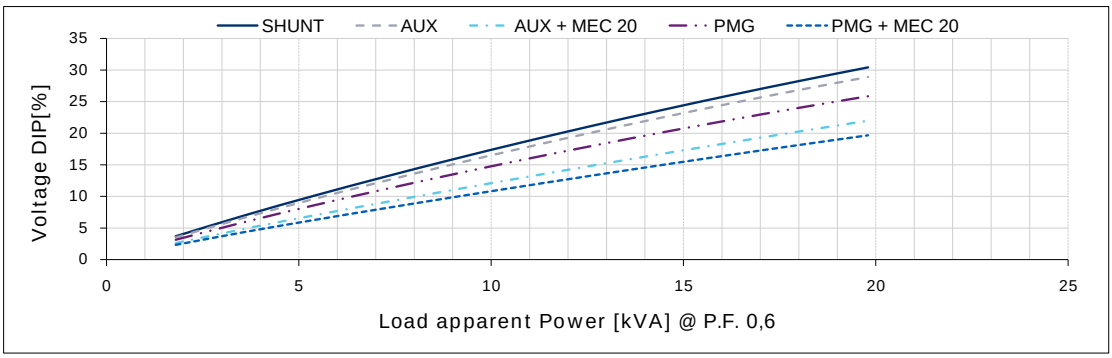
400 V



415 V



440 V



SYN.DS.0050_=

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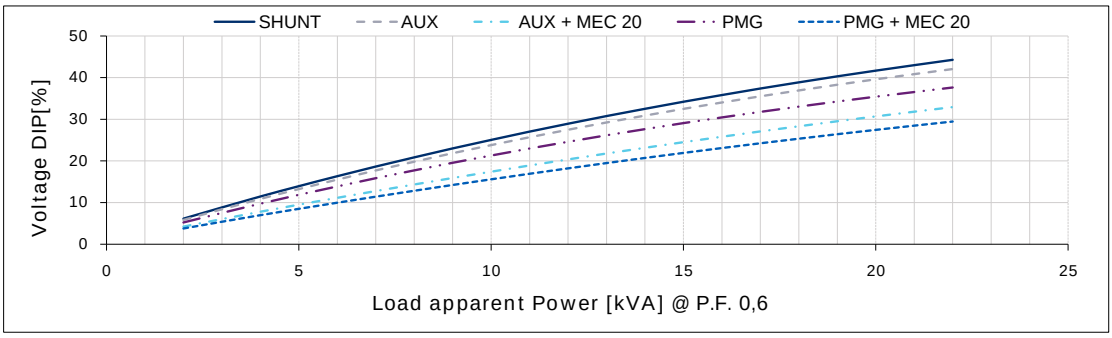
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

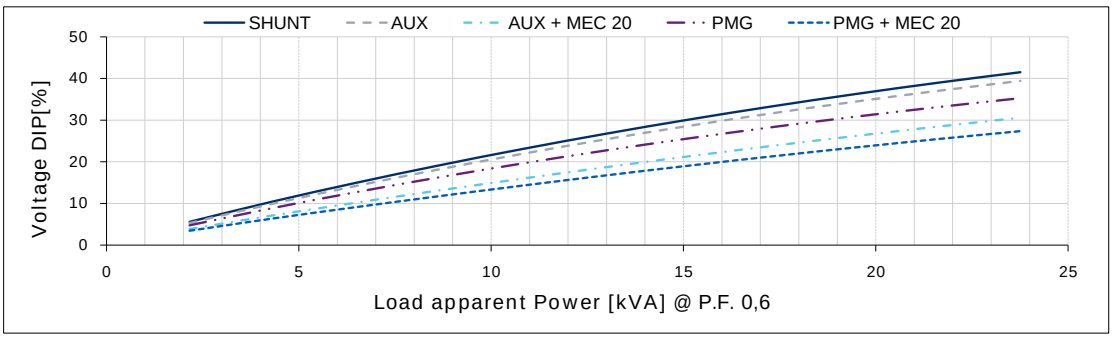
Typical voltage DIP curves

60 Hz - 1800 min^{-1}

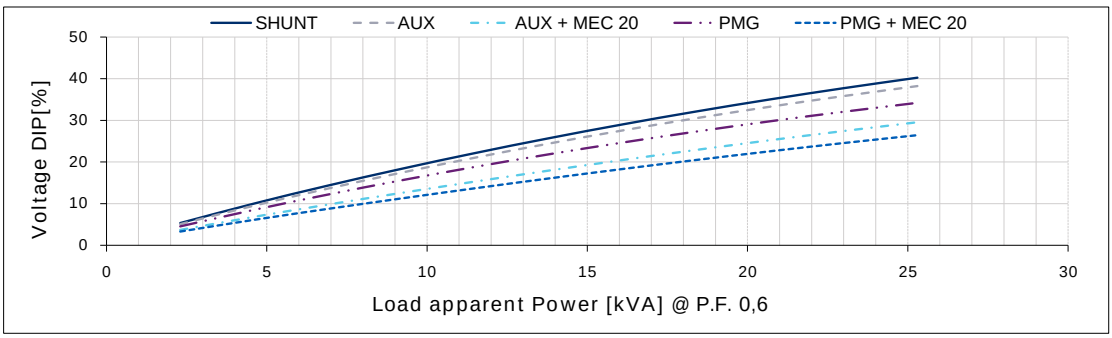
380 V



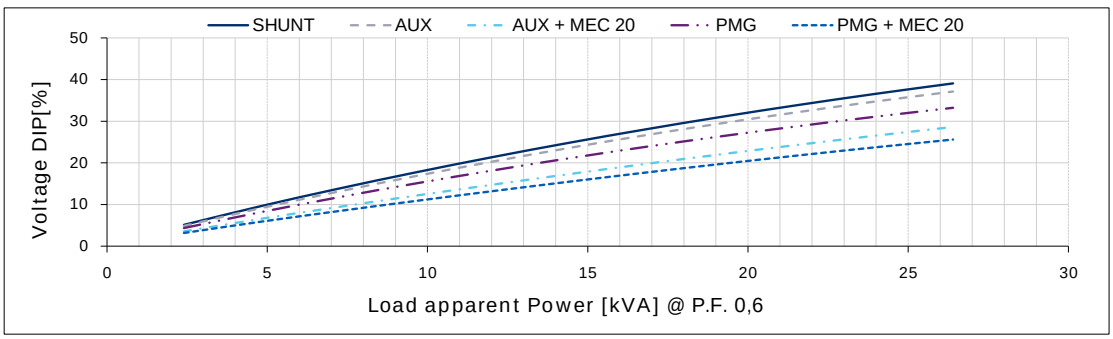
416 V



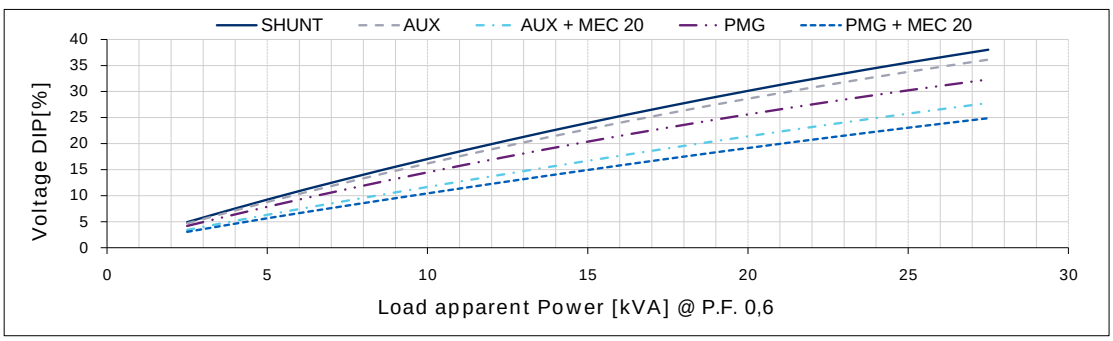
440 V



460 V



480 V



For P.F. different from 0,6 the following simplified formula can be used: ΔV (@ P.F.) = ΔV (@ 0,6)*sin(arcos(P.F.))/0,8

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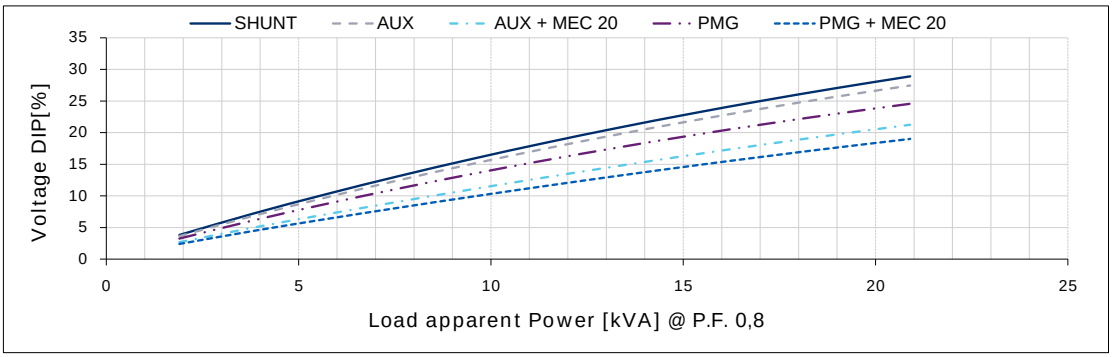
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

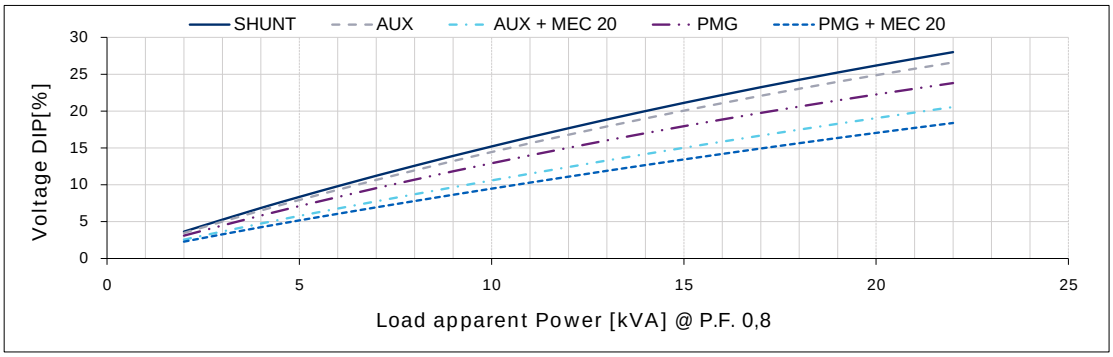
Typical voltage DIP curves

50 Hz - 1500 min^{-1}

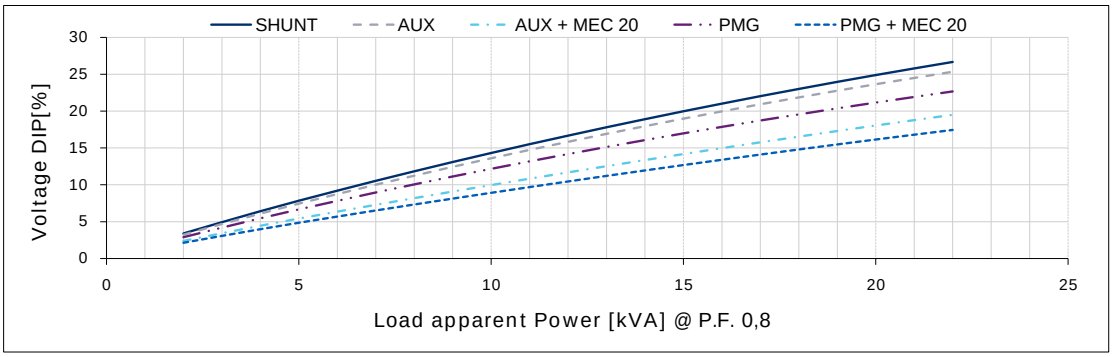
380 V



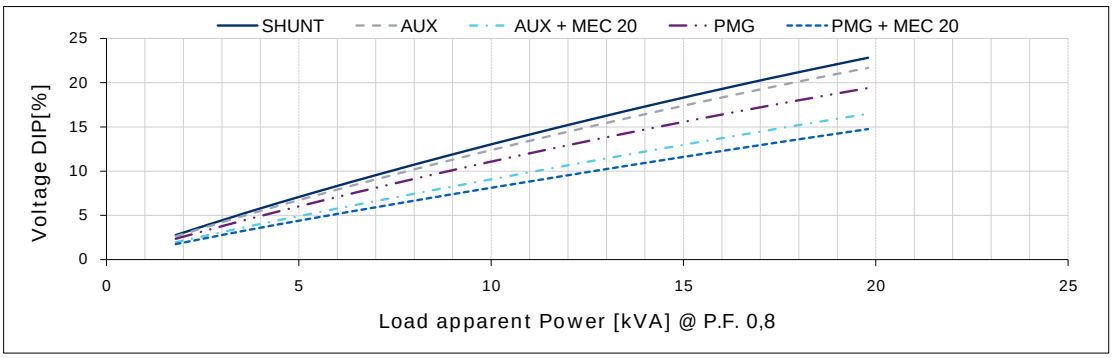
400 V



415 V



440 V



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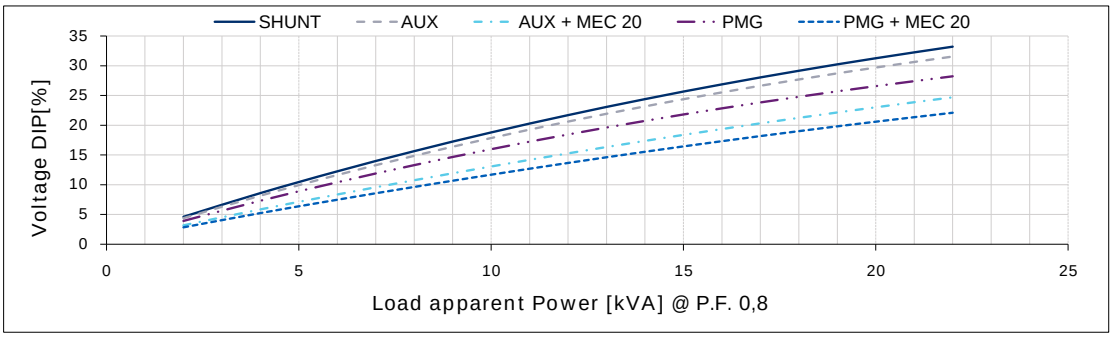
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

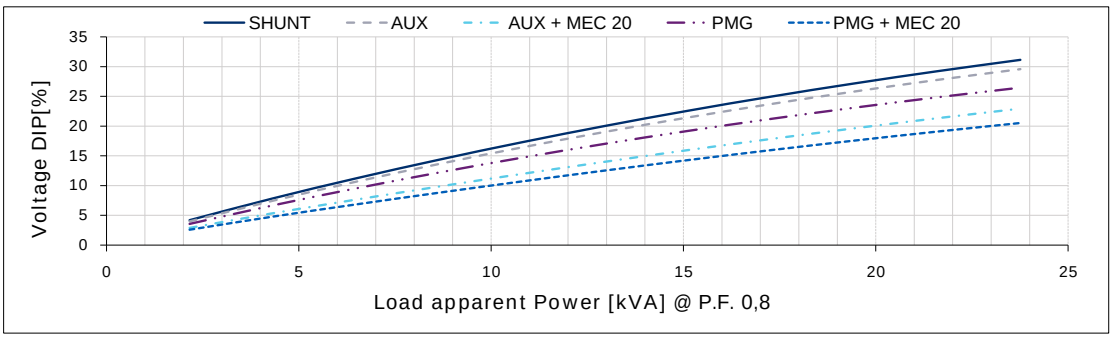
Typical voltage DIP curves

60 Hz - 1800 min^{-1}

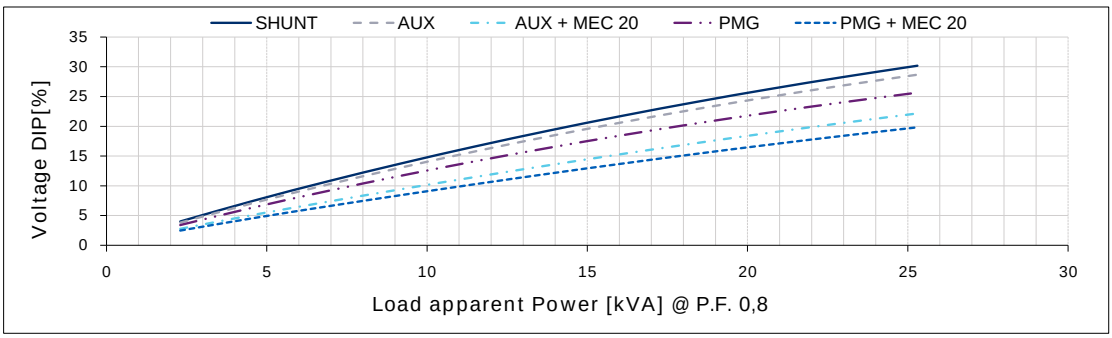
380 V



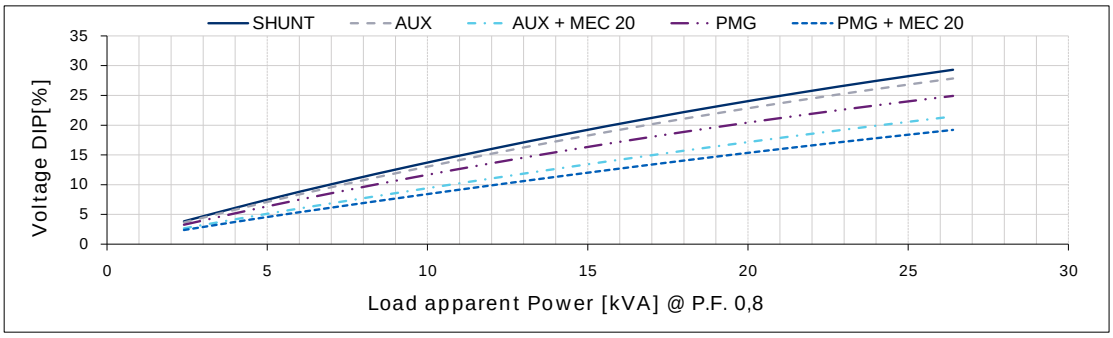
416 V



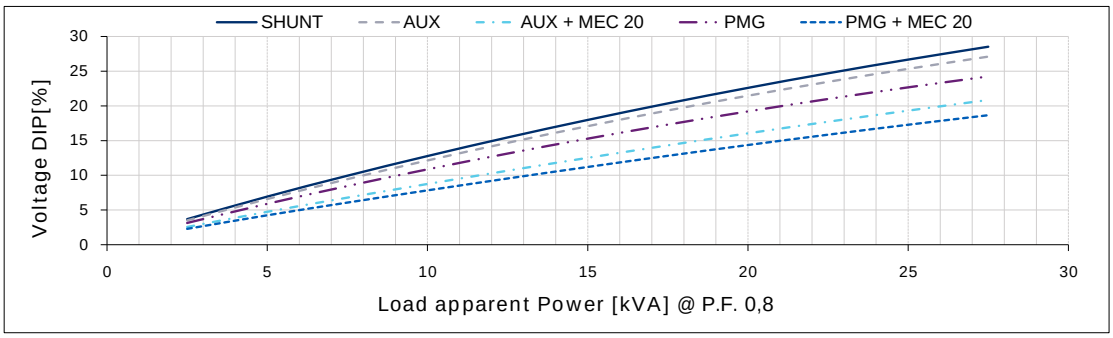
440 V



460 V



480 V



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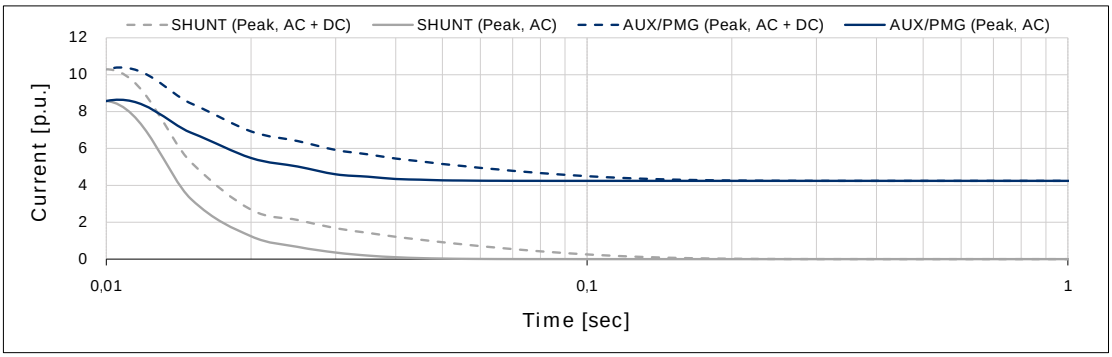
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

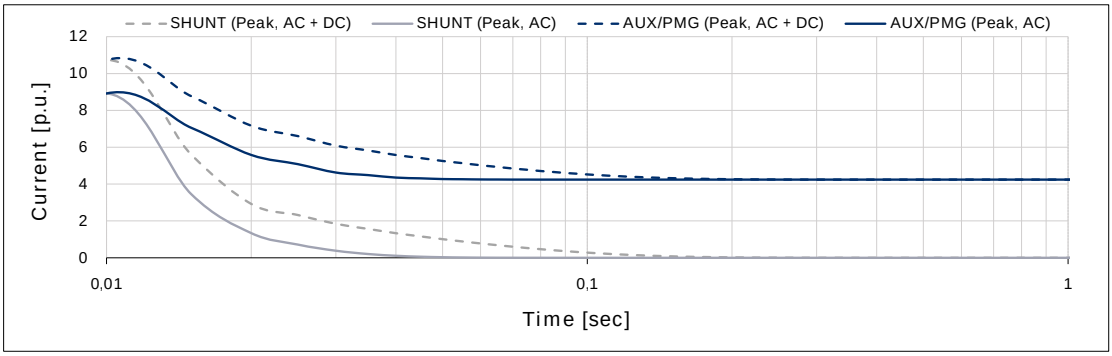
Typical 3-phase short circuit decrement curves

50 Hz - 1500 min^{-1}

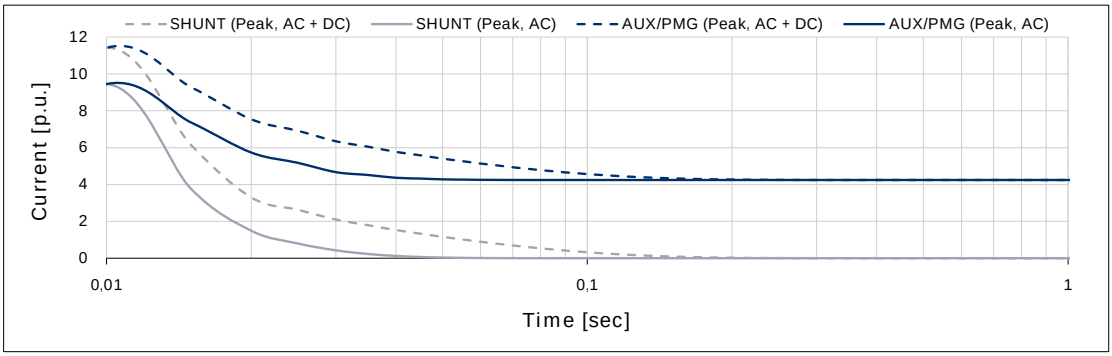
380 V



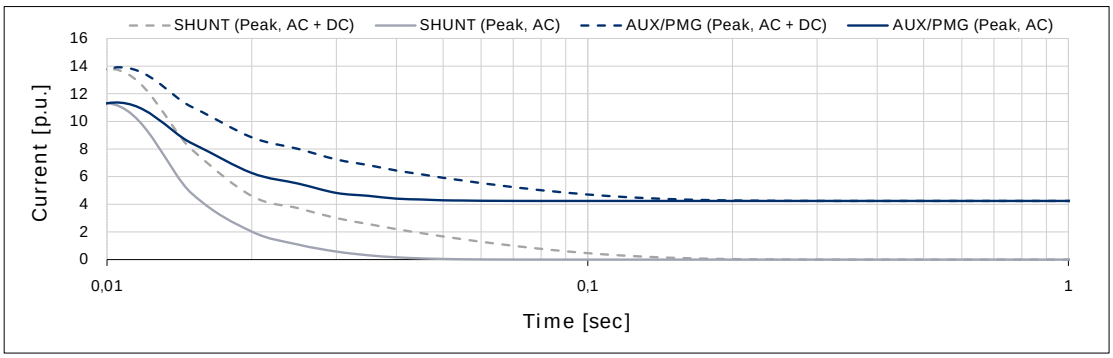
400 V



415 V



440 V



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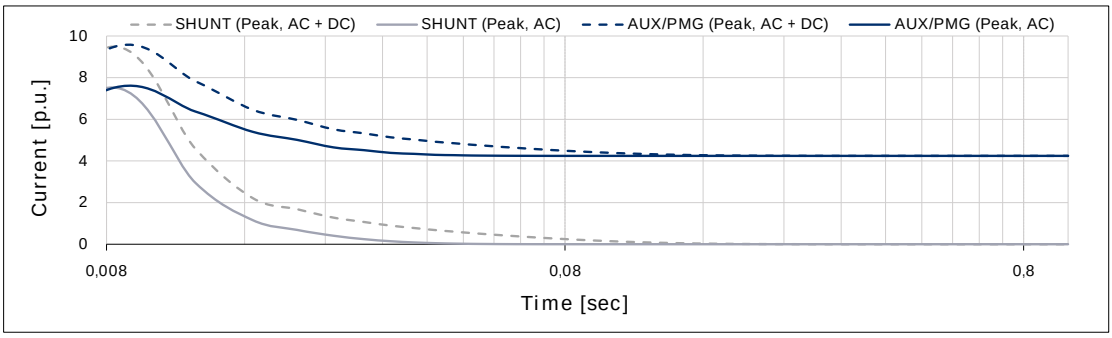
THREE-PHASE SYNCHRONOUS GENERATOR

MXB-E 160 XA 4

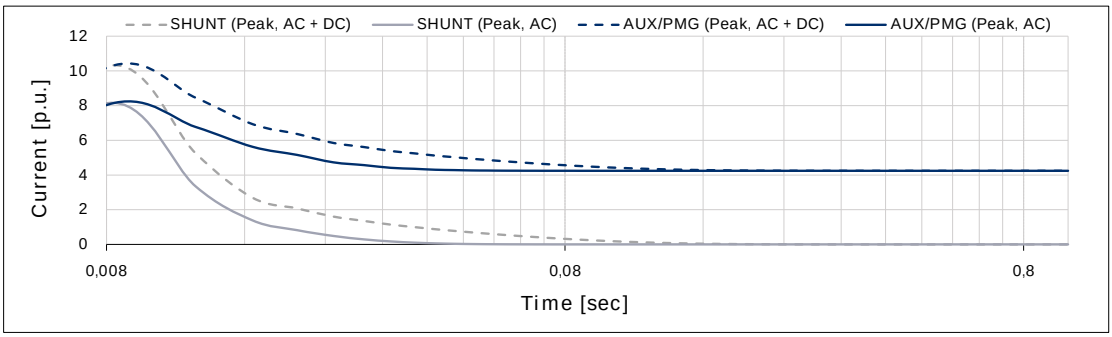
Typical 3-phase short circuit decrement curves

60 Hz - 1800 min^{-1}

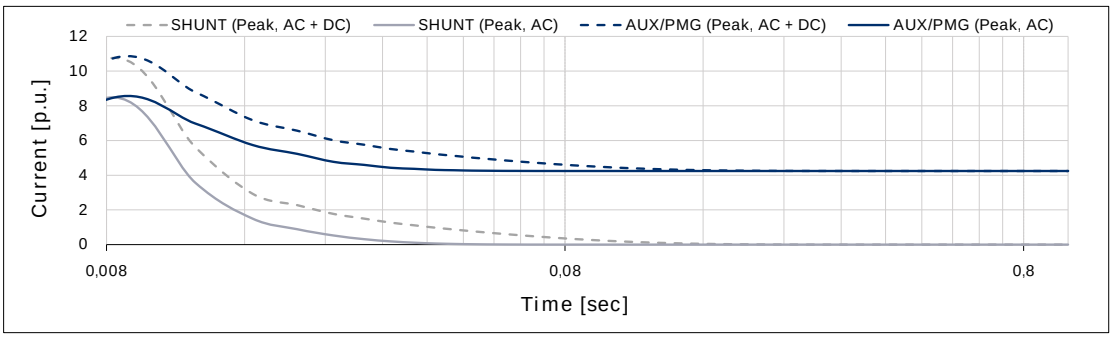
380 V



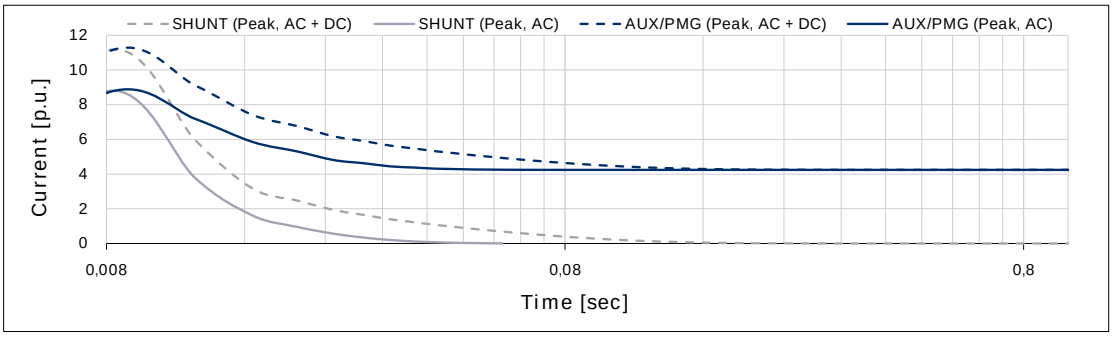
416 V



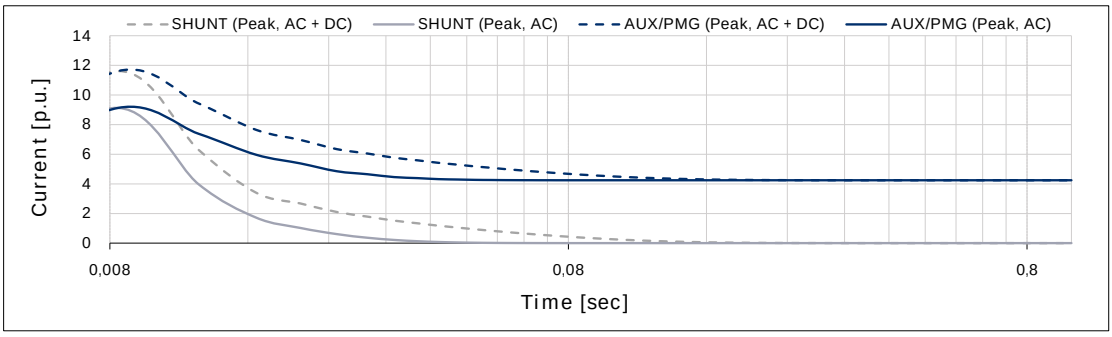
440 V



460 V



480 V

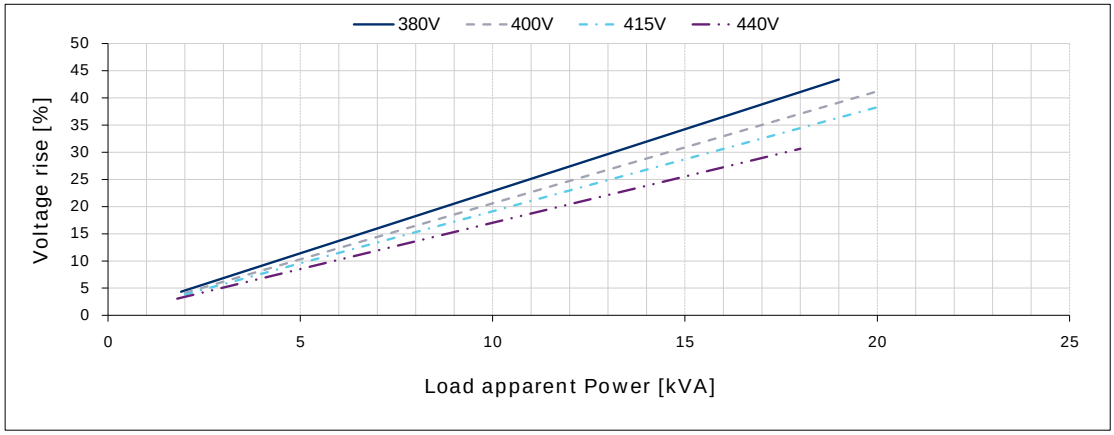


Above curves are based on a three-phase short circuit
For other type of short circuit use the following moltiplication factors

	2 phase	1 phase
Instantaneous (max)	0,95	1,16
Continuous	1,50	1,83

Typical load rejection curves

50 Hz - 1500 min-1



60 Hz - 1800 min-1