

MANUFACTURED IN THE UNITED KINGDOM



FG Wilson (Engineering) Ltd

Old Glenarm Road, Larne, Co Antrim BT40 1EJ

Northern Ireland, United Kingdom

Tel: +44 (0) 28 28261000

Fax: +44 (0) 28 28261111

www.FGWilson.com

GENERATING SET

MODEL	P625P1	
SERIAL NUMBER	FGWRPES1LLPS01764	
YEAR OF MANUFACTURE	2004	
RATED POWER - PRIME	625.0	kVA
	500.0	kW
	0.80	COS Ø
RATED VOLTAGE	480/277	V
PHASE	3	
RATED FREQUENCY	60	Hz
RATED CURRENT	752	A
RATED R.P.M	1800	
MAXIMUM ALTITUDE*	152.4	m
MAXIMUM AMBIENT TEMPERATURE*	27	°C
MASS	5540	Kg
SALES ORDER REFERENCE	5006277/10	
ALTERNATOR CONNECTION	S_STAR	
RATING ISO 8528-3	BR	
ALTERNATOR ENCLOSURE	IP23	
INSULATION CLASS	H	
EXCITATION VOLTAGE	35	V
EXCITATION CURRENT	3	A
AVR	R448C	
MADE IN U.K		

*GENERATOR SET IS DESIGNED TO OPERATE IN AMBIENT TEMPERATURES UP TO 50°C AND AT HIGHER ALTITUDES. PLEASE CONSULT FACTORY FOR OUTPUTS AVAILABLE

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www.FGWilson.com



www.FGWilsonMiami.com

GENERATOR SET

MODEL	P750-1
SERIAL NUMBER	FGWPES28JPCB00484
YEAR	2013
RATED POWER PRIME	750 KVA
	600 KW
	0.8 COS
RATED VOLTAGE	480/277 VOLT
PHASE	3
RATED FREQUENCY	60 HZ
RATED CURRENT	902 AMP
RPM	1800
MAX ALT	100 M
TEMP	25 C

SALES ORDER REF#	5055210/30
ALT CONNECTION	S. STAR
RATING ISO 8528-3	PR 500H TLO.875
ALTERNATOR ENCLOSURE	IP23
INSULATION CLASS	H
EXCITATION VOLT	53 V
EXCITATION CURRENT	4 A
A.V.R	R450
MADE IN UK	

*GENERATOR SET IS DESIGNED TO OPERATE IN AMBIENT TEMPERATURE UP TO 50°C
AND AT HIGHER ALTITUDES. PLEASE CONSULT FACTORY FOR OUTPUTS AVAILABLE.

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www.FGWilson.com



www.FGWilsonMiami.com

GENERATOR SET

MODEL
SERIAL NUMBER
YEAR
RATED POWER PRIME

P750-1
FGWPES28APCB00487
2013

750 KVA
600 KW
0.8 COS

RATED VOLTAGE
PHASE
RATED FREQUENCY
RATED CURRENT
RPM
MAX ALT

480/277 VOLT
3
60 HZ
902 AMP
1800
100 M

TEMP

25 C

SALES ORDER REF#
ALT CONNECTION
RATING ISO 8528-3
ALTERNATOR ENCLOSURE
INSULATION CLASS
EXCITATION VOLT
EXCITATION CURRENT
A.V.R.
MADE IN UK

5055210/20
S. STAR
PR 500H TLO.875
IP23
H
53 V
4 A
R450

Perkins Engines Company Ltd, England



Engine No.

JGZF7146 U15121X

Designation.

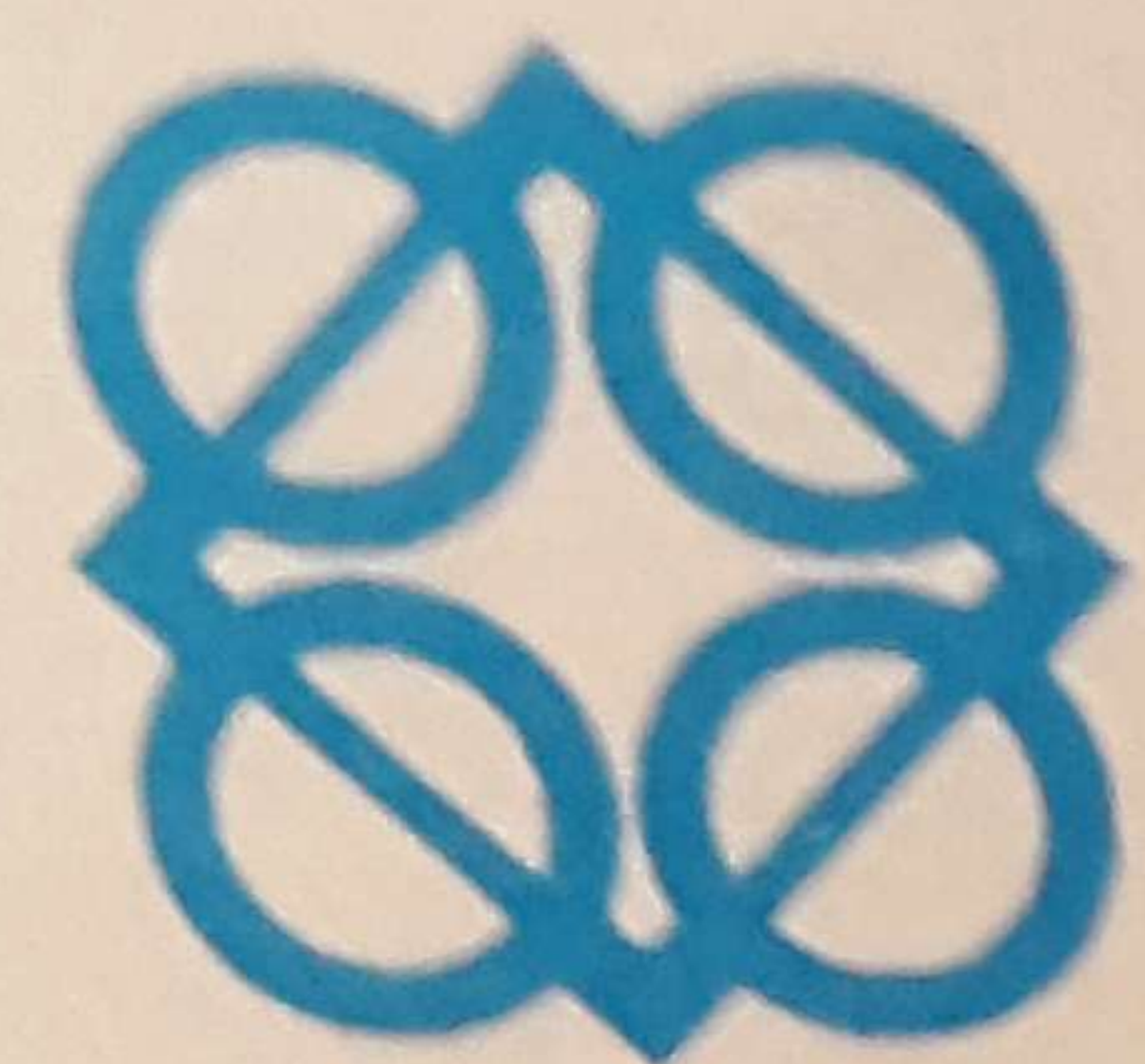
2806A-E18TAG3

Engine Rating.

652BKW 1800RPM

For spares quote Engine No.

Perkins Engines Company Ltd, England



Perkins®

Engine No.

JGZF7146 U15121X

Designation.

2806A-E18TAG3

Engine Rating.

652BKW 1800RPM

For spares quote Engine No.

Doosan Gensets in Lethem

Lethem Power Company have three (3) Genset that were purchased from Farm Supply LTD. All three are driven by Doosan Engines. Please find specification below:

Genset #1

Generator Set Model:		MDSS450-2	
Serial No.	ML1407039-2	Power Factor:	0.8 (lag)
Standby Power:	563kVA/450kW	Speed:	1800 r/min
Voltage:	440V/254V	Frequency:	60 Hz
Phase:	3	Weight::	3356 kg
P. Date:	2014.08	Dimensions (LxWxH) :	3120*1402*1760

Genset model: MDSS 450-2

Engine: Doosan DP158LD

Alternator: Stamford HCI 544CI

Control Panel: EASYGEN 3200-5

Governor controller: DOOSAN DIGITAL CONTROLLER

AVR: MX341

Breaker: ABB SACE PR231/P

Accessory: PMG installed

Genset #2



Genset model: MP 560

Engine: Doosan DP180LA

Alternator: Mecc alte ECO 40 1L4

Control Panel: EASYGEN 3200-5

Governor controller: DOOSAN DIGITAL CONTROLLER

AVR: DER1

Droop Module: PD 1

Breaker: ABB SACE PR231/P

Genset #3



Generator Set Model: MP560			
Serial No.	MLB11044-01/01	Power Factor:	0.8
Standby Power:	700KVA/560KW	Speed:	1800 r/min
Voltage:	480/277V	Frequency:	60 Hz
Phase:	3	Current:	842A
P. Date:	2016.12	Weight:	3371 kg
Max Altitude:	1000 M	Dimension (LxWxH) :	3675*1403*2101
Max Ambient Temp:	40 Cd		

Genset model: MP560

Engine: Doosan DP180LA

Alternator: Stamford HCI 534E1

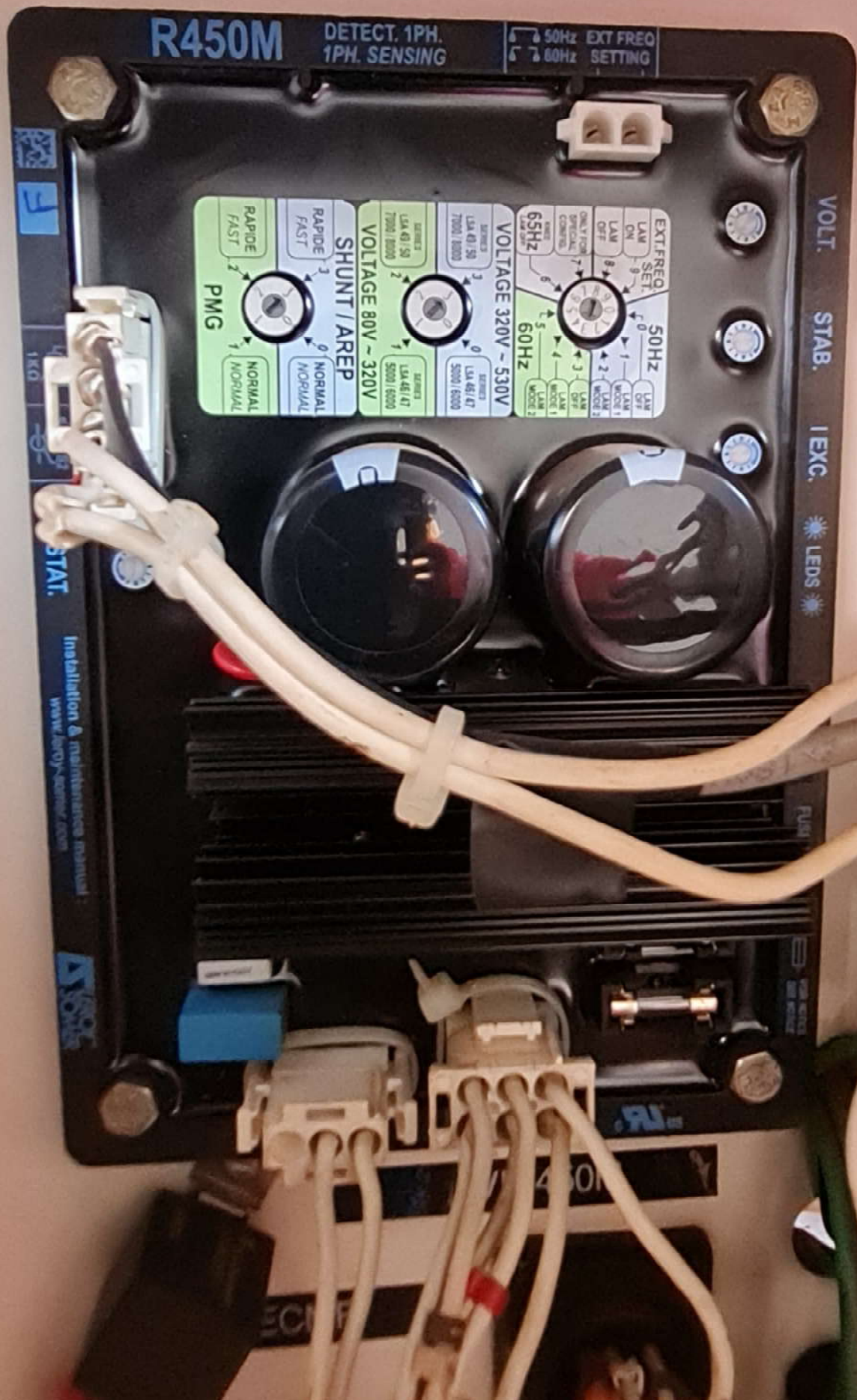
Control Panel: EASYGEN 3200-5

Governor controller: DOOSAN DIGITAL CONTROLLER

AVR: MX341

Breaker: ABB SACE PR231/P

Accessory: PMG installed



80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
MPU		Discrete Inputs													Relay Outputs																								
		DI 12	DI 11	DI 10	DI 09	DI 08	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	Common DI	Aux. excitat. D+	Power 24 V-	supply 24 V+	Engine grnd.	PE	Common	R 12	R 11	R 10	R 09	R 08	R 07	R 06	R 05	Common	R 04	R 03	R 02	R 01						



WOODWARD
Stuttgart, Germany

CE S/N: 18239043 1207

PART NO: 8440-2050 B REV: EASYGEN-3200-5
EASYGEN-3200-5/P1

U_{in}: 12/24V DC I_{in}: 1.4/0.7ADC U_{out}(IEC): 120VAC / 480VAC U_{out}(UL): 600V AC
I_{out}: 5A AC I_{out}: 5A AC f_{in}: 50/60Hz U_{out} (typ): 12/24V DC
U_{out} (typ): 250V AC T_{amb}: -20 TO 70°C UK(PH-GROUND): 300VAC

Housing: TYPE 1
US LISTED Ind. Cont. Eq. File No. E221544
N13246 2FD9
CUL US File No. E347132

WARNING BEFORE UNPLUGGING CT CONNECTIONS

VOR ABKLEMMEN DER STROMWANDLERANSCHLÜSSE

APPLY A SHORT CIRCUIT TO THE GENERATOR CT TERMINALS AND, IF APPLICABLE, MAINS CT TERMINALS (SEE MANUAL)

GENERATOR-STROMWANDLER- UND GGF. NETZ-STROMWANDLERKLEMMEN KURZSCHLIESSEN (SIEHE BEDIENUNGSANLEITUNG)

Mains/ground CT		Generator CT						Analog inputs 0 to 500 Ohm 0/4 to 20 mA						Analog outputs ±10 Vdc / ± 20 mA PWM				Mains PT				Generator PT				Busbar PT													
L1		L1		L2		L3		AI 01		AI 02		AI 03		AO 01 PWM V _{OUT}		AO 02 PWM V _{OUT}		L1	L2	L3	N	L1	L2	L3	N	L1	L2/N												
s2	s1	s2	s1	s2	s1	s2	s1	-	+	-	+	-	+	+	-	+	-	100 V	400 V	100 V	400 V	100 V	400 V	100 V	400 V	100 V	400 V												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

STAMFORD®

OEM: BAIFA

www.baifapower.com Tel: +86 510 85345555

S/N X22G303718 MODEL S6L1D-C41

PF	0.80	CONNECTION	S STAR
EXC.V	59.0	PHASE	3
EXC.A	2.9	INS.CLASS	H
WDG	311	IP	23
ALT.m	1000	kg	1897.00

DUTY
kVA
kW
V
A
Hz
RPM
AMB.TEMP °C
TEMP.RISE K
TL

Con S1 BR	Stb S10 PR	Con S1 BR	Stb S10 PR
1000.0	1088.0	810.0	860.0
800.0	870.4	648.0	688.0
480	480	400	400
1202.8	1308.7	1169.2	1241.3
60	60	50	50
1800	1800	1500	1500
40	27	40	27
125	163	125	163
N/A	0.84	N/A	0.84



LR 11305

ENCLOSURE TYPE : DPGD
Continuous rated mva only:
10% OVERLOAD FOR 2H IN A 24H PERIOD



IEC 60034-1 ISO 8528-3 MG 1-32 BS 5000-3

stamford-avk.com

HQ: FOUNTAIN COURT, PETERBOROUGH, PE2 6FZ, UK

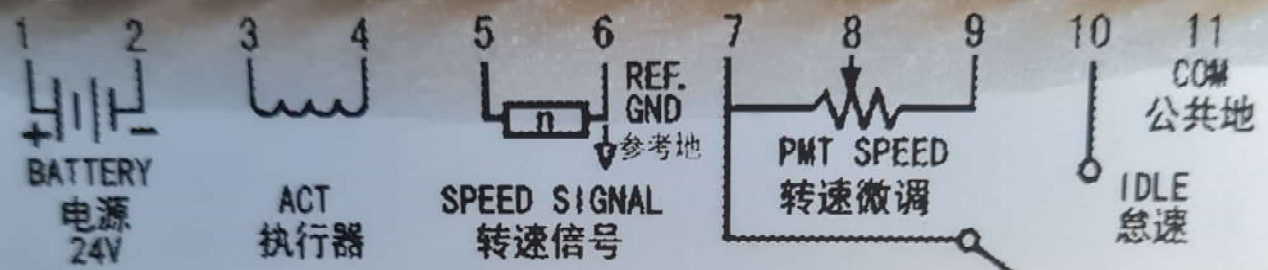
NEWAGE® | STAMFORD® | AvK®

UL 1446 Info.

STAMFORD®

UL File: OBJY2, E187789
Designation: H: UL1446
Factory ID Code: XJ

A040L646-C



PN 零件号:4296675
ID 供应商代码:61009
NO 生产序列号:220634L0127
DATE 出厂日期:202206



电源
POWER
怠速
IDLE

输出
OUTPUT
衰减
DAMPING
A B

转速降
DROOP

增益
GAIN

运行 怠速
RUN IDLE

启动烟度控制
SMOKE CONTROL



80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
Discrete Inputs															Relay Outputs																								
MPU DI12 DI11 DI10 DI09 DI08 DI07 DI06 DI05 DI04 DI03 DI02 DI01															Power Supply 12/24 Vdc Auxiliary Excitation NC R12 R11 R10 R09 R08 R07 R06 R05 R04 R03 R02 R01																								

WOODWARD

Designed in Germany / Manufactured in Poland

Manufacturer contact address:
Woodward GmbH
Handwerkstraße 29
70565 Stuttgart / Germany

S/N: 22797957 2112

P/N: 8440-2082 REV: L

EASYGEN-3200XT-P1
EASYGEN-3200XT

U supply: 12/24V DC
I supply: 1.0/0.7ADC

U relays: 250V AC
T amb: -20 TO 70 C

cRU
File No. E347132

UL
US LISTED
Ind. Cont. Eq.
File No. E231544

CE ENEC



WARRANTY SEAL
WARRANTY IS VOID IF THIS SEAL IS DAMAGED
OR REMOVED

WARNING



BEFORE UNPLUGGING CT
CONNECTIONS
VOR ABKLEMMEN DER
STROMWANDLERANSCHLÜSSE
AVANT DE DEBRANCHER LES
CONNEXIONS DU TRANSFORMATEUR

APPLY A SHORT CIRCUIT TO THE GENERATOR CT TERMINALS
AND, IF APPLICABLE, MAINS CT TERMINALS (SEE MANUAL)
GENERATOR-STROMWANDLER- UND GSP-
NETZ-STROMWANDLERKLEMMEN KURZSCHLIESSEN
(SIEHE BEDIENUNGSANLEITUNG)
APPLIQUEZ UN COURT-CIRCUIT AUX TERMINAUX DU
GÉNÉRATEUR TRANSFORMATEUR DE COURANT ET, LE CAS ÉCHÉANT,
AU BORNES DE RÉSEAU (VOIR MANUEL)

Generator Current AC 1A/5A				Analog Inputs 0 to 20 mA 0 to 1 V				Analog Outputs ±10 Vdc ±20 mA PWM Speed AO 01 Voltage AO 02				Mains Voltage AC 120 V 480 V ph-ph				Generator Voltage AC 120 V 480 V ph-ph				Busbar Voltage AC 120 V 480 V ph-ph																			
L1		L2		L3		N		AI 01	AI 02	AI 03	Engine Ground	AO 01	NC	AO 02	NC	V1	V2	V3	N	V1	V2	V3	N	V1	V2	V3	N												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Caterpillar (NI) Limited

Old Glenarm Road, Larne, Co Antrim BT40 1EJ
Northern Ireland, United Kingdom
Tel: +44 (0) 28 28261000 Fax: +44 (0) 28 28261111
www.FGWilson.com

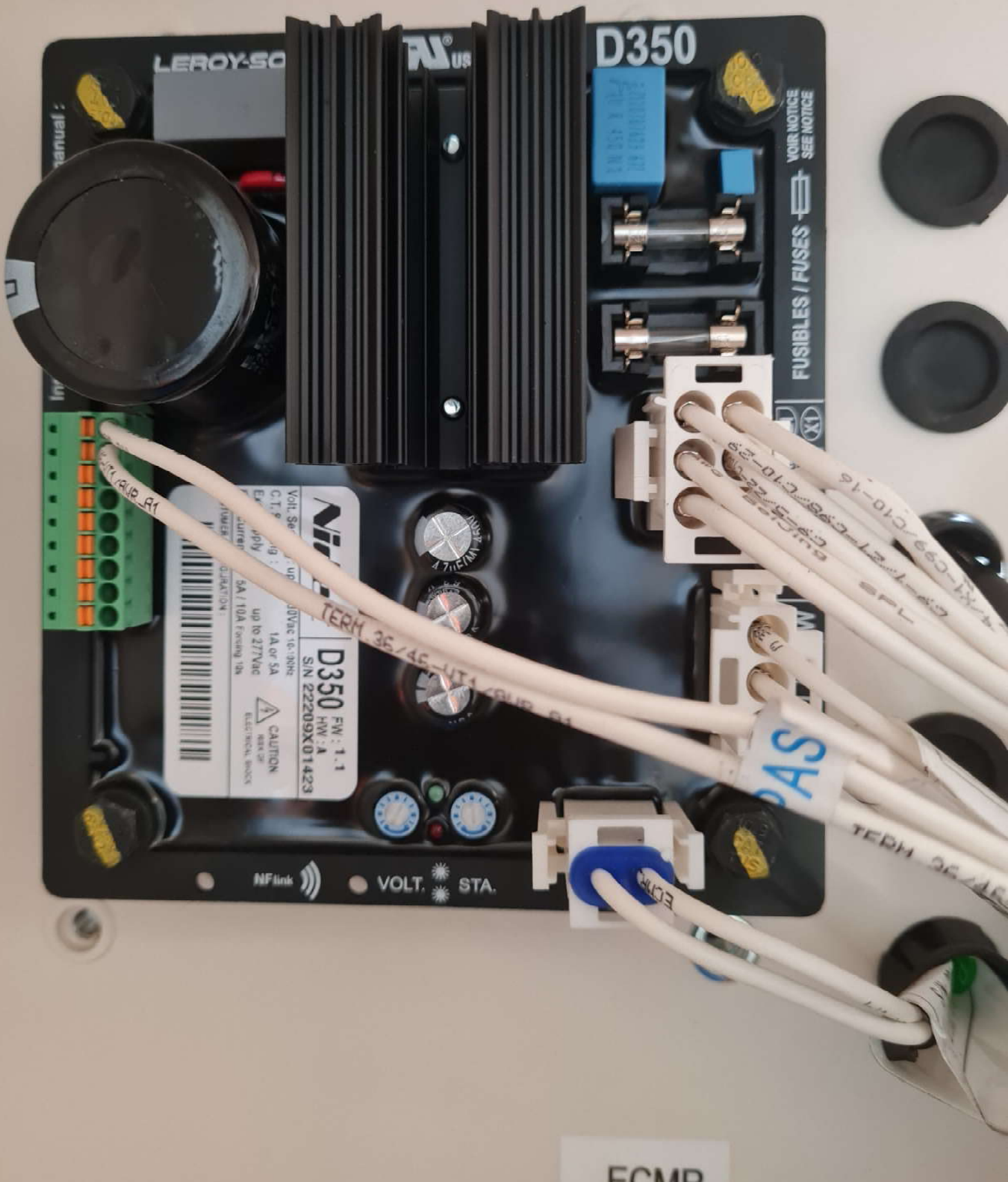


GENERATING SET

ISO 8528

MANUFACTURER	Caterpillar (NI) Limited	
MODEL	P813-1	
SERIAL NO.	FGWCPES6TPCF01103	
SALES ORDER REF.	5200319/10	
MONTH/YEAR OF MANUFACTURE	10/2022	
AMBIENT TEMP.	25	°C
RATED POWER		
STANDBY	812.5	kVA
	650	kW
PRIME	750	kVA
	600	kW
RATED VOLTAGE	480/277	V
PHASE	3	
RATED POWER FACTOR	0.8	Cos Ø
RATED FREQUENCY	60	Hz
RATED CURRENT - STANDBY	977	A
RATED CURRENT - PRIME		A
RATED RPM	1800	rpm
ALTITUDE	100	m
ALTERNATOR CONNECTION	S_STAR	
ISO 8528 - 3 RATING	PR	
ALTERNATOR ENCLOSURE	23	IP
INSULATION CLASS	H	
EXCITATION VOLTAGE	78.3	V
EXCITATION CURRENT	4.96	A
MASS	4834	kg
DIMENSIONS LxWxH	4159*1689*2570	mm

This generator set is designed to operate in ambient temperatures up to 50 deg C and at higher altitudes
Please consult dealer / helpdesk for outputs available



80	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
D12	D11	D10	D09	D08	D07	D06	D05	D04	D03	D02	D01	Common DI	Auxiliary Excitation	Power Supply 12/24 Vdc	NC	⊕			R12	R11	R10		R09		R08		R07		R06		R05		R04	R03	R02		R01	
Discrete Inputs														Relay Outputs																								

WOODWARD

Designed in Germany / Manufactured in Poland
 Manufacturer contact address:
 Woodward GmbH
 Handwerkstraße 29
 70565 Stuttgart / Germany
 S/N: 22904542 2206

Manufacturing address:
 Woodward Poland Sp. z o.o.
 Skarbowska 32
 32-005 Niepolomice / Poland

P/N: 8440-2082
 REV: L
 U supply: 12/24V DC
 I supply: 1.0/0.7ADC
 U relays: 250V AC

EASYGEN-3200XT-P1
 EASYGEN-3200XT
 U meas IEC (L-N): 300V AC
 U nom (L-L): 480V AC
 I meas: 1A/5A AC
 T amb: -20 TO 70 C

File No. E347132
 UL LISTED
 Ind. Cont. Eq.
 File No. E291544
 CE EAC



<http://www.manuals.com/easygen-3200xt>

WARRANTY SEAL
 WARRANTY IS VOID IF THIS SEAL IS DAMAGED
 OR REMOVED

WARNING

BEFORE MAKING CT CONNECTIONS
 VOR ANSCHLIESSEN DER STROMWANDLERANSCHLÜSSE
 AVANT DE DEBRANCHER LES COILLES DU TRANSFORMATEUR

APPLY A SHORT CIRCUIT TO THE GENERATOR CT TERMINALS
 (SEE IF APPLICABLE, MAINS CT TERMINALS (SEE MANUAL))
 GENERATOR STROMWANDLER- UND GGF.
 NETZ-STROMWANDLERANSCHLÜSSE KURZSCHLIESSEN
 (SIEHE BEDIENANLEITUNG)
 APPLIQUEZ UN COURT CIRCUIT AUX TERMINAUX DU
 GÉNÉRATEUR ET/OU DU RÉSEAU DE COURANT ET LE CAS
 S'Y PRÉSENTE DES BORNES DE RÉSEAU (VOIR MANUEL)

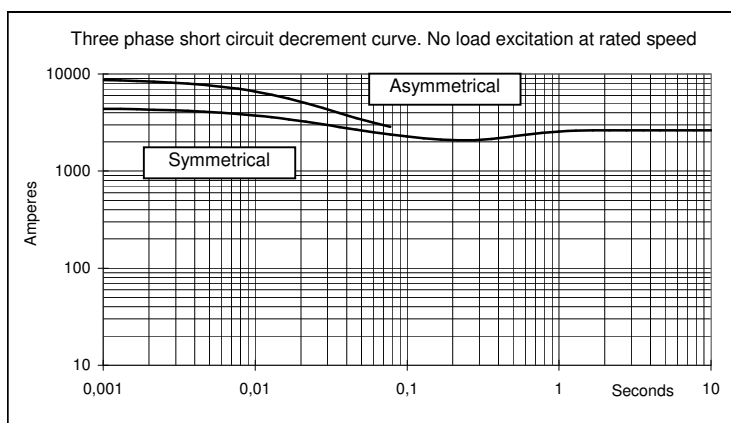
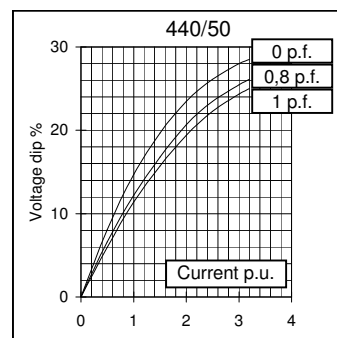
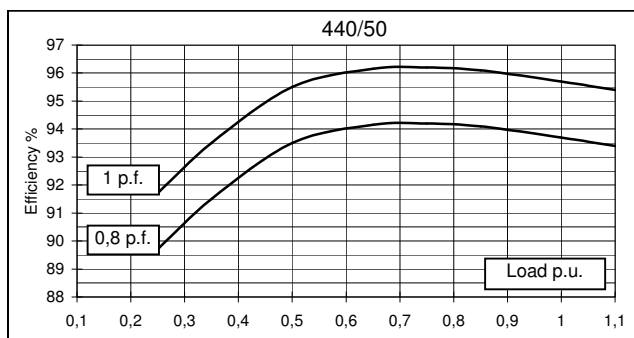
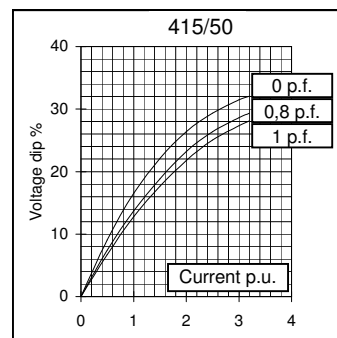
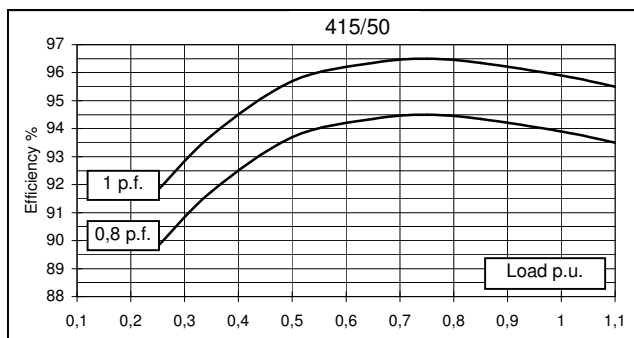
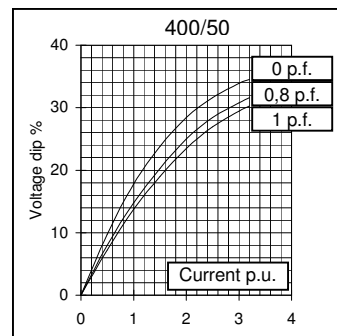
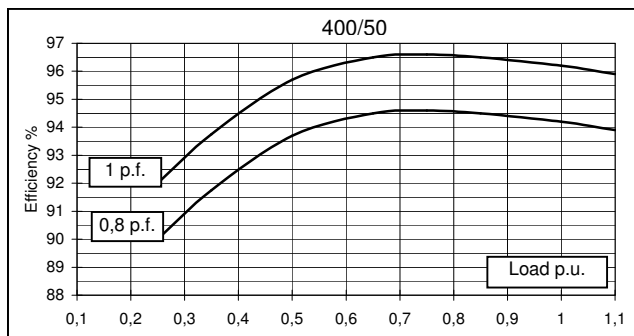
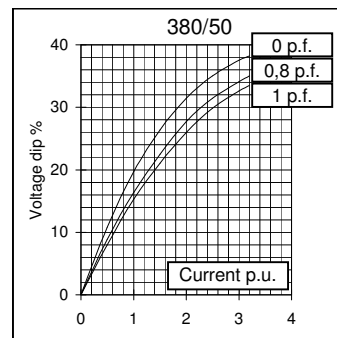
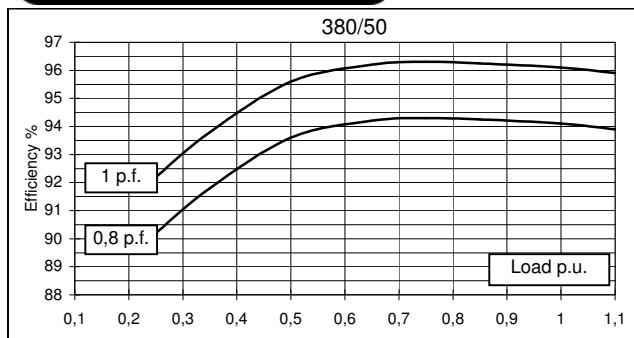
Mains Gnd Current AC 1 A 5 A		Generator Current AC 1 A 5 A						Analog Inputs 0 to 2 kOhm 0/4 to 20 mA 0 to 1 V						Analog Outputs ±10 Vdc ±20 mA PWM Speed AO 01 Voltage AO 02						Mains Voltage AC 120 V 480 V ph-ph						Generator Voltage AC 120 V 480 V ph-ph						Busbar Voltage AC 120 V 480 V ph-ph																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
L1		L1	L2		L3		AI 01	AI 02	AI 03	Engine Ground	AO 01	AO 02	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Electrical Characteristics										
Frequency		Hz	50				60			
Voltage (parallel star)		V	380	400	415	440	415	440	460	480
Rated power class H		kVA	550	550	540	500	570	630	660	660
		kW	440	440	432	400	456	504	528	528
Rated power class F		kVA	500	500	490	454	515	570	600	600
		kW	400	400	392	363	412	456	480	480
Regulation with		DER1	±1% with any power factor and speed variations between -5% +30%							
Insulation class			H							
Execution			Brushless							
Stator winding			12 ends							
Rotor			with damping cage							
Efficiencies class H	4/4	%	94,1	94,2	93,9	93,7	94,5	95	95,1	95,2
(see graph. for details)	3/4	%	94,3	94,6	94,5	94,2	94,9	95,1	95,2	95,5
	2/4	%	93,6	93,7	93,7	93,5	94,5	94,6	94,7	94,8
	1/4	%	90,2	90	89,8	89,7	91	91,1	91,1	91
Reactances (f. l.cl. F)	Xd	%	312,5	282	257,2	211,9	325,8	320,3	307,1	282
	Xd'	%	31,2	28,2	25,7	21,2	32,6	32,0	30,7	28,2
	Xd''	%	20,7	18,7	17,1	14,0	21,6	21,2	20,4	18,7
	Xq	%	168,4	152	138,6	114,2	175,6	172,7	165,5	152
	Xq'	%	168,4	152	138,6	114,2	175,6	172,7	165,5	152
	Xq''	%	26,8	24,2	22,1	18,2	28,0	27,5	26,4	24,2
	X ₂	%	23,7	21,4	19,5	16,1	24,7	24,3	23,3	21,4
	X ₀	%	3,5	3,2	2,9	2,4	3,7	3,6	3,5	3,2
Short Circuit Ratio	Kcc		0,30	0,42	0,62	1,10	0,22	0,26	0,30	0,42
Time Constants	Td'	sec.	0,138							
	Td''	sec.	0,0185							
	Tdo'	sec.	2,85							
	Tα	sec.	0,03							
Short Circuit Current Capacity		%	>300				>350			
Excitation at no load		Amp.	0,5	0,7	1,1	1,3	0,4	0,5	0,6	0,7
Excitation at full load		Amp.	3,2	3,3	3,6	3,8	2,9	3	3,1	3,2
Overload (long-term)		%	1 hour in a 6 hours period 110% rated load							
Overload per 20 sec.		%	300							
Stator Winding Resistance (20 °C)		Ω	0,010							
Rotor Winding Resistance (20 °C)		Ω	6,025							
Exciter Resistance (20 °C)		Ω	Rotor : 0,317				Stator : 8,85			
Heat dissipation at f.l.cl.H		W	27588	27091	28064	26894	26540	26526	27205	26622
Telephone Interference			THF < 2%				TIF < 40			
Radio interference			EN61000-6-3, EN61000-6-1. For others standards apply to factory							
Waveform Distors.(THD) at f. load	LL/LN %		2,3 / 2,4							
Waveform Distors.(THD) at no load	LL/LN %		2,5 / 2,5							
Mechanical characteristics										
Protection			IP 21 (other protection on request)							
DE bearing			6322							
NDE bearing			6318.2RS							
Weight of wound stator assembly	kg		477							
Weight of wound rotor assembly	kg		297,5							
Weight of complete generator	kg		1324							
Maximun overspeed	rpm		2250							
Unbalanced magnetic pull at f.l.cl.F	kN/mm		6,1							
Cooling air requirement	m³/min		54				64,8			
Inertia Constant (H)	sec.		0,170				0,204			
Noise level at 1m/7m	dB(A)		94 / 82				98 / 88			

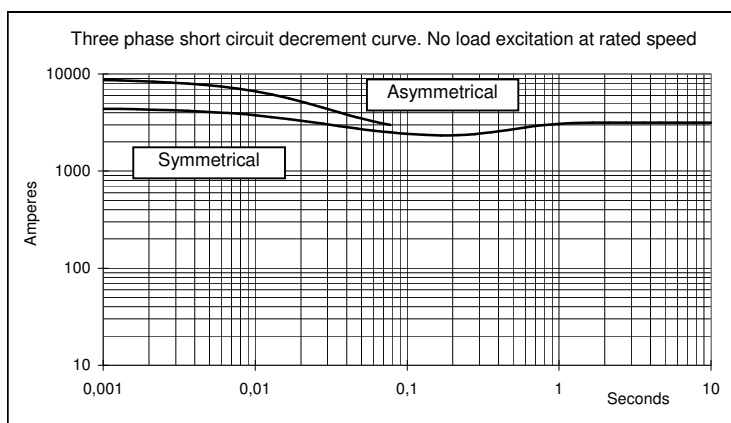
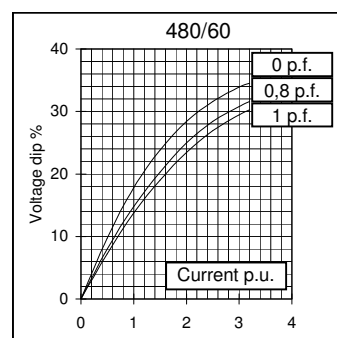
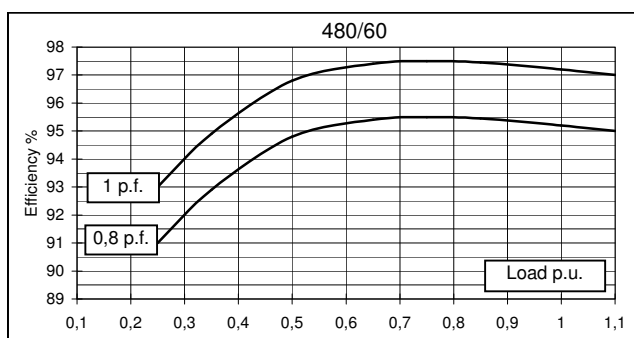
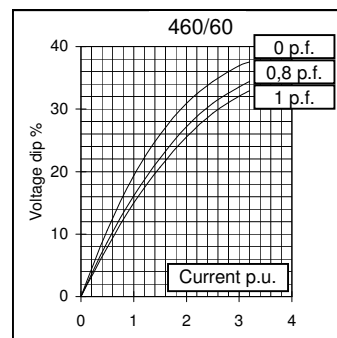
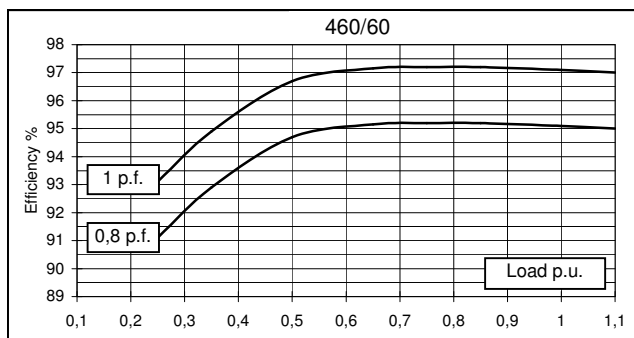
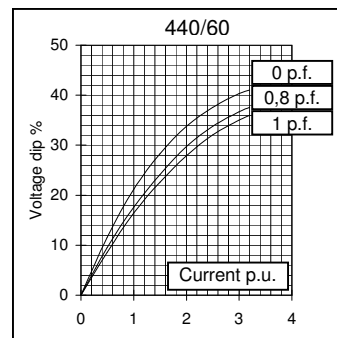
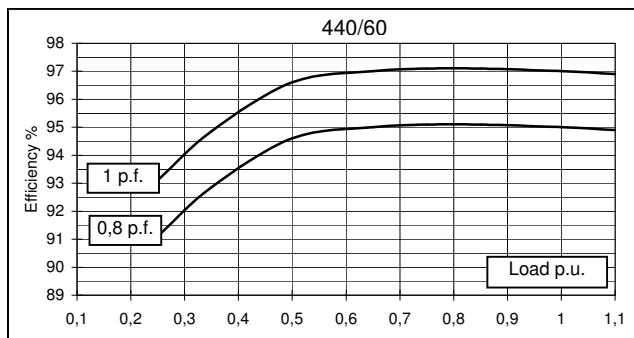
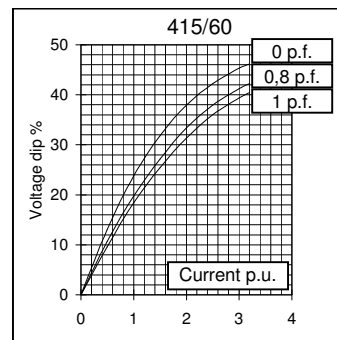
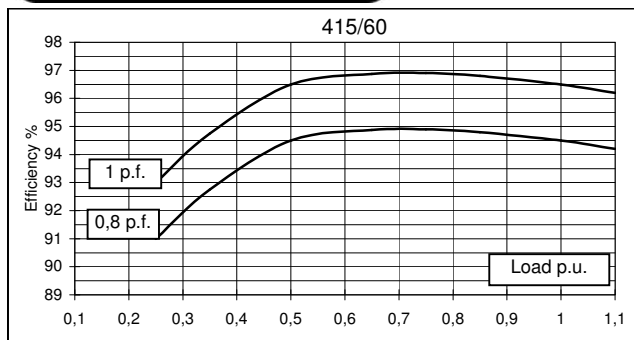
All technical data are to be considered as a reference and they can be modified without any notice.

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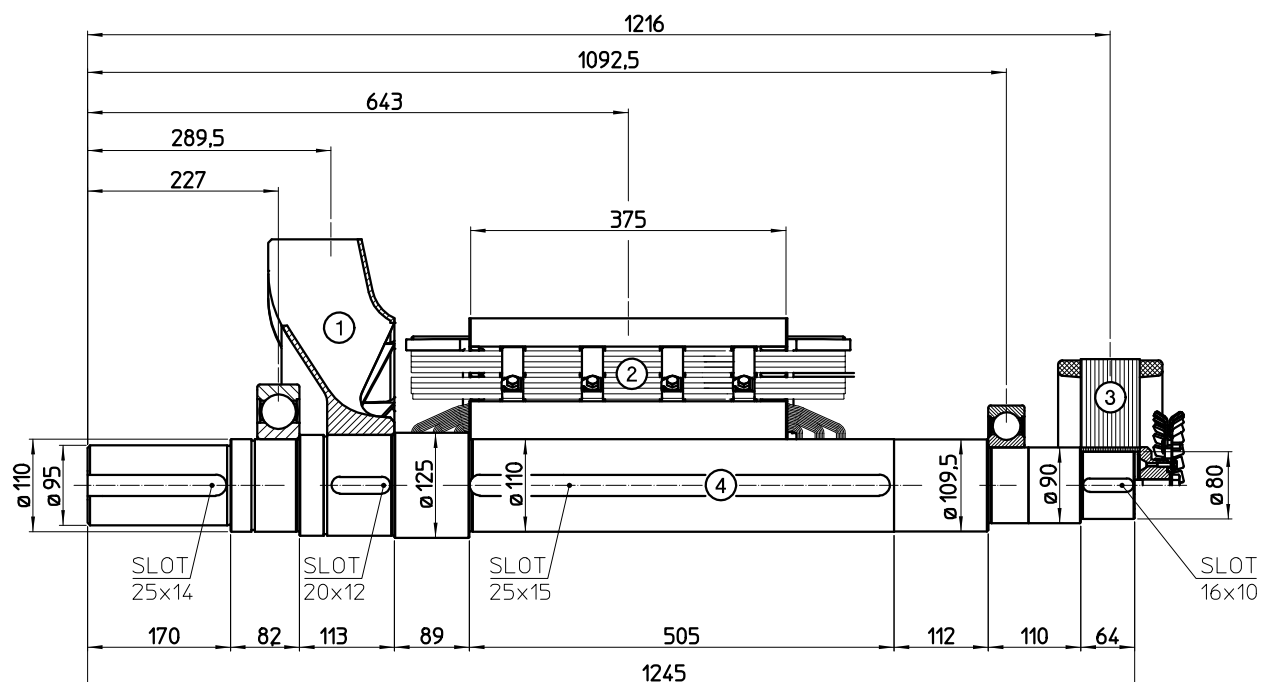
50 Hz



60 Hz

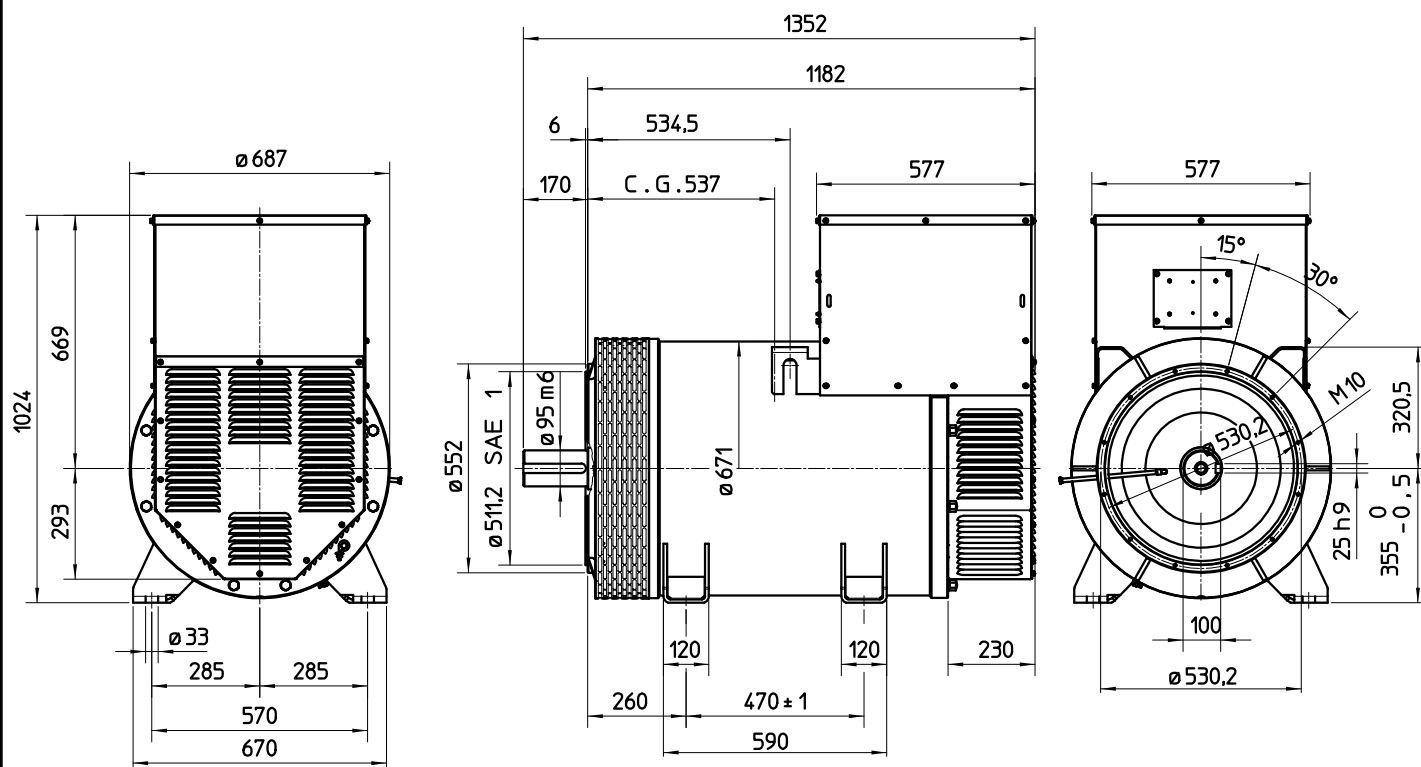


TWO BEARING MOMENTS OF INERTIA



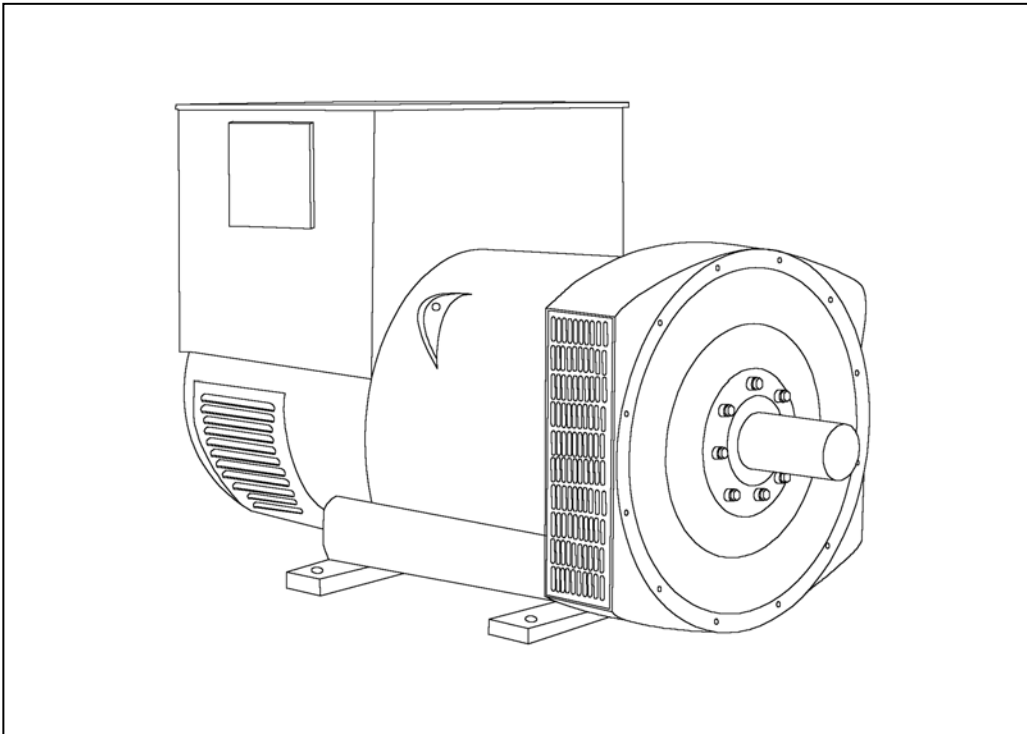
	COMPONENT	WEIGHT kg	J kgm ²
1	FAN	10,2	0,335
2	MAIN ROTOR	297,5	6,332
3	EX. ROTOR	35	0,562
4	SHAFT	85,7	0,127
	TOTAL	428,4	7,356

TWO BEARING DIMENSIONS



C.G.= GRAVITY CENTER

HCI 534C/544C - Technical Data Sheet



HCI534C/544C

SPECIFICATIONS & OPTIONS



STANDARDS

Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX440 AVR - STANDARD

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421 AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.

Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

HCI534C/544C

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.						
A.V.R.	MX321	MX341					
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING				
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)						

CONTROL SYSTEM	SELF EXCITED						
A.V.R.	SX440	SX421					
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING				
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT						

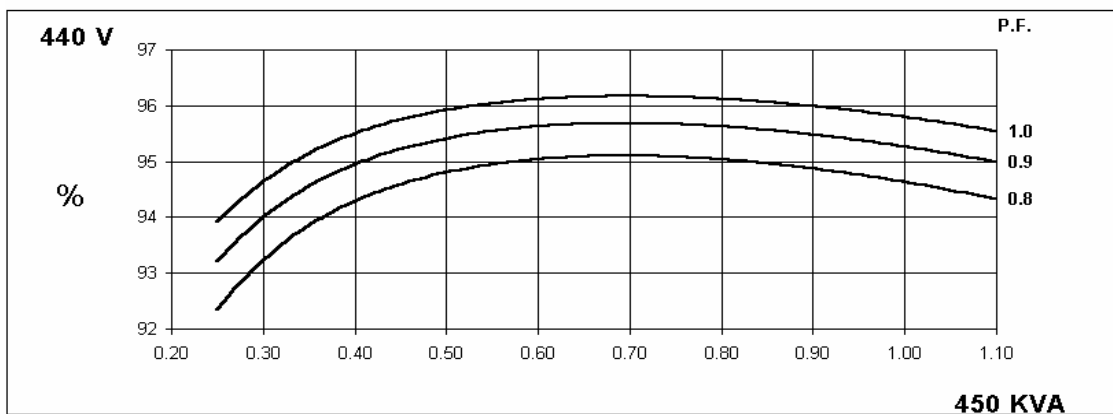
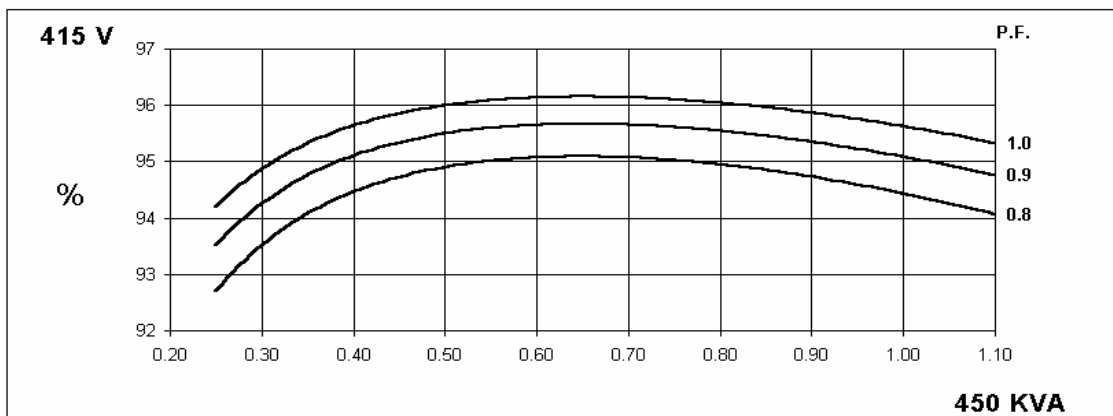
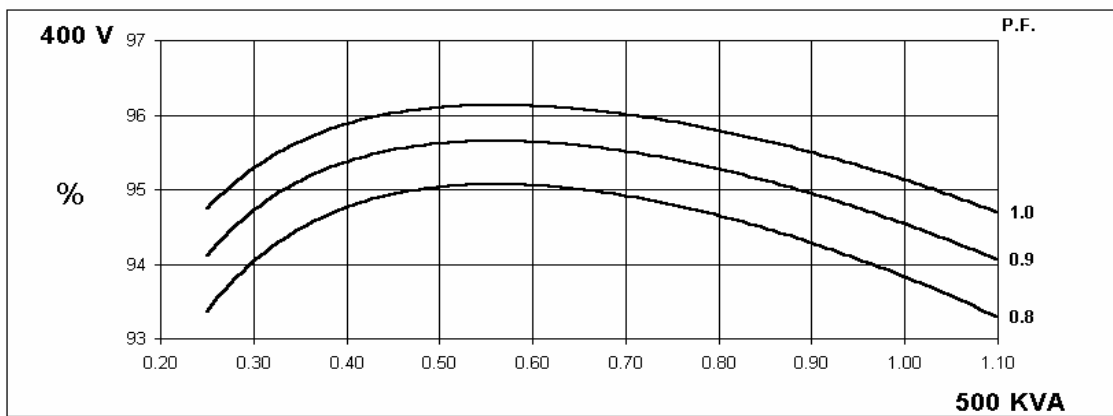
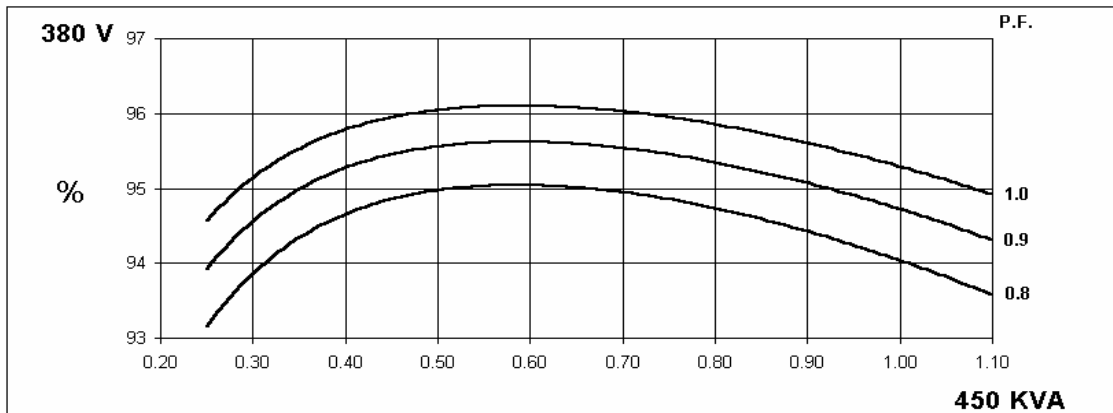
INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	12							
STATOR WDG. RESISTANCE	0.0065 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.55 Ohms at 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6220 (ISO)							
BEARING NON-DRIVE END	BALL. 6314 (ISO)							
	1 BEARING			2 BEARING				
WEIGHT COMP. GENERATOR	1263 kg			1275 kg				
WEIGHT WOUND STATOR	584 kg			584 kg				
WEIGHT WOUND ROTOR	502 kg			473 kg				
WR² INERTIA	6.8928 kgm²			6.6149 kgm²				
SHIPPING WEIGHTS in a crate	1355 kg			1395 kg				
PACKING CRATE SIZE	166 x 87 x 124(cm)			166 x 87 x 124(cm)				
	50 Hz			60 Hz				
TELEPHONE INTERFERENCE	THF<2%			TIF<50				
COOLING AIR	1.035 m³/sec 2202 cfm			1.312 m³/sec 2780 cfm				
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	450	450	450	450	525	550	581	594
Xd DIR. AXIS SYNCHRONOUS	3.27	2.95	2.74	2.44	3.94	3.69	3.57	3.35
X'd DIR. AXIS TRANSIENT	0.18	0.16	0.15	0.13	0.18	0.17	0.16	0.15
X''d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11	0.10	0.13	0.12	0.12	0.11
Xq QUAD. AXIS REACTANCE	2.66	2.40	2.23	1.98	3.12	2.92	2.82	2.65
X''q QUAD. AXIS SUBTRANSIENT	0.26	0.24	0.22	0.20	0.34	0.32	0.31	0.29
Xl LEAKAGE REACTANCE	0.07	0.06	0.06	0.05	0.08	0.07	0.07	0.07
X2 NEGATIVE SEQUENCE	0.19	0.17	0.16	0.14	0.23	0.22	0.21	0.20
X0 ZERO SEQUENCE	0.11	0.10	0.09	0.08	0.11	0.10	0.10	0.09
REACTANCES ARE SATURATED			VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED					
T'd TRANSIENT TIME CONST.	0.08s							
T''d SUB-TRANSTIME CONST.	0.012s							
T'do O.C. FIELD TIME CONST.	2s							
Ta ARMATURE TIME CONST.	0.017s							
SHORT CIRCUIT RATIO	1/Xd							

**50
Hz**

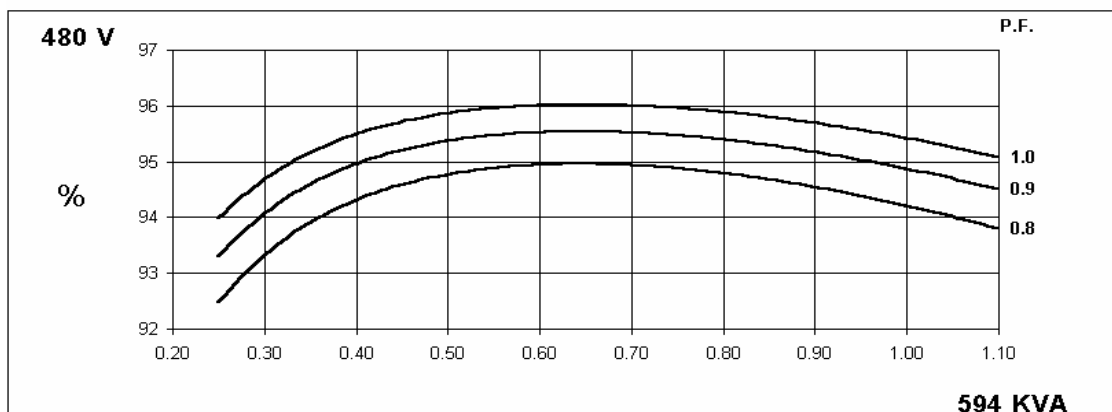
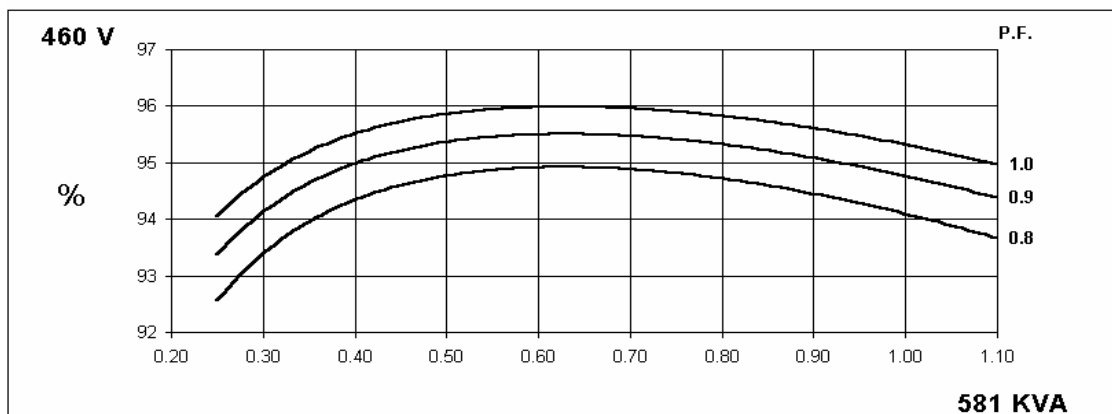
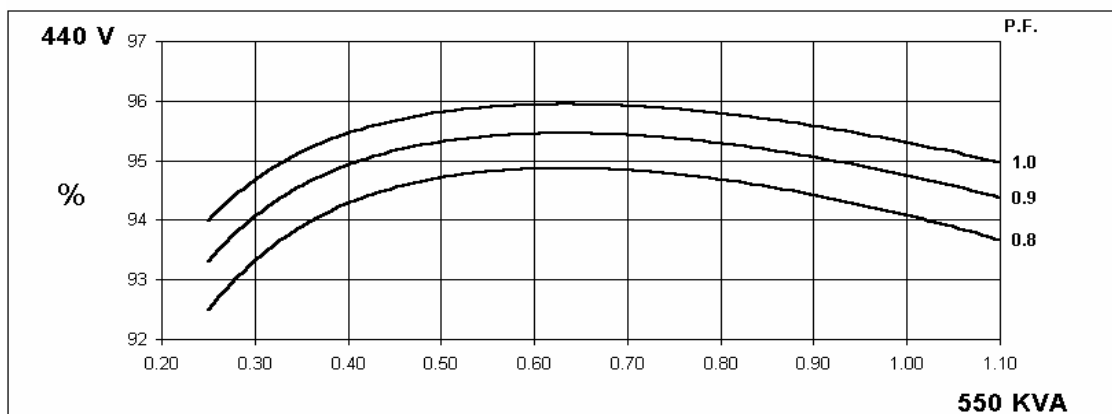
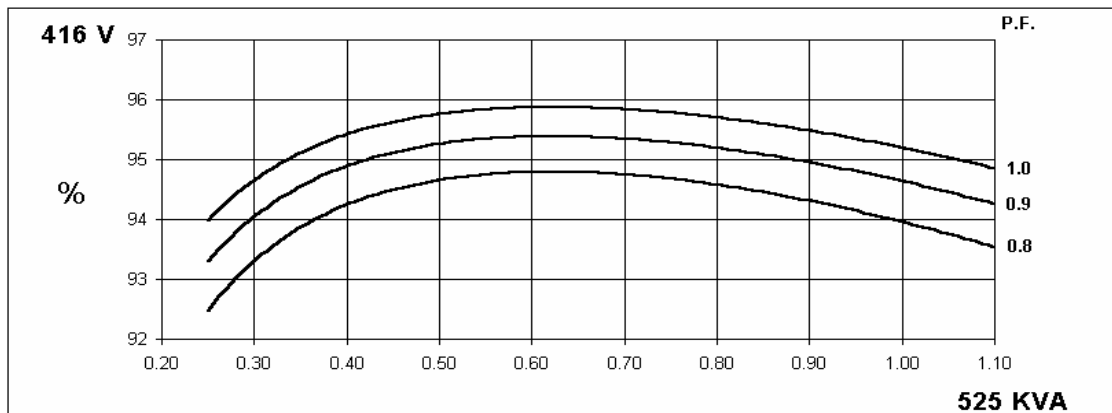
HCI534C/544C
Winding 311

STAMFORD
power generation

THREE PHASE EFFICIENCY CURVES



THREE PHASE EFFICIENCY CURVES



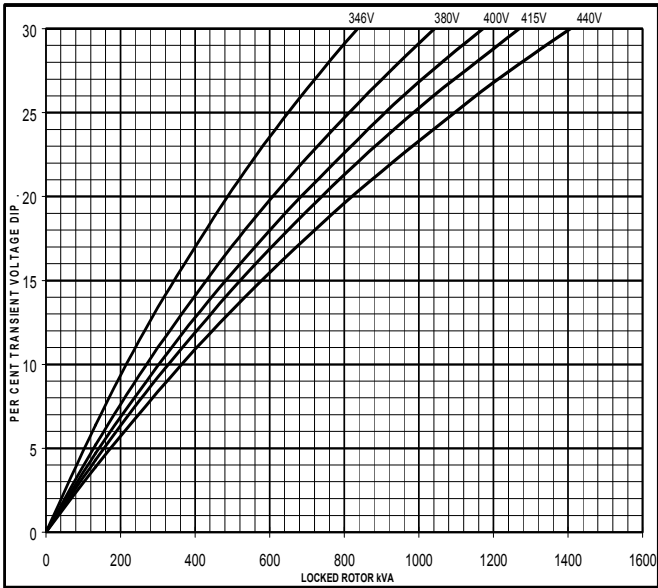
HCI534C/544C
Winding 311



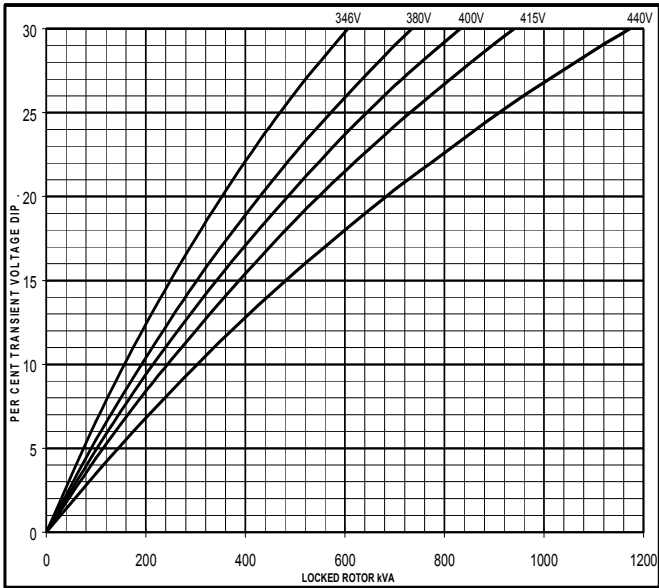
Locked Rotor Motor Starting Curve

**50
Hz**

MX

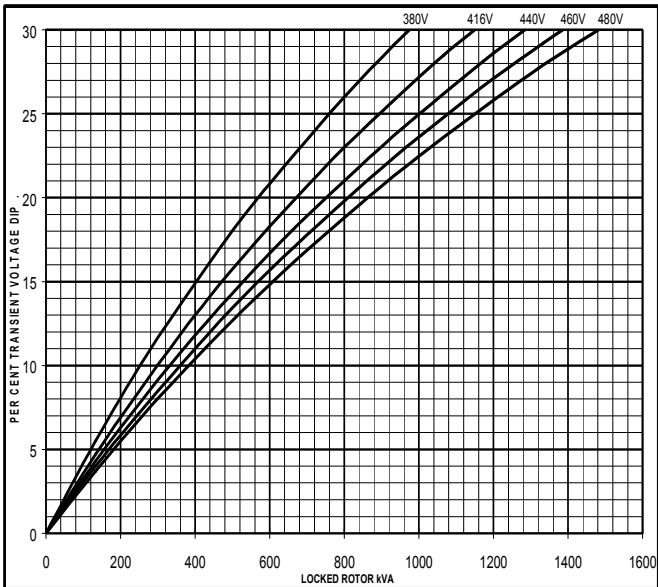


SX

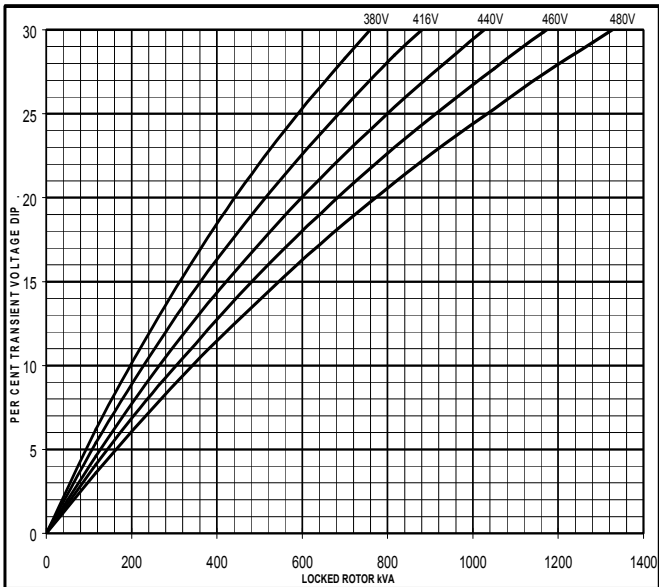


**60
Hz**

MX

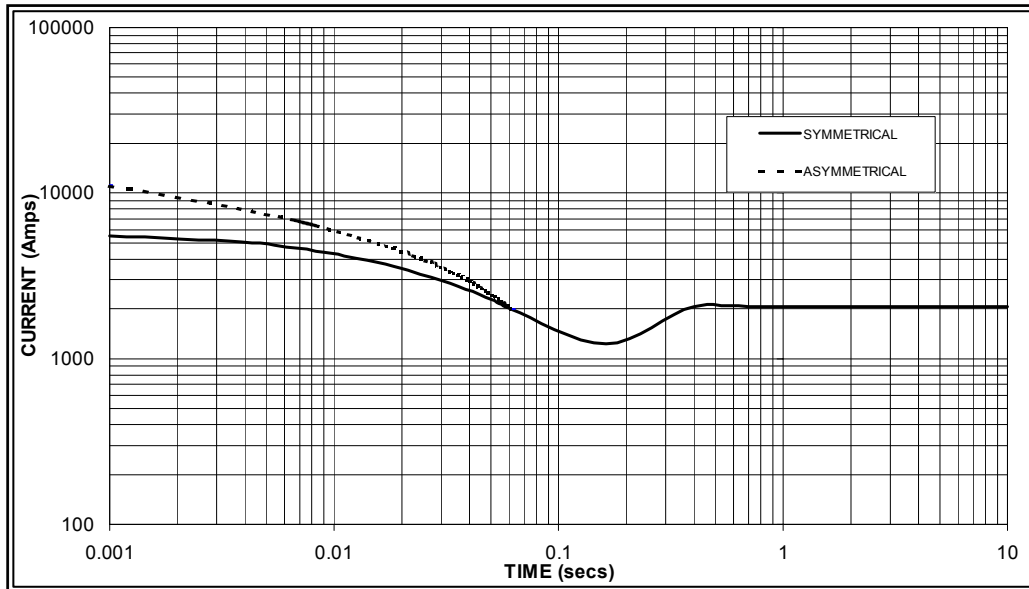


SX



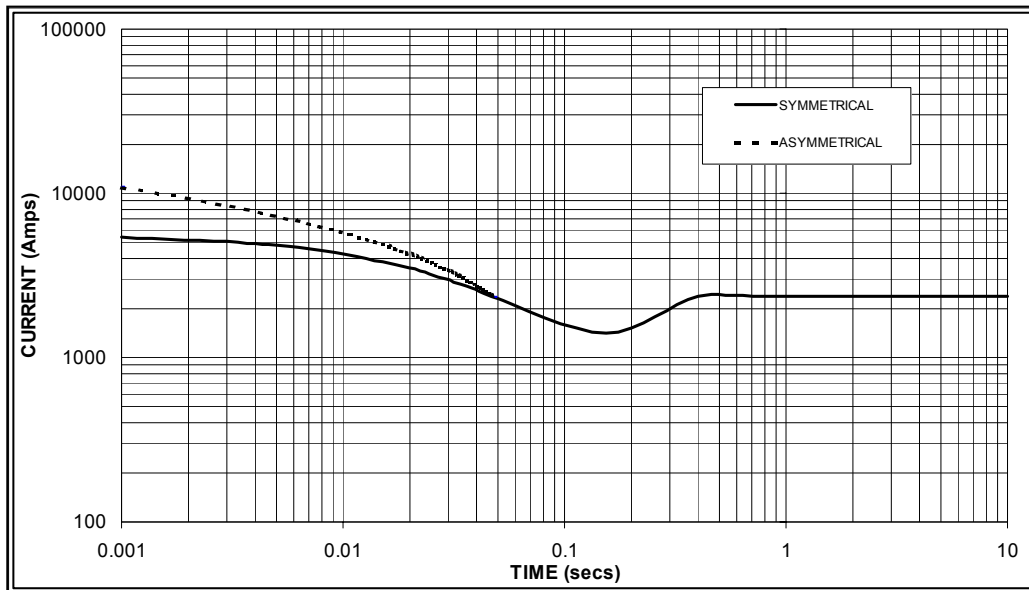
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.**

**50
Hz**



Sustained Short Circuit = 2,050 Amps

**60
Hz**



Sustained Short Circuit = 2,350 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.03	440v	X 1.06
415v	X 1.05	460v	X 1.12
440v	X 1.07	480v	X 1.20

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

HCI534C/544C

Winding 311 0.8 Power Factor

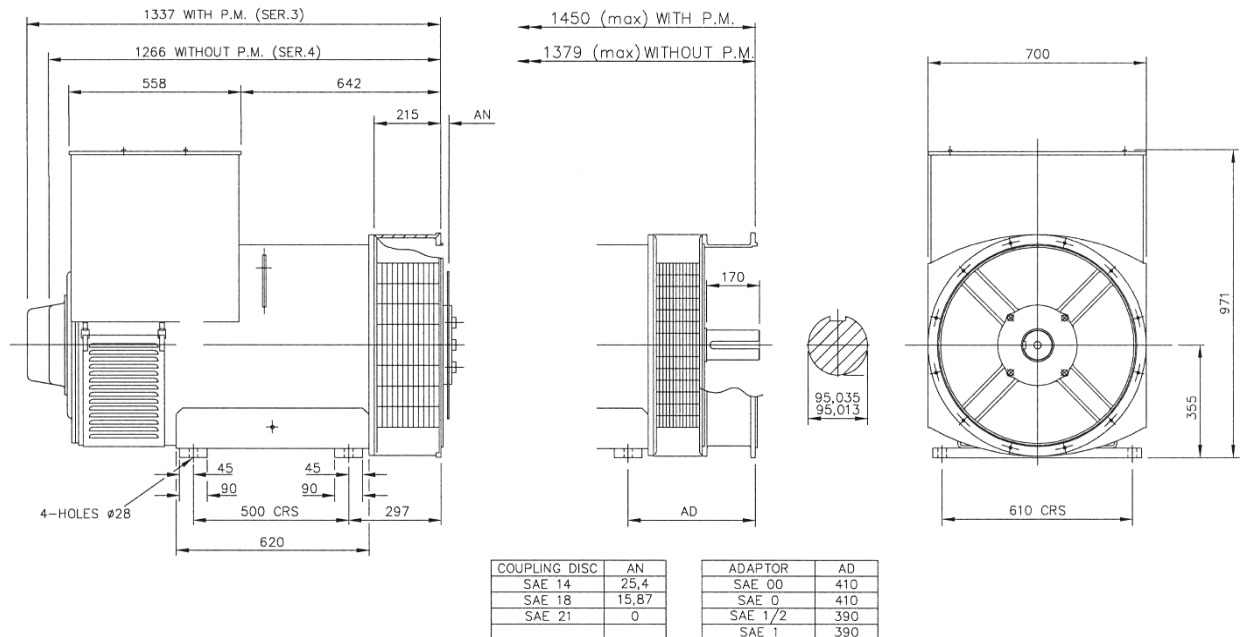


RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	400	445	400	400	450	500	450	450	478	512	478	478	495	520	495	495
	kW	320	356	320	320	360	400	360	360	382	410	382	382	396	416	396	396
	Efficiency (%)	94.5	94.3	94.8	94.9	94.0	93.8	94.4	94.6	93.8	93.7	94.2	94.4	93.6	93.6	94.1	94.3
	kW Input	339	378	338	337	383	426	381	381	408	437	406	405	423	444	421	420

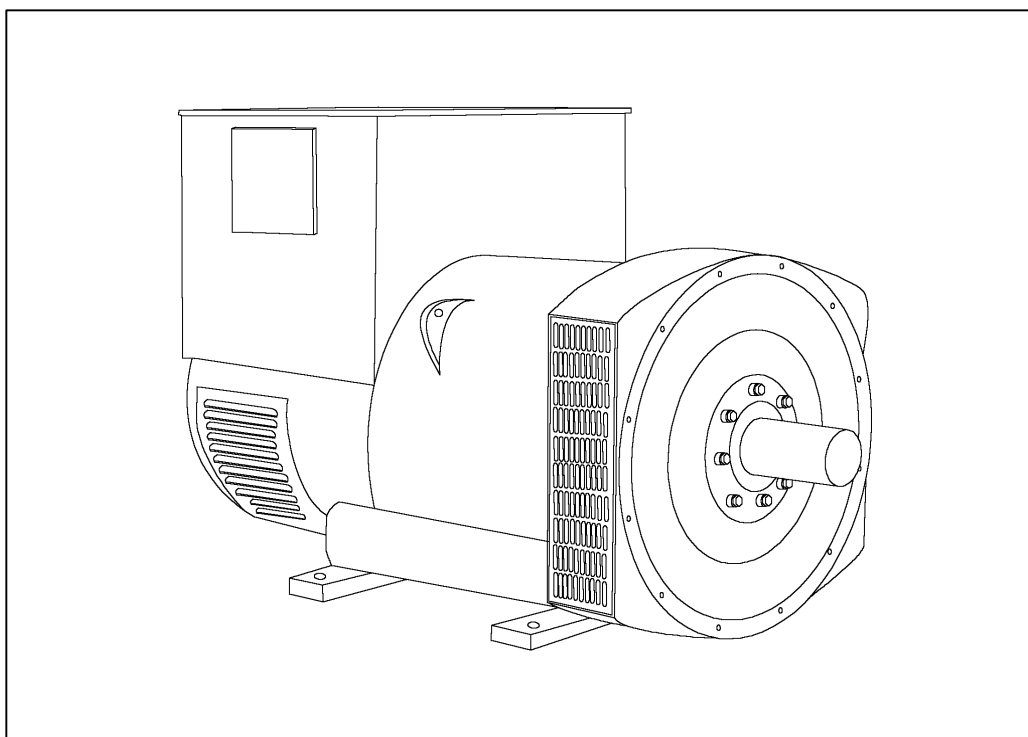
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	481	500	531	538	525	550	581	594	550	581	613	625	569	600	631	644
	kW	385	400	425	430	420	440	465	475	440	465	490	500	455	480	505	515
	Efficiency (%)	94.3	94.4	94.4	94.5	94.0	94.1	94.1	94.2	93.8	93.9	93.9	94.0	93.6	93.7	93.7	93.9
	kW Input	408	424	450	455	447	468	494	504	469	495	522	532	486	512	539	549

DIMENSIONS



PO Box 17 • Barnack Road • Stamford • Lincolnshire • PE9 2NB
 Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100
 Website: www.newage-avkseg.com

HCI 534F/544F - Technical Data Sheet



HCI534F/544F

SPECIFICATIONS & OPTIONS



STANDARDS

Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-22, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX440 AVR - STANDARD

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421 AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.

Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

HCI534F/544F

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX440	SX421	
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

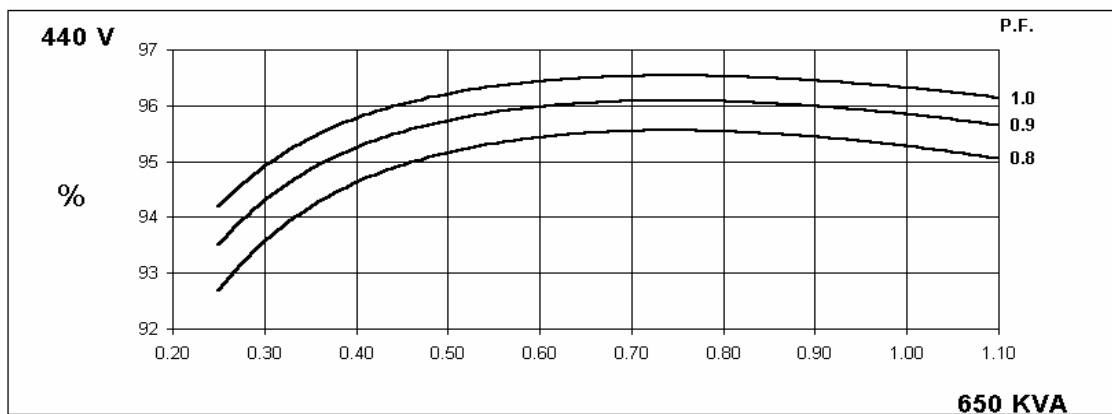
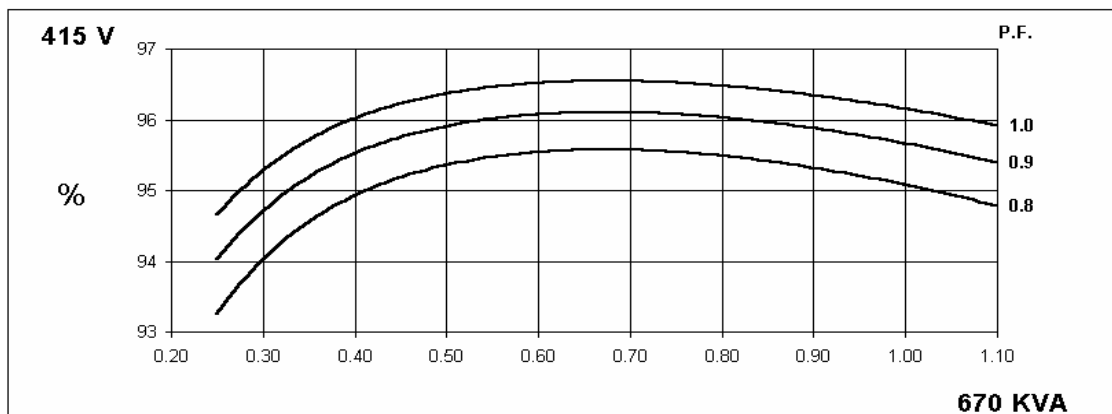
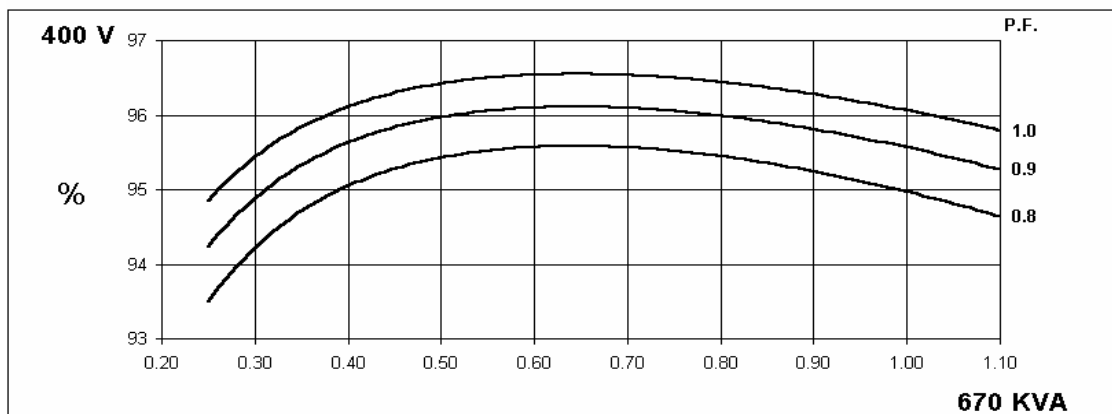
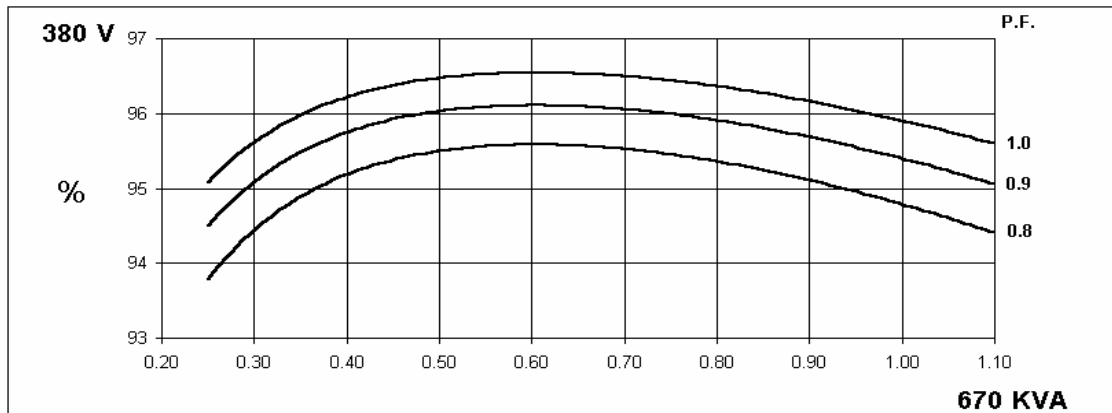
INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	12							
STATOR WDG. RESISTANCE	0.0037 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	2.16 Ohms at 22°C							
EXCITER STATOR RESISTANCE	17 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.092 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6220 (ISO)							
BEARING NON-DRIVE END	BALL. 6314 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	1685 kg				1694 kg			
WEIGHT WOUND STATOR	805 kg				805 kg			
WEIGHT WOUND ROTOR	684 kg				655 kg			
WR² INERTIA	10.033 kgm²				9.7551 kgm²			
SHIPPING WEIGHTS in a crate	1775 kg				1780kg			
PACKING CRATE SIZE	166 x 87 x 124(cm)				166 x 87 x 124(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	1.035 m³/sec 2202 cfm				1.312 m³/sec 2780 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	670	670	670	650	738	775	800	825
Xd DIR. AXIS SYNCHRONOUS	2.90	2.62	2.43	2.10	3.33	3.13	2.95	2.80
X'd DIR. AXIS TRANSIENT	0.16	0.14	0.13	0.11	0.16	0.15	0.14	0.13
X''d DIR. AXIS SUBTRANSIENT	0.11	0.10	0.09	0.08	0.11	0.10	0.10	0.09
Xq QUAD. AXIS REACTANCE	2.42	2.19	2.03	1.75	2.66	2.50	2.36	2.23
X''q QUAD. AXIS SUBTRANSIENT	0.25	0.23	0.21	0.18	0.31	0.29	0.27	0.26
Xl LEAKAGE REACTANCE	0.05	0.04	0.04	0.03	0.05	0.05	0.04	0.04
X2 NEGATIVE SEQUENCE	0.18	0.16	0.15	0.13	0.21	0.20	0.19	0.18
Xo ZERO SEQUENCE	0.08	0.08	0.07	0.06	0.09	0.08	0.08	0.08
REACTANCES ARE SATURATED			VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED					
T'd TRANSIENT TIME CONST.		0.08s						
T''d SUB-TRANSTIME CONST.		0.012s						
T'do O.C. FIELD TIME CONST.		2.5s						
Ta ARMATURE TIME CONST.		0.019s						
SHORT CIRCUIT RATIO		1/Xd						

**50
Hz**

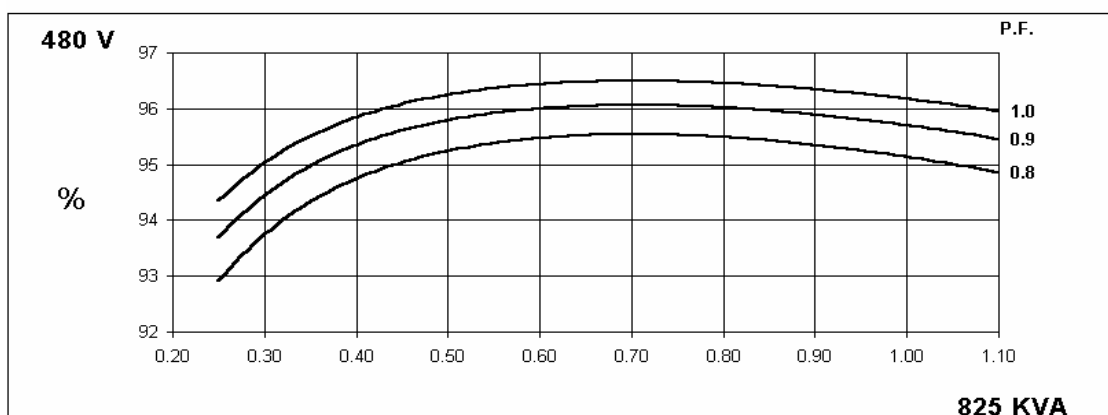
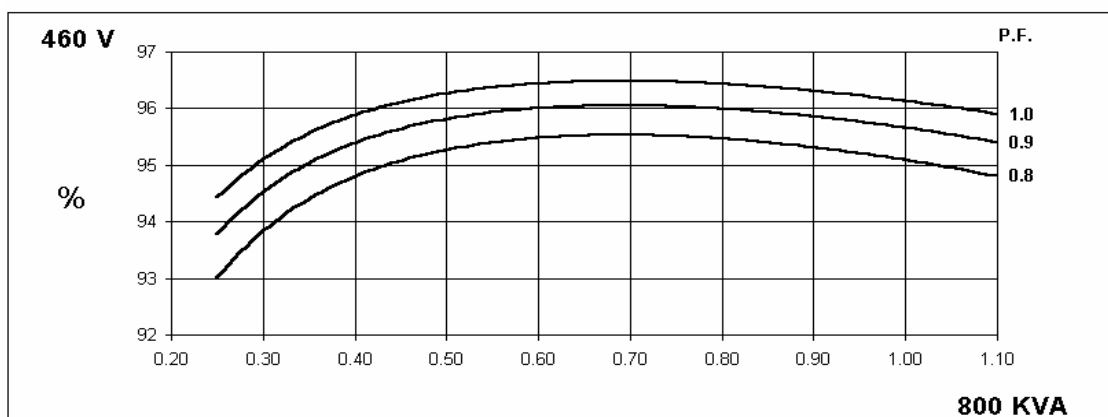
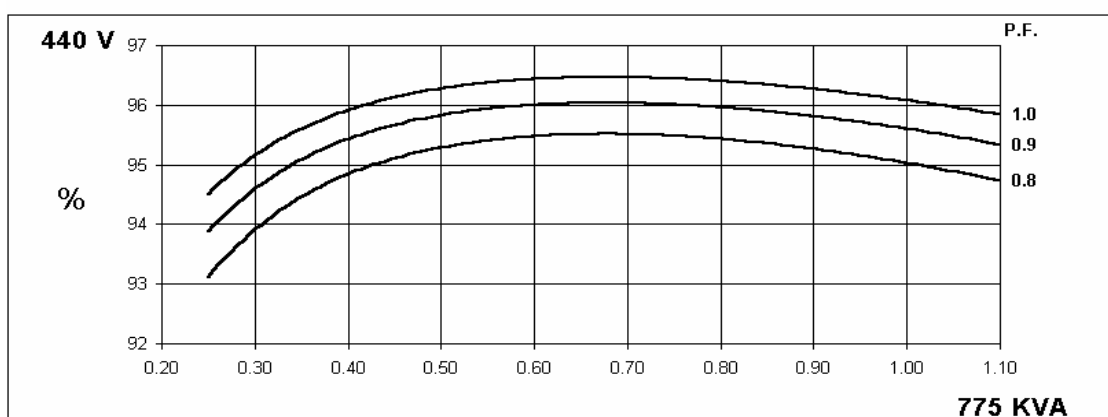
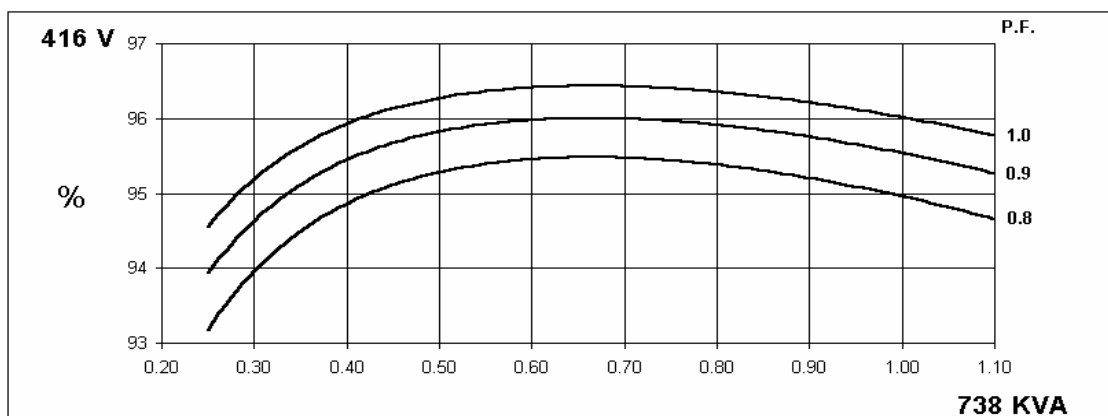
HCI534F/544F
Winding 311

STAMFORD
power generation

THREE PHASE EFFICIENCY CURVES



THREE PHASE EFFICIENCY CURVES



HCI534F/544F

Winding 311

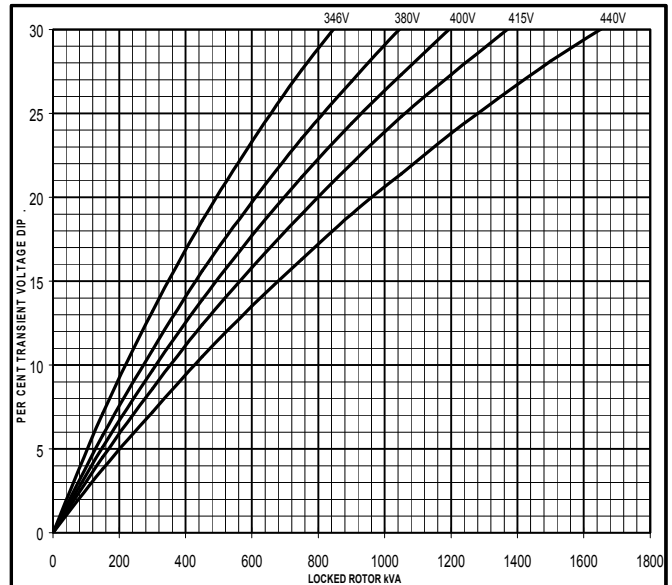
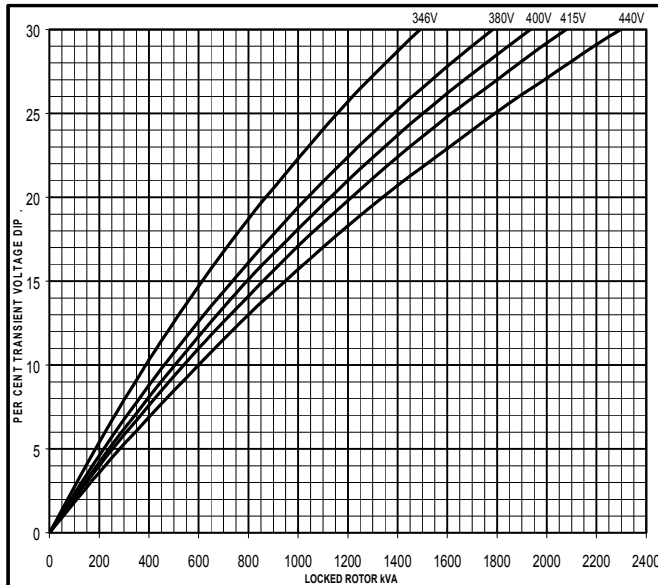


Locked Rotor Motor Starting Curve

**50
Hz**

MX

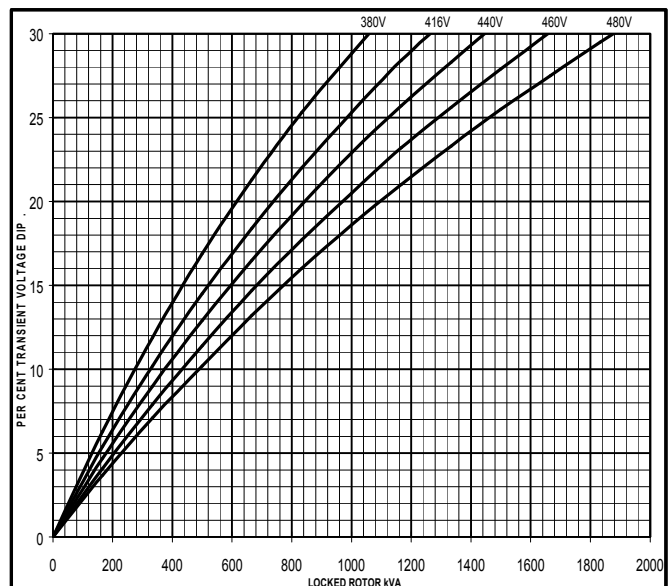
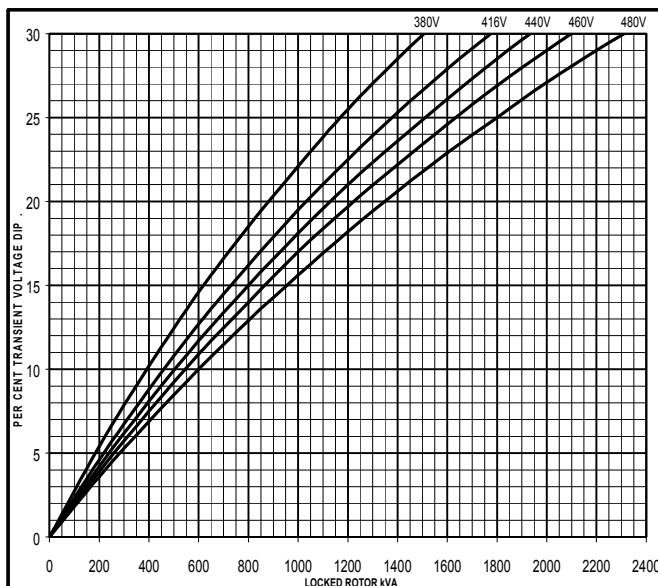
SX



**60
Hz**

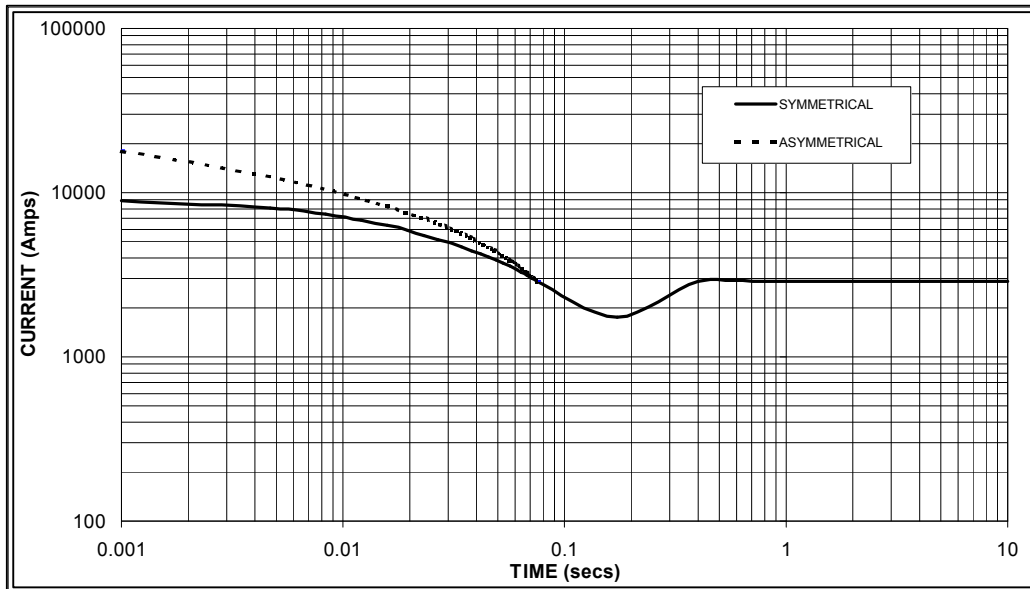
MX

SX



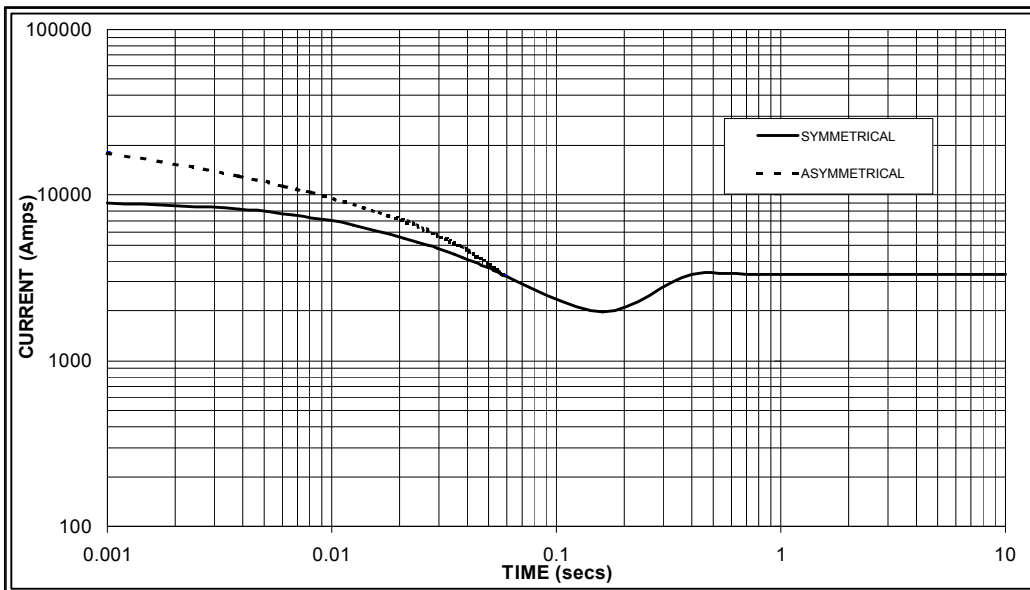
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.**

**50
Hz**



Sustained Short Circuit = 2,900 Amps

**60
Hz**



Sustained Short Circuit = 3,300 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.06	440v	X 1.06
415v	X 1.09	460v	X 1.12
440v	X 1.12	480v	X 1.20

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

HCI534F/544F

Winding 311 0.8 Power Factor

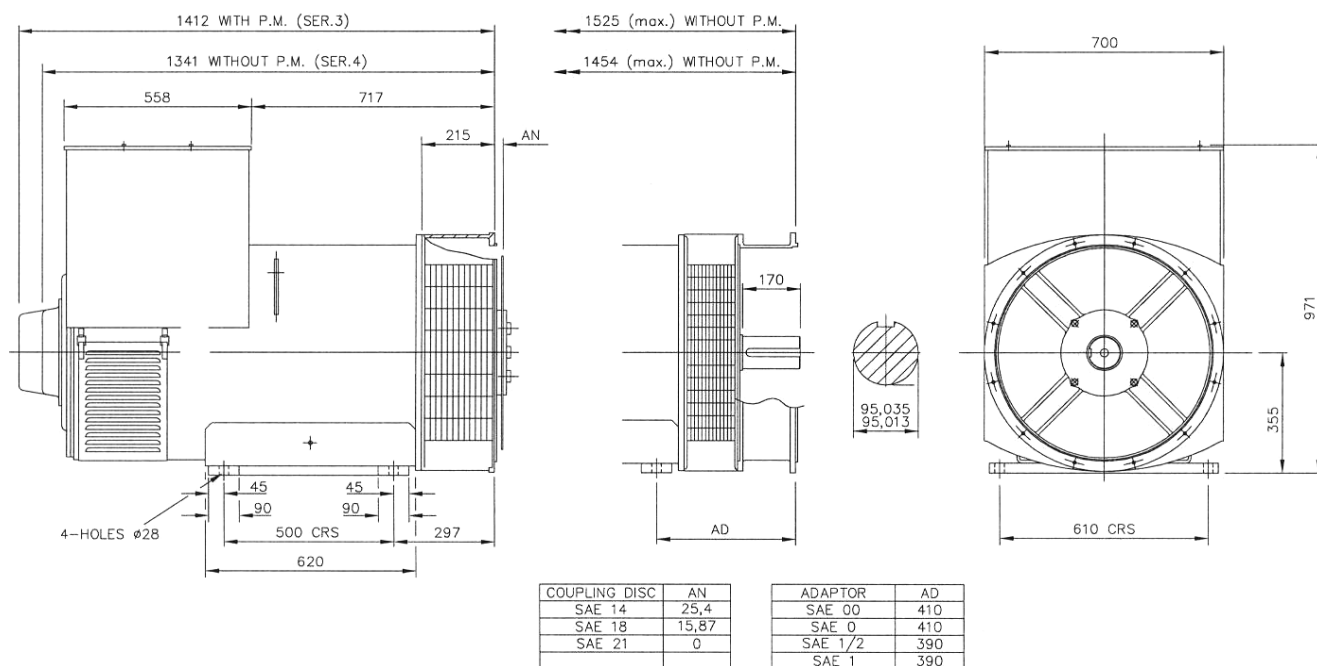


RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	620	620	620	600	670	670	670	650	710	710	710	690	738	738	738	715
	kW	496	496	496	480	536	536	536	520	568	568	568	552	590	590	590	572
	Efficiency (%)	95.0	95.2	95.3	95.4	94.8	95.0	95.1	95.3	94.6	94.8	94.9	95.1	94.4	94.6	94.8	95.1
	kW Input	522	521	520	503	565	564	564	546	600	599	599	580	625	624	623	601

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	688	719	731	750	738	775	800	825	781	819	848	875	806	844	878	906
	kW	550	575	585	600	590	620	640	660	625	655	678	700	645	675	702	725
	Efficiency (%)	95.1	95.2	95.3	95.3	95.0	95.0	95.1	95.1	94.8	94.9	94.9	95.0	94.7	94.8	94.8	94.9
	kW Input	579	604	614	630	621	653	673	694	659	690	715	737	681	712	741	764

DIMENSIONS



Barnack Road • Stamford • Lincolnshire • PE9 2NB
 Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100
 Website: www.newage-avkseg.com

easYgen-3200 Overview

Genset Control for Multiple Unit Operation



CE marked

UL[®] US
LISTED

Lloyd's
Register

CERTIFICATE of
Design Assessment
by **ABS**
American Bureau of Shipping & Affiliated Companies

1 = ∞

ONE UNIT - INFINITE POSSIBILITIES: the easYgenTM - 3000

Introduction

The easYgen-3000 platform offers a new level of technology for power generation customers. New software and hardware capabilities enable users to customize this control to their exact requirements and adapt it to numerous genset applications. The functions needed to run applications from very basic to the advanced have been incorporated into a single part number and at an exceptionally competitive price.

The easYgen-3000 is the result of Woodward's leading edge, global experience in the genset control business. Communications with our global market have enabled Woodward to optimize a control that meets technical and commercial aspects for the market today and in the future.

The easYgen-3000 will permit our customers to differentiate themselves in their respective markets and will assist them in maintaining a competitive advantage in the coming years.

This presentation is to introduce the easYgen-3200 as the first model available from the easYgen-3000 platform line.

Current and *future* Part Numbers

P2

easYgen-3000 Platform	Terminal Blocks	Comm. Ports	1A CT	5A CT	1A CT P2	5A CT P2
RP-3000 (Remote Panel)	2	1	No	No	No	No
easYgen-3100	80	4	8440-1818	8440-1817	8440-1844	8440-1845
easYgen-3200	80	4	8440-1816	8440-1831	8440-1842	8440-1843
easYgen-3400	80+	4+	8440-xxxx	8440-xxxx	8440-xxxx	8440-xxxx
easYgen-3500	80+	4+	8440-xxxx	8440-xxxx	8440-xxxx	8440-xxxx



RP-3000



easYgen-3100



easYgen-3200

Market

Genset application

- Diesel and gas engines.
- Synchronous Generators
- Single unit island/mains parallel operation
- Multiple unit island/mains parallel operation

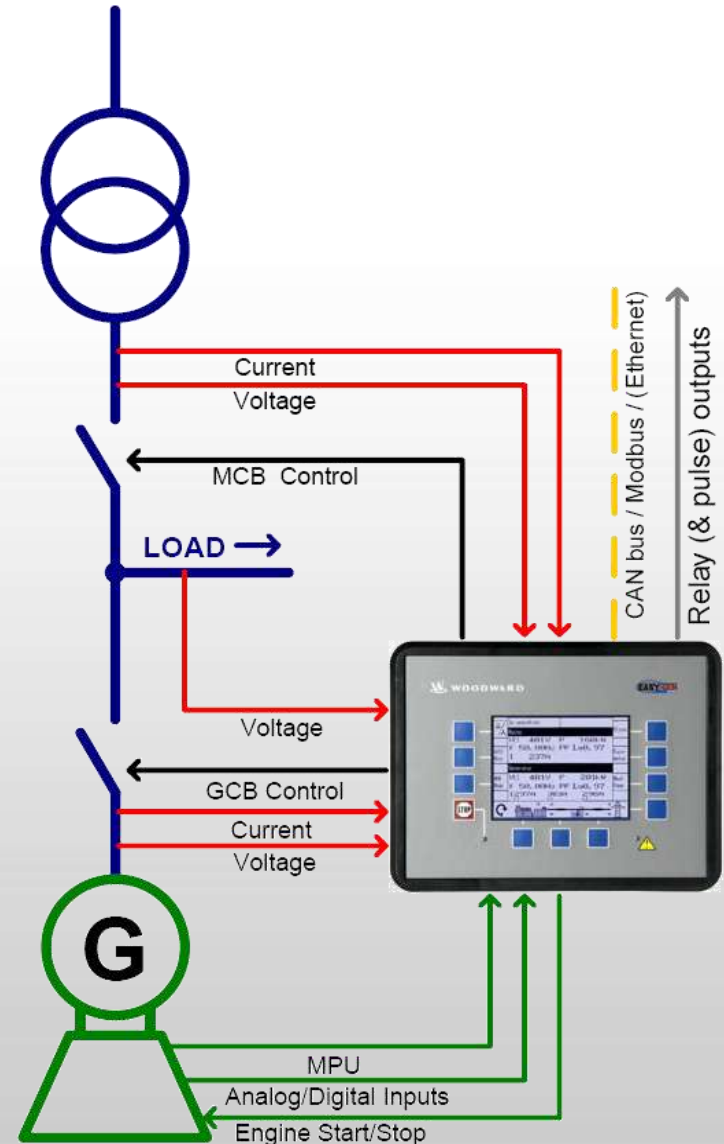
Typical Field applications

- Emergency mode - AMF (Automatic Mains Failure)
- Stand-by application
- Cogeneration – CHP (Combined Heat and Power)
- Peak shaving
- Prime mover application
- Export/Import control
- Load or process dependend start/stop for single/multiple units

Application

Single Unit Mains Parallel

- Engine start / stop
- Generator protection
- AMF (auto mains failure)
- Generator control
- Frequency / active power
- Voltage / power factor
- Parallel to mains
- Full Generator Breaker Control
- Full Mains Breaker Control



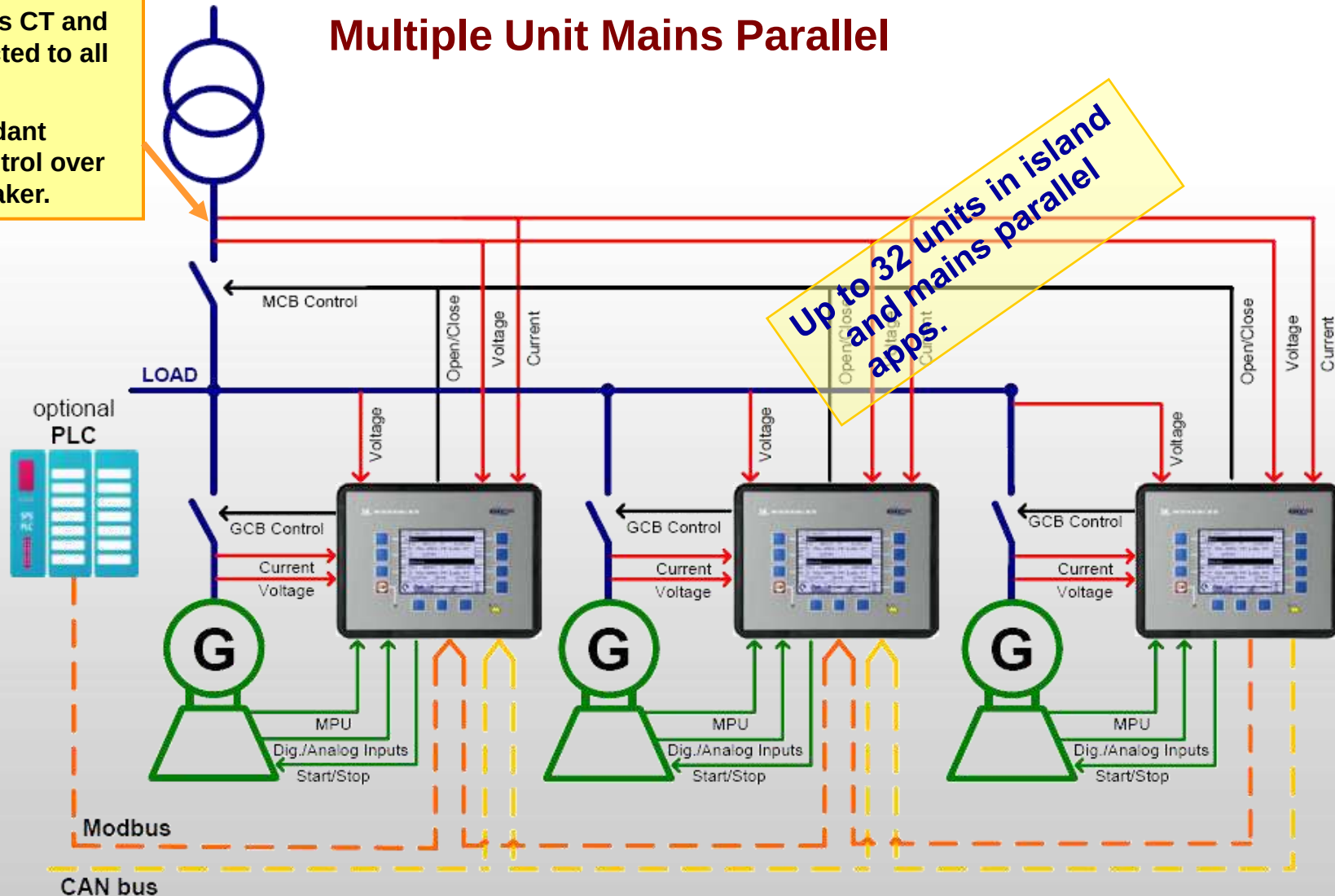
Application

Multiple Unit Mains Parallel

No external mains breaker control module required. Mains CT and PT will be connected to all easYgen-3000.

=> Full redundant protection/control over the Mains Breaker.

Up to 32 units in island and mains parallel apps.



Overview

- ***FlexApp™*** Multiple breaker operation application setups in one unit:
No breaker, GCB o/, GCB o/c, GCB & MCB o/c*
- ***FlexRange™*** Allows for the control to operate on a wide range of PT voltage inputs and CT configurations
- ***FlexIn™*** The controller analog inputs are compatible with both resistive and mA signals permitting the use of a wide range of sending units
- ***LogicsManager™*** Configurations, operating sequences, and operating modes can be modified through the use of logical operators, timers, internal and external status
- ***Analog Manager™*** Analog signals can be monitored and sent to an output (metered values, bias signals for control purposes)
- ***FlexLimits™*** Free running and programmable analog limit switches extend the quantity of trip levels or actuation triggers
- ***FlexCAN™*** Allows for CANopen and J1939 protocols

* o/ = open; o/c = open/synch./close

Features – Overview

Engine control

- Diesel or gas engines
- Start/Stop management
- ECU interconnection

Breaker control

- GCB
- MCB
- No breaker application

Power Management

- kW-,kVAr-, f-, V-, pow.fact.-Control
- kW-, kvar-, Sharing

Protection

- Engine protection
- Generator protection
- Mains monitoring
- Breaker monitoring

Customization

- High flexibility via LogicsManager
- Multiple languages
- Customized front foils/face panels

Features – Engine Control

- Stop, Manual, Automatic modes
- Start / stop by discrete inputs, interface, frontpanel, analog inputs ...
- ECU CAN J1939 connection for
 - Monitoring
 - Visualization
 - Control
- Override mode for critical operation
- Speed sensing/monitoring by MPU
- Redundant relay outputs for safety considerations (breaker, gas valves,...) via LogicsManager
- Crank control and protection
- Aux. excitation for alternator via D+ terminal
- Aux. services for pre- and postrun
- Counters for running hours , service requests,...

Features – Engine Control

Start-Stop-Management

- Load-Dependent Start/Stop (LDSS) up to 32 generator sets based on:
 - Fuel efficiency
 - System reserve power
 - Service hours
 - Different sized engines/generators
- Fault conditions on genset “X” in the network (Next genset starts)
- Process data; e.g. temperature, fuel level, or any other measured state
- Loss of mains detection for supplying emergency power

Features – Breaker

Breaker

- No breaker, GCB, MCB

Breaker modes

- Parallel
- Open transition
- Closed transition
- Interchange (Soft transfer)
- External (No breaker ops.)

Synchronization Modes

- Phase matching
- Slip frequency synch.
- Synch. check option

Protection

- Synch Time Out
- Close Time Out
- Open Time Out
- Field rotation monitoring

Features – Controllers

AVR and Governor Control Signals

Droop can be dynamically activated/deactivated via LogicsManager.

Frequency

- Load sharing
- Isochronous
- Droop

Voltage

- Reactive (var) sharing
- Isochronous
- Droop

Load control

- Baseload
- Export/Import

Power Factor

- Constant

Two setpoints for each controller

- Internal setpoints
- Interface
- Discrete Inputs (discrete raise/lower)
- Analog inputs (by mA, by potentiometer)

Bias outputs (for AVR & Governor)

- Adjustable analog bias signal between +/-20 mA or +/-10 V
- PWM output
- Relay outputs raise/lower (3-step-Logic)
- Analog bias and raise/lower outputs are separately configurable for V, var, f and kW. (=> dual fuel capability)

Features - *LogicsManager™*

Configuration and modification of sequences and operation modes by using logical operators, timers, internal and external status conditions.

Digital Signals

Discrete inputs
Relay status
External discrete inputs
External relays
Control messages via CAN, Modbus, ...

Internal Conditions

Conditions

- CB status
- operating mode
- engine status

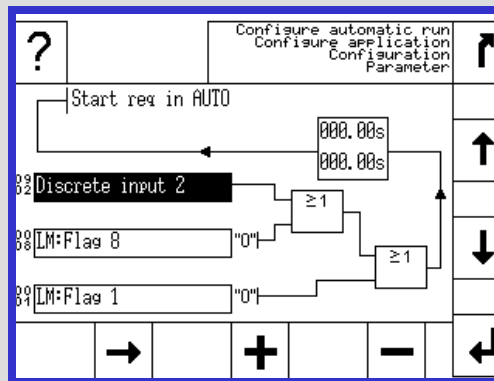
Alarms

- warning alarm
- shutdown alarm

Time / Date

Assignment

With timer ON-delay and OFF-delay
16 additional/internal flags or logical operations



Relay Outputs

- Operate free configurable outputs

Internal Conditions

- Start/stop engine
- Change operation mode
- Acknowledge of alarms
- Inhibit emergency mode
- Creating internal flags for cascading multiple dependencies

Discrete I/O

12 x Relay Outputs

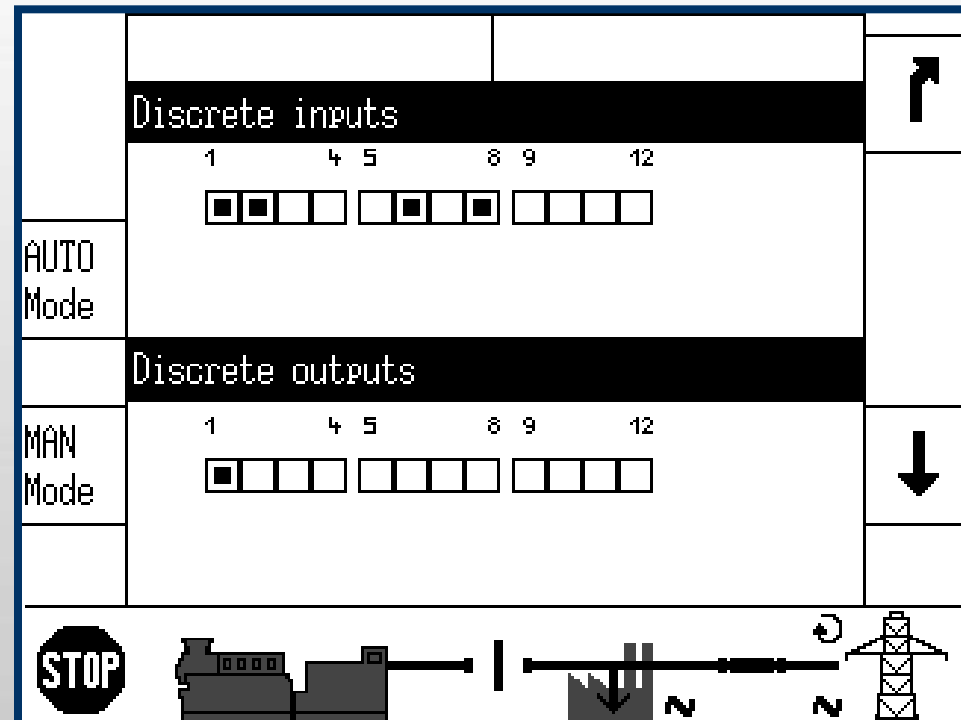
- Alarm and control
- 6 single-pole contacts
- 6 two-pole contacts
- Max 2A @ inductive load

12 x Discrete Inputs

- Alarm and control (isolated)
- Configurables: Timers, alarm classes, text

Expansion with external DI/DO boards

- Max. 16 DI/16 DO
- Woodward IKD 1
- Phoenix



Analog I/O

3 x Analog Inputs

- 0 to 500 Ohm or 0/4 to 20 mA
- Change between different senders via parameter
- 1- and 2-wire senders supported
- 11 bit resolution
- Configurables: Timers, alarm classes, text

1 x Battery Voltage

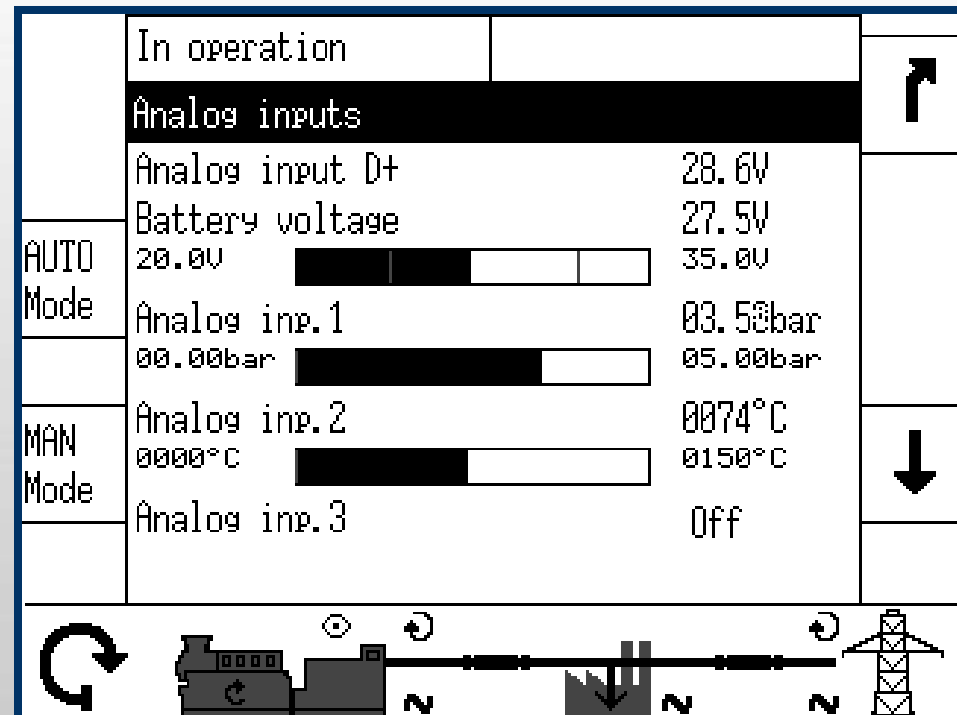
- Monitoring of power supply 8 to 40 Vdc



P2 Expansion with external analog boards

1 x Magnetic Pickup Unit (MPU)

- Switching or inductive
- Configurable for number of teeth



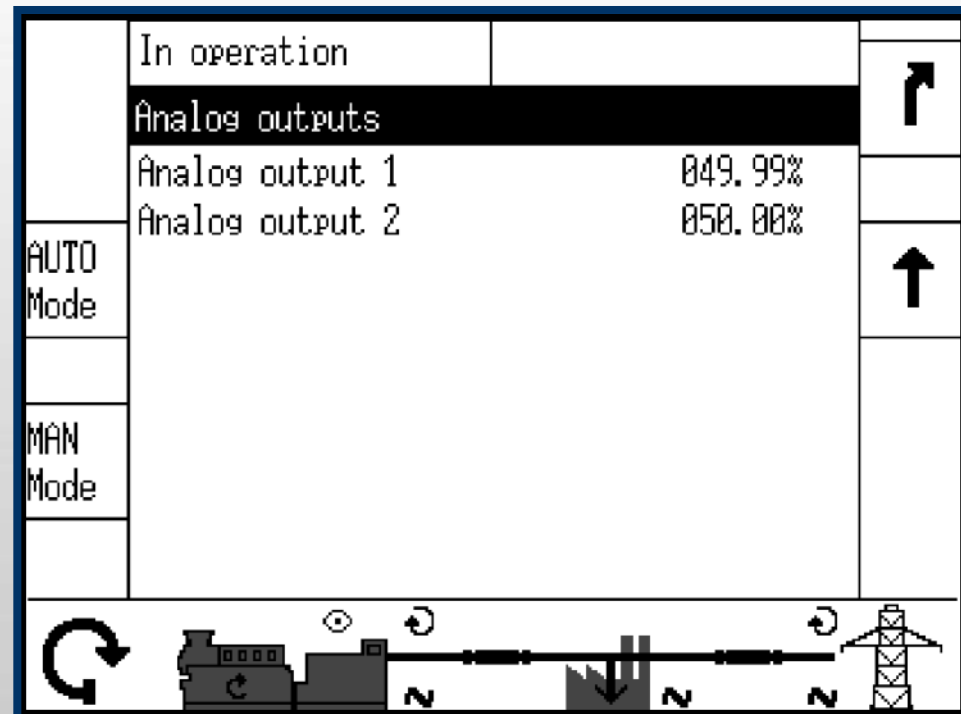
Analog I/O

2 x Analog Outputs

- Maximum +/- 20 mA or +/- 10 V or PWM (500 kHz)
- Preconfigured for speed and voltage bias and configurable as scalable output for measured values (kW) (ext. analog meters)
- Change between voltage and current by using simple jumpers
- 11/12 bit resolution

1 x Auxiliary Excitation D+

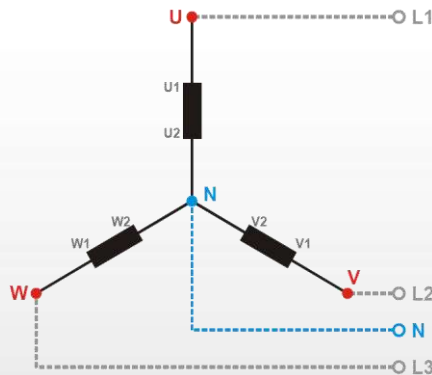
- Input: Sensing and monitoring of excitation voltage
- Output: Supplying excitation voltage (via internal shunt resistor)



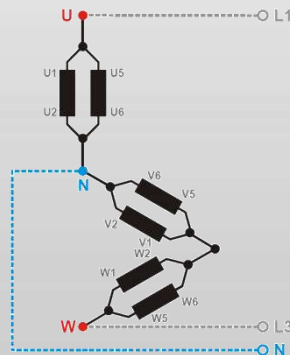
Voltage and Current sensing Generator and Mains

3Ph4W (3phase, 4wire)

1-, 2- and 3-phase CT arrangement possible & configurable for each phase

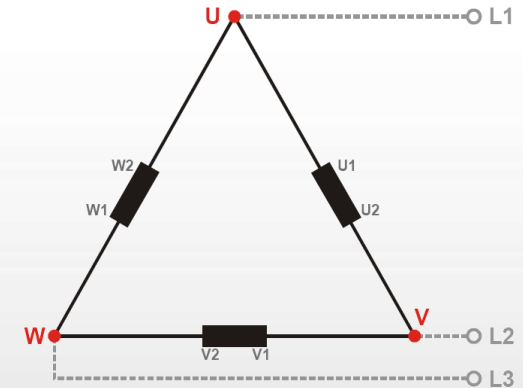


1Ph3W (1phase, 3wire) only 2-phase CT possible

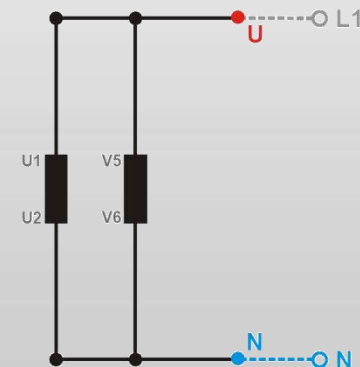


FlexRange™

3Ph3W (3phase, 3wire)



1Ph2W (1phase, 2wire) only 1-phase CT possible



AC Generator sensing

True RMS Voltage Sensing

- 4-phase (L1, L2, L3, Neutral)
- 100 and 400 V input
- Frequency measurement
- Field rotation detection
- Class 1 accuracy
- Phase-to-Phase measurement
- Phase-to-Neutral measurement
- 3ph3w, 3ph4w, 1ph2w, or 2ph3w

True RMS Auxilliary Current Sensing

- Configurable as mains CT or
Generator ground fault CT

True RMS Current Sensing

- 3-phase
- Non-returning slave pointer
- Class 1 accuracy

Power Sensing

- Class 2 accuracy
- True RMS power measuring
- Real and reactive power
- Power factor
- Energy counters Wh and varh

AC Mains sensing

True RMS Voltage Sensing

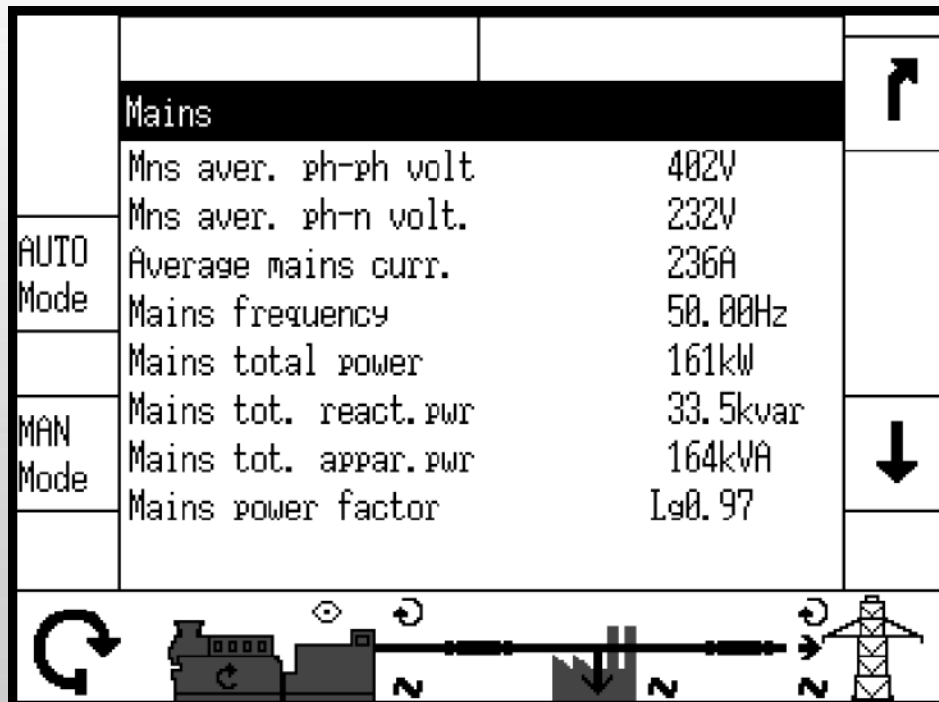
- 4-phase (L1, L2, L3, Neutral)
- 100 and 400 V input
- Frequency measurement
- Field rotation detection
- Class 1 accuracy
- Phase-to-Phase measurement
- Phase-to-Neutral measurement
- 3ph3w, 3ph4w, 1ph2w, or 2ph3w

Power Sensing

- Real, reactive and appearant power

True RMS Current Sensing

- Non-returning slave pointer
- Class 1 accuracy



AC Bus sensing

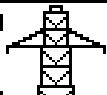
True RMS Voltage Sensing

- 2-phase sensing (phase-to-phase or phase-to-neutral)
- Phase angle between mains / bus and generator / bus
- Dead bus detection

	AUTO mode ready		↑
	Busbar		
	Busbar 1 volt. L1-L2	401V	
	Busbar 1 freq. L1-L2	50.01Hz	
AUTO Mode	Ph. ang. busb1-gen. L12	0180.0°	
MAN Mode	Ph. ang. mns-busb1 L12	0000.0°	





DynamicsLCD™

Multiple languages – 10 standard

- English
- German
- Italian
- French
- Spanish
- Turkish
- Portuguese
- Russian
- Chinese
- Japanese

Configure language / clock	Parameter System Overview	↗
Language	English	
Hour	19h	
Minute	38min	↑
Second	08s	
Day	06	
Month	11	
Year	06	↓
		↖

Sprache / Uhr konfigurieren	Parameter Systemübersicht
Language	Deutsch
Stunde	15h
Minute	55min
Sekunde	01s
Tag	11
Monat	07
Jahr	07

DynamicsLCD™

Italian

Configurare lingua / orologio	Parametro Panoramica del sistema
Language	Italiano
Ore	15h
Minuti	17min
Secondi	04s
Giorno	11
Mese	07
Anno	07

French

Config langue/horloge	Paramètres Vue système
Language	Français
Heure	15h
Minute	21min
Seconde	26s
Jour	11
Mois	07
Année	07

Spanish

Configurar idioma/reloj	Parámetro Conjunto del sistema
Language	Español
Horas	15h
Minutos	24min
Segundos	37s
Día	11
Mes	07
Año	07

Turkish

Saat/Dil Ayarları	Parametre Sistem genel görünüşü
Language	Türkçe
saat	15sa
dakika	28dak
saniye	44san
gün	11
ay	07
yıl	07

Portuguese

Configurar Idioma/Relógio	Parâmetro Avaliação do sistema
Language	Português
Horas	15h
Minutos	41min
Segundos	52s
Dia	11
Mês	07
Ano	07

DynamicsLCD™

Chinese

配置 语言/时钟	参数 系统纵览
Language	中文
小时	15h
分	37min
秒	44s
日	11
月	07
年	07

Russian

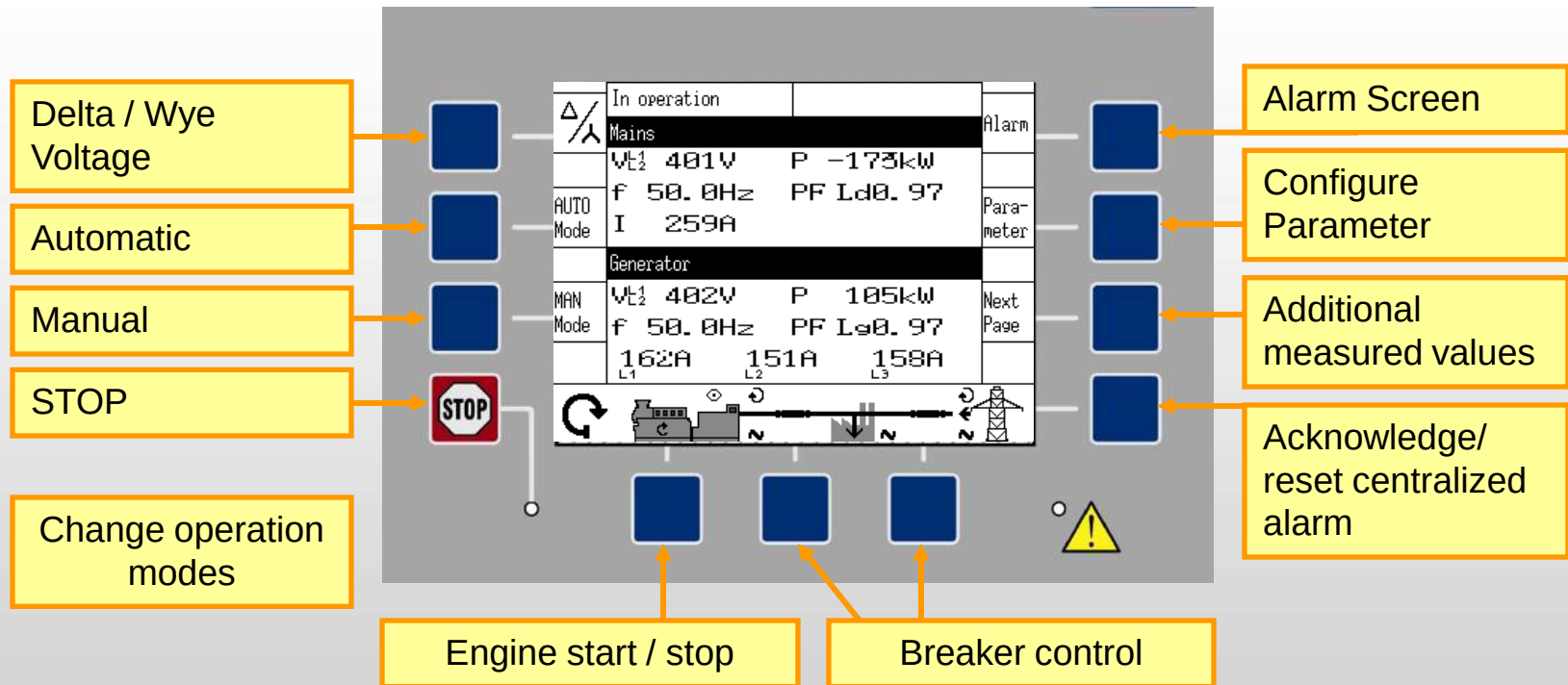
Конфигурация языка/часов	Параметры Обзор системы
Language	Russky
Часы	15h
Минуты	32min
Секунды	54s
День	11
Месяц	07
Год	07

Japanese

言語/時計設定	パラメータ システム概要
Language	日本語
時計 時設定	15h
時計 分設定	46min
時計 秒設定	57s
日付設定	11
月設定	07
年設定	07

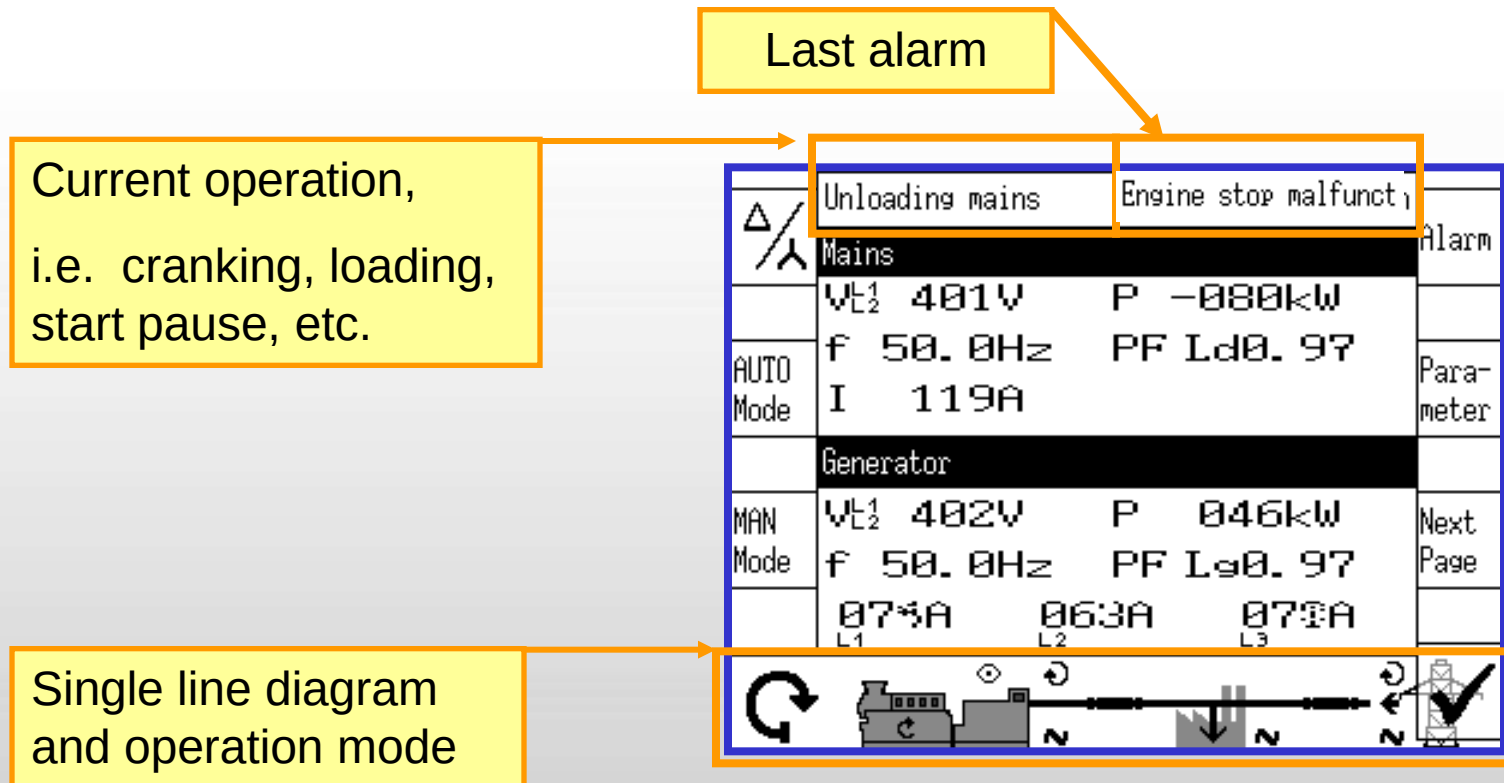
DynamicsLCD™

The 320x240 pixel graphic interactive LC display provides soft keys whose functionality changes depending on application (see *FlexApp™*) and operation.



DynamicsLCD™

The display sections:



DynamicsLCD™

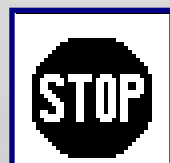
Operating modes



Automatic mode



Manual mode



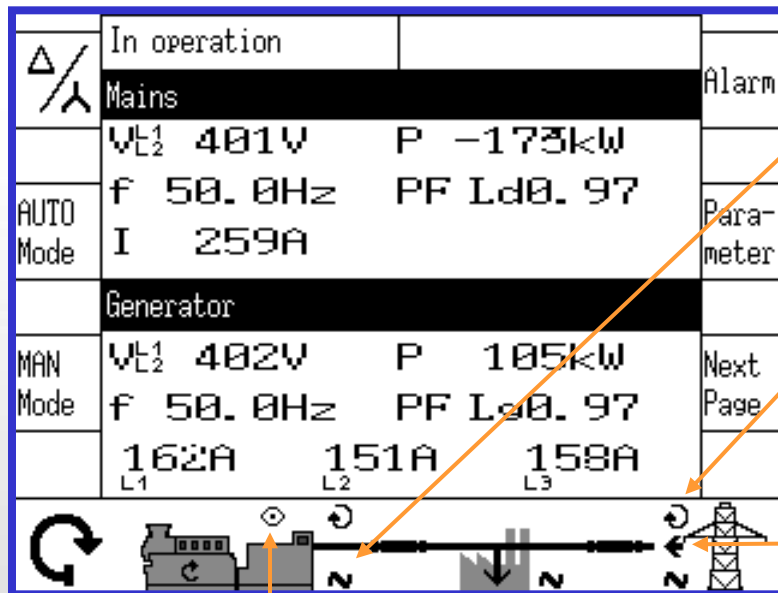
Stop mode

	In operation			Alarm
	Mains			
AUTO Mode	VL2 401V		P -173kW	Parameter
	f 50.0Hz		PF Ld0.97	
	I 259A			
	Generator			
MAN Mode	VL2 402V		P 105kW	Next Page
	f 50.0Hz		PF Ld0.97	
	162A		151A	158A
L1		L2	L3	



DynamicsLCD™

Symbol meanings in the single line diagram



Voltage detected

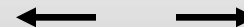


Rotation field clockwise (CW)



Rotation field counter clockwise (CCW)

Import/export mains power

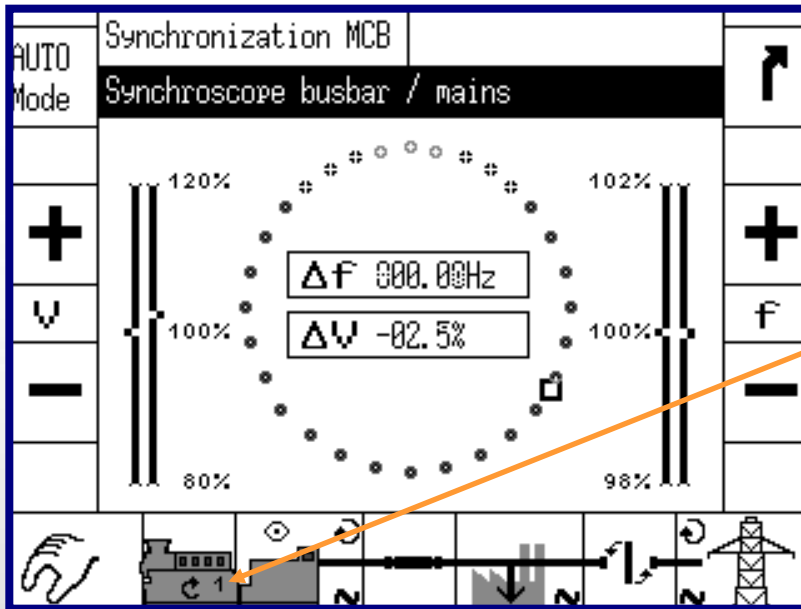


Delayed engine monitoring expired



Engine speed detected

DynamicsLCD™



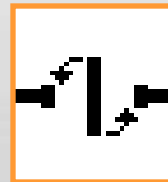
0

Stop command issued

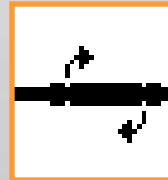
1

Start/run command issued

Unit is trying to close the breaker



Unit is trying to open the breaker



DynamicsLCD™

Examples for measuring screens

	In operation		
	Generator		
AUTO Mode	V L ₁ 402V	L ₂ 402V	L ₃ 403V
	V N ¹ 233V	N ² 231V	N ³ 233V
	I L ₁ 299A	L ₂ 299A	L ₃ 298A
	I L _{Max} 302A	L _{Max} 300A	L _{Max} 299A
MAN Mode	Calc. ground current		00.0A
	P ₁ 068kW	2 067kW	3 067kW
	Q ₁ 15.6kvar	2 16.1kvar	3 16.9kvar
	S ₁ 070kVA	2 069kVA	3 069kVA
	PF ₁ Lg0.97	2 Lg0.97	3 Lg0.96

	In operation		
	Counters and service		
AUTO Mode	Hours of operation	695.16h	
	Number of starts	23	
MAN Mode	Hours until maintenance	250h	
	Days until maintenance	296d	

	In operation		
	Counters and service		
AUTO Mode	Gen. positive active energy	0.00MWh	
	Gen. positive reactive energy	0.00Mvarh	
	Gen. negative reactive energy	0.00Mvarh	
MAN Mode			

DynamicsLCD™

Alarm screen

- Visible active state
- Date and time stamp
- With totally 16 entries

Event History

- In-/ out coming events (+ / -)
- Date and time stamp
- 300 entries (FIFO)

Alarms will stay active until acknowledged, even if power is cycled.

Alarm list	System Overview						
	A!	B!	C	D	E!	F!	
Emergency stop	07-Jul-17 09:08:29.11 ①						
Free text DI 10	07-Jul-17 09:07:52.23						
Discrete Inp. 11	07-Jul-17 09:06:47.19						
Mains undervoltage 1	07-Jul-17 09:05:50.53 ①						
Mains underfreq. 1	07-Jul-17 09:05:50.53 ①						
Mains undervoltage 2	07-Jul-17 09:05:49.09 ①						
Mains underfreq. 2	07-Jul-17 09:05:49.09 ①						
Discrete Inp. 9	07-Jul-13 09:04:47.23 ①						
Discrete Inp. 12	07-Jul-13 09:04:39.35						
							

Event History		Next Page System Overview		↑
Mains undervoltage 1	06-Nov-06	16:04:35.53	+	↑
Mains underfreq. 1	06-Nov-06	16:04:35.53	+	
Mains undervoltage 2	06-Nov-06	16:04:34.65	+	
Mains underfreq. 2	06-Nov-06	16:04:34.65	+	
GCB fail to open	06-Nov-06	16:04:34.05	+	↓
Mains decoupling	06-Nov-06	16:04:34.05	+	
Emergency Stop	06-Nov-06	16:04:34.05	+	
Bat. overvoltage 1	06-Nov-06	16:04:34.05	-	
MCB close	06-Nov-06	16:04:34.04	+	
GCB close	06-Nov-06	16:04:34.04	+	
STOP				✓

Alarm Classes

Alarm Classes are free configurable for most monitorings

Class	Action			Result
A	Display			Warning
B	Display and Horn			Warning
C	Display and Horn	Unload Gen. and open GCB	Cool down	Shut down
D	Display and Horn	Open GCB immediate	Cool down	Shut down
E	Display and Horn	Unload Gen. and open GCB	Immediate Stop	Shut down
F	Display and Horn	Open GCB immediate	Immediate Stop	Shut down
Control	For control purposes via LogicsManager to change/modify sequencing or discrete outputs			internal

Generator Protection

	<i># of Trip Levels</i>	<i>ANSI Code</i>
• Over-/undervoltage	2/2	[59/27]
• Voltage asymmetry	1	[47]
• Over-/underfrequency	2/2	[81O/U]
• Overload (IOP/MOP)	2	[32]
• Reverse/reduced power	2	[32R/F]
• Unbalanced load	2	[46 measured]
• Definite time-overcurrent	3	[50/51]
• Inverse time-overcurrent	1	[IEC 255]
• Overspeed (MPU)	2	[12]
• Measured ground current	2	[50G]
• Calculated ground current	2	

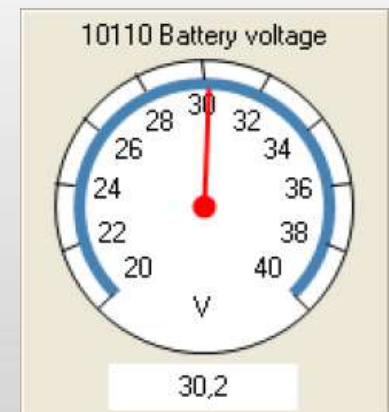
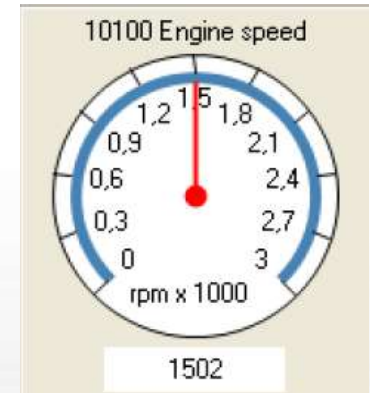
Generator Protection

	<i># of Trip Levels</i>	<i>ANSI Code</i>
• Power factor (PF) lagging	2	
• PF leading – loss of excitation	2	[40Q]
• Phase rotation field CW/CCW	1	
• $P_{\text{setpoint}} \Leftrightarrow P_{\text{actual}}$ mismatch	1	Controller*
• Unload mismatch (time out monitoring)	1	Controller*
• Operating range failed	1	Controller*

* plausibility monitoring features

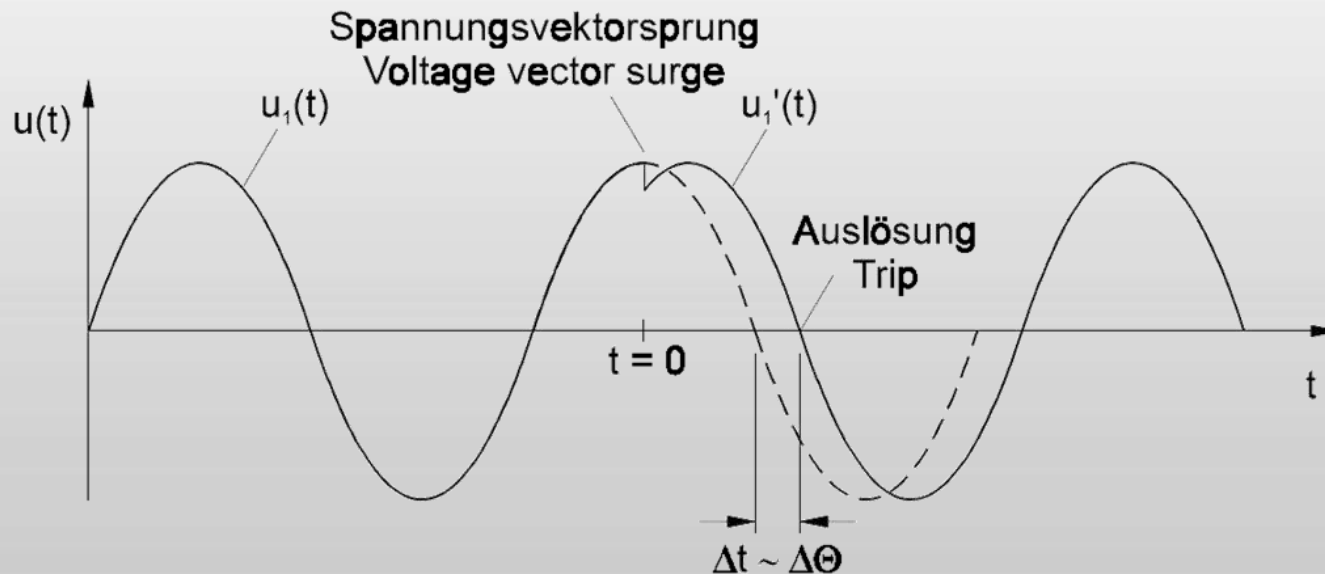
Engine Protection

- Maintenance days exceeded
- Maintenance hours exceeded
- Over-/Underspeed (MPU)
- Unintended Stop
- Engine Stop malfunction
- Speed/frequency mismatch
- Start failure
- Charge alternator low voltage
- Red stop lamp (J1939)
- Amber warning lamp (J1939)
- Battery over-/undervoltage



Mains Monitoring and decoupling

	<i># of Trip Levels</i>	<i>ANSI Code</i>
• Over-/undervoltage	2/2	[59/27]
• Over-/underfrequency	2/2	[81O/U]
• Import/Export power	2	[32]
• Power factor leading	2	
• Power factor lagging	2	
• Phase shift	1ph/3ph	[78]
• Field rotation		



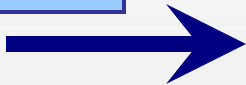
Miscellaneous Monitoring

- GCB / MCB fail to close
- GCB / MCB fail to open
- Synch. Time Out GCB / MCB
- Phase rotation mismatch generator / busbar / mains
- Mains decoupling
- CAN bus communications monitoring (J1939, CANopen)
- Parameter alignment (multiple units)
- Missing members (multiple units)
- EEPROM failure (internal CPU)
- Wire break analog inputs
- Discrete inputs
- **FlexLimitsTM** for analog values

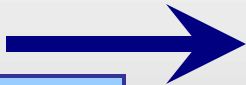
Interfaces

- Load share
- CANopen

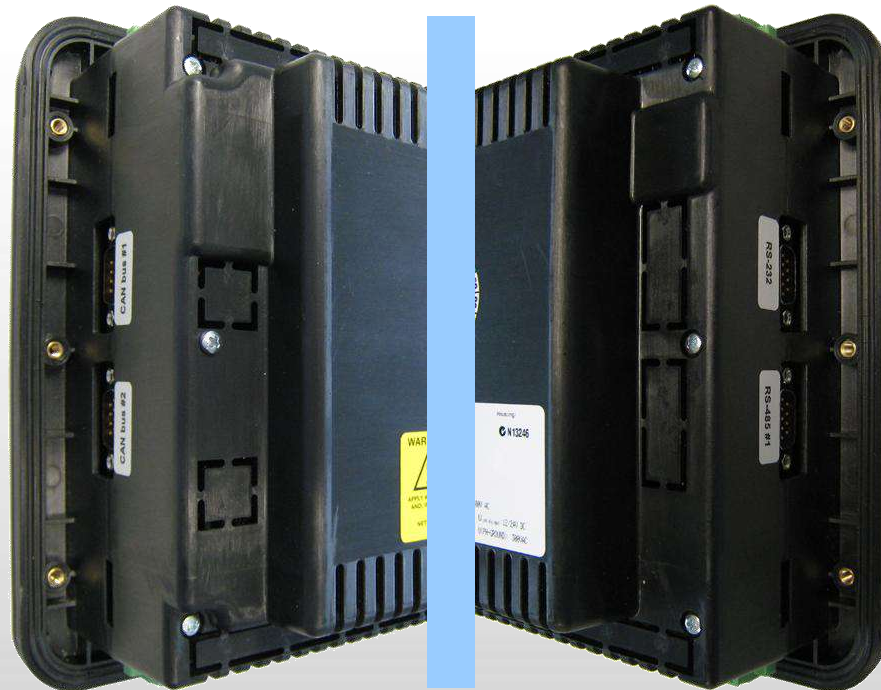
CAN 1



CAN 2



- Extension cards (IKD 1, Phoenix)
- J1939 ECU



- ToolKit
- Modbus

**Serial 1
RS-232**



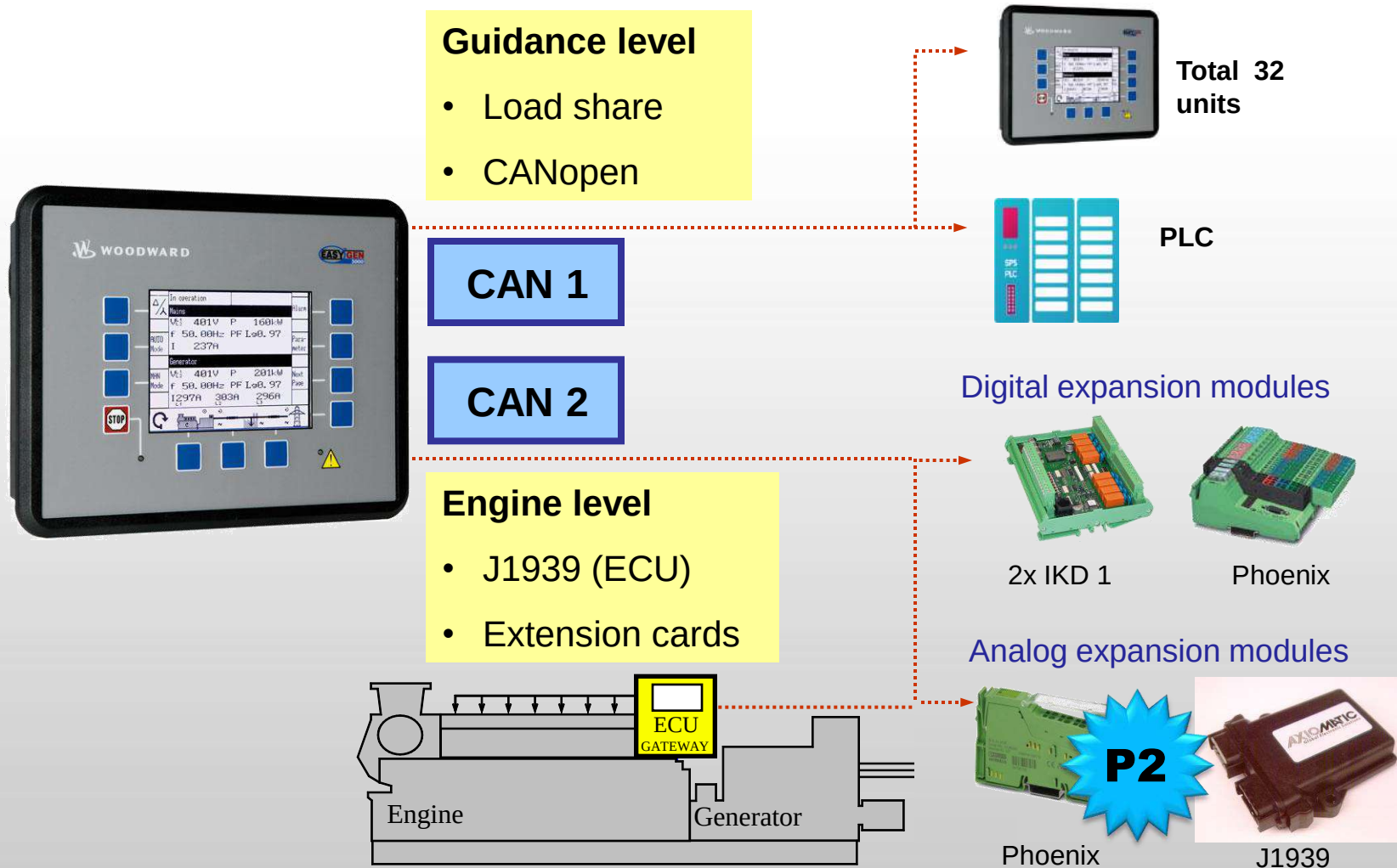
**Serial 2
RS-485**



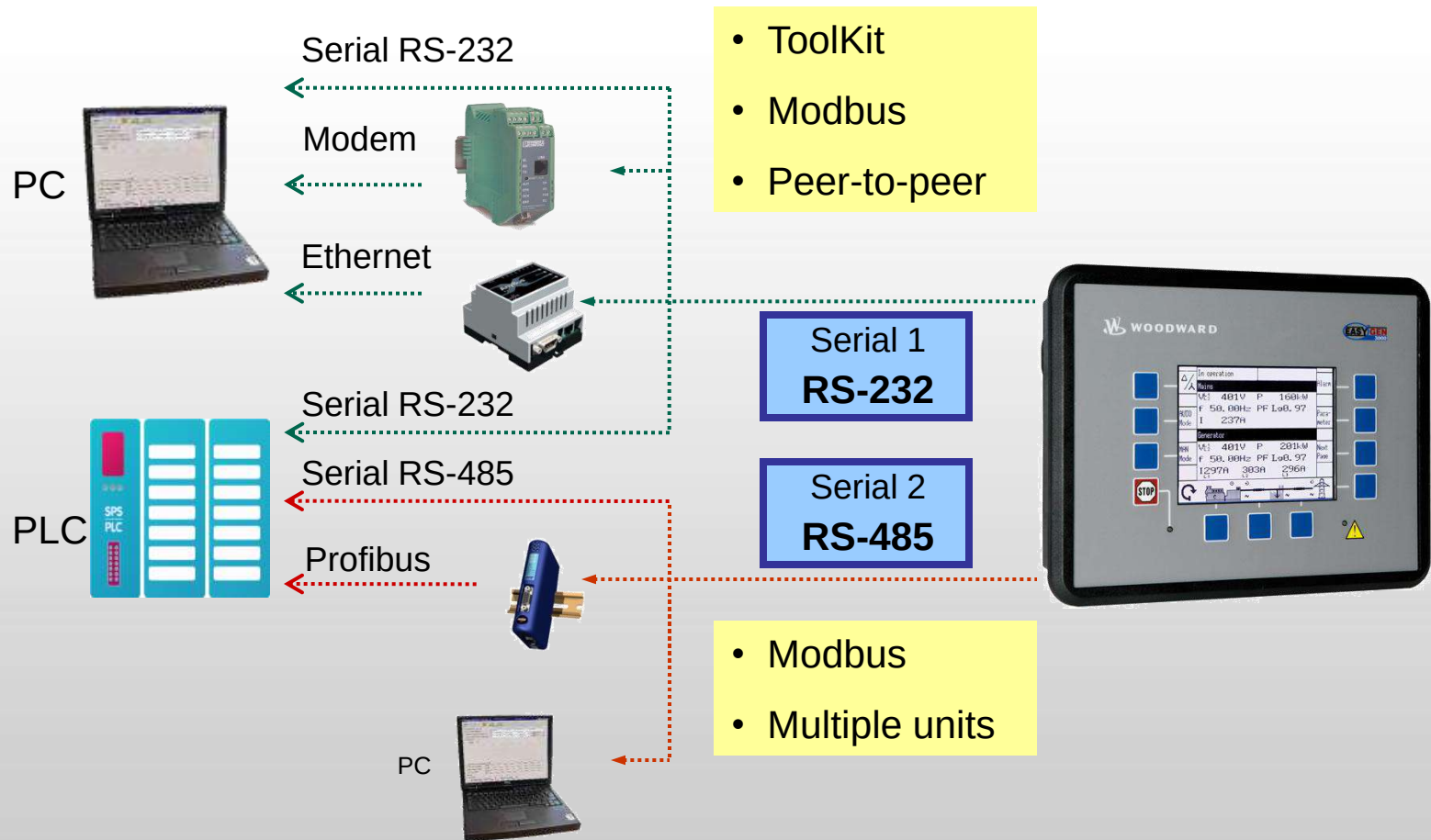
- Modbus

All interfaces are galvanically isolated!

Interface Overview CAN bus



Interface Overview Serial Ports



Configuration via ToolKit



Serial 1
RS-232

← RS-232 or CAN →



8440-1831-NEW_us_5418-2752-NEW_32.wtool - Woodward ToolKit

File View Device Settings Tools Help

HOME PAGE

WOODWARD easYgen-3200-5 HOME PAGE

Device # 2

Application mode: GCB/MCB

Operation modes: In operation

Warning alarms: A B C D E F

Shutdown alarms: C D E F

Latest alarm:

PLANT PAGE

ALARM STATUS

PARAMETER

STATUS MENUS

SERVICE COUNTERS

STATUS MAINS

174 Mns aver. ph-ph volt	399.4 V	140 Mains total power	-215.566 kW
173 Mns aver. ph-n volt	230.5 V	208 Mains power factor	1.00
207 Average mains curr.	312.960 A	147 Mains frequency	49.99 Hz

MCB closed

Rotation: CW

STATUS GEN

171 Gen. aver. ph-ph volt	399.9 V	135 Gen. total power	132.130 kW
170 Gen. aver. ph-n volt	230.7 V	160 Gen. power factor	1.00
185 Gen. current average	191.600 A	144 Gen. frequency	50.00 Hz

GCB closed

Rotation: CW

STATUS ENGINE

10100 Engine speed	0 rpm
10110 Battery voltage	27.7 V

10100 Engine speed: 0 rpm x 1000

10110 Battery voltage: 27.7 V

Connected on COM4

Miscellaneous

- CE marked, UL listed, Marine Approval (LR)
- IP54 (NEMA 2) from front with clamp fasteners
- IP66 (NEMA 4) from front with screw kit
- IP20 from back
- Operating temperature range –20 to +70°C
- Weight approx. 1,850 g
- UL
- CERTIFICATE of Design Assessment by ABS



Complete Product Package

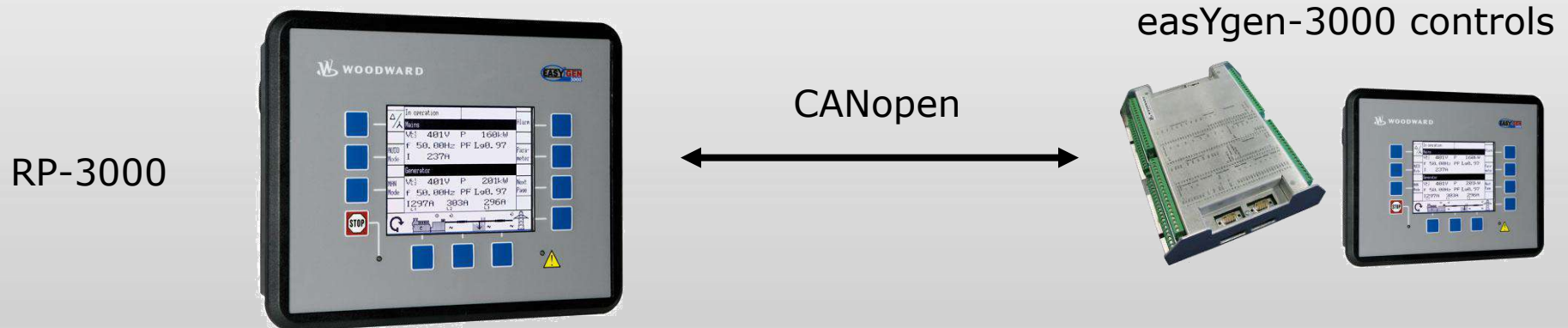
- **Control unit easYgen-3200-5 (5A CT model)**
- 12 x Screws for IP66 front panel mounting 8923-1262
- 4 x clamp fasteners brackets and screws for IP56 front panel mounting 8923-1263
- 1 x CD with
 - PC Configuration ToolKit Version 2.0
 - ToolKit *.WTOOL files (English and German)
 - ToolKit *.SID files (English and German)
 - Manuals



Planned Remote Panel

Remote Panel RP-3000

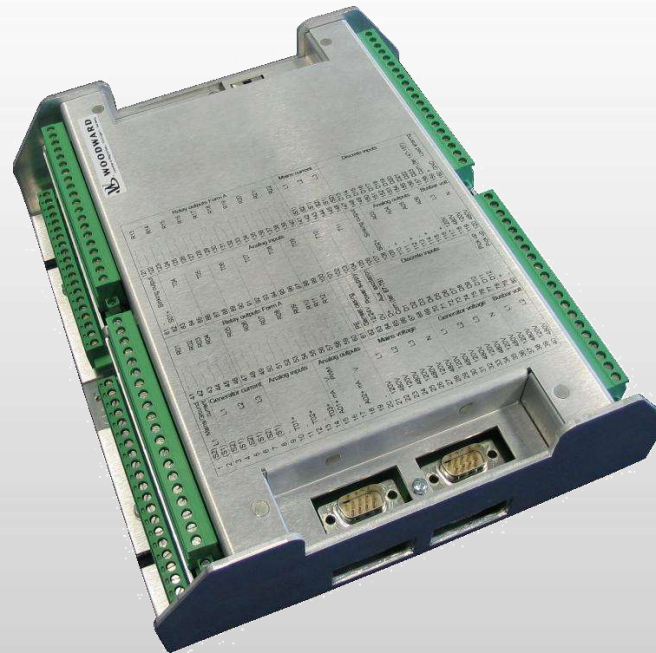
- CANopen connected panel to all easYgen-3000 controls
- Point-to-point connection
- Same look and feel as easYgen-3200
- Target release: 2008



easYgen-3100

easYgen-3100 (1A CT and 5A CT model)

- Metal housing: no display, HMI via interfaces and DI
- Same functionality as easYgen-3200



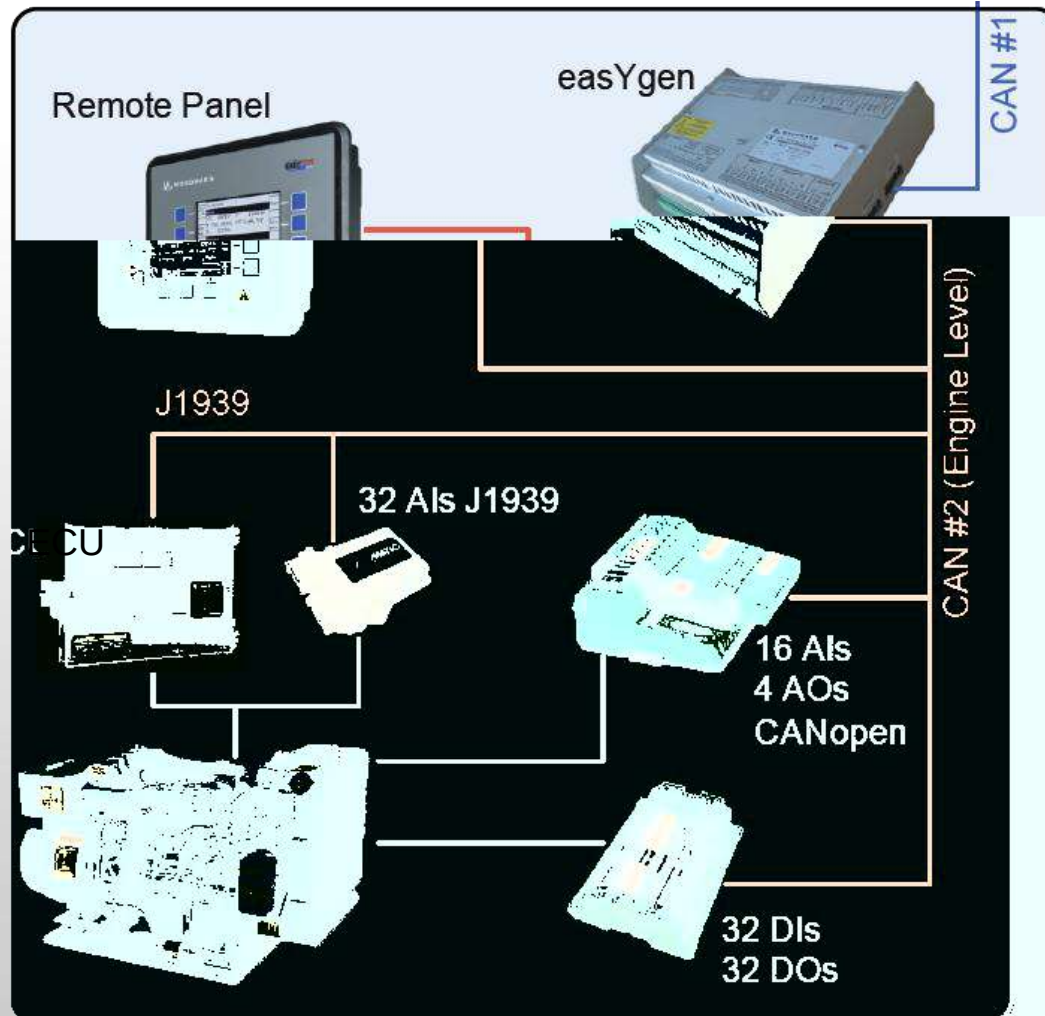
Planned Release easYgen-3500

easYgen-3200 I/O and functionality plus:

- 11 x Discrete Inputs (onboard, freely configurable)
- 11 x Discrete Outputs (onboard, freely configurable)
- 2 x Sinking Outputs (onboard, kWh metering)
- 9 x Analog Inputs (onboard, freely configurable)
- 4 x Analog Outputs (onboard, scalable)
- 1x Ethernet port (load sharing, SCADA connection, Modbus TCP/IP)
- Release date: mid-2009

New Features Package P2

Extended I/O via external terminals – graphical Overview



New Features Package P2

Extended I/O via external terminals

- 48 x Analog Inputs
 - 32 x Inputs via predefined J1939 engine messages in 10 languages
 - 16 x Inputs via CANopen terminals
- 4 x Analog Outputs (CANopen, scalable, 0-20 mA or 0-1 0V)
- 16 x Discrete Inputs (CANopen terminals) additional → **32 total**
- 16 x Discrete Outputs (CANopen terminals) additional → **32 total**
- Some terminals I/O will be mapped to act like a central terminal (single point connection and message broadcast to every control e.g.: central room temperature, central fuel tank level, gas leakage detection,)
- The J1939 terminals need to be configured by the PC tools of the terminal manufacturers.
- The CANopen terminals can be configured via ToolKit directly

New Features Package P2

Free running PID loops

3 x Independent freely programmable PID control loops

- Configurable as Analog Outputs (0-20 mA) or 3-step-outputs (Relay Outputs)
- Proportional, Integral and Derivative adjustment
- Programmable for activation/deactivation via LogicsManager
- External and internal set points can be used
 - Usable for water heat cycle control, dual-fuel control, room temperature control ...

3rd Party Accessories

Accessories easYgen-3000/P2

- CANopen bus coupler

IL CAN BK-TC-PAC (#2718701) [max 3 possible]

- Analog inputs

IB IL AI 2/SF-PAC (#2861302) 2x analog (0-20 mA, 4-20 mA, ± 20 mA, 0-10 V, ± 10 V)

IB IL TEMP 2 UTH-PAC (#2861386) 2x thermocouples

IB IL TEMP 2 RTD-PAC (#2861328) 2x RTDs, resistive senders

- Analog outputs

IB IL AO 2/SF-PAC (#2863083) 2x analog outputs (0-20 mA, 4-20 mA, 0-10 V)

Phoenix order # numbers in brackets



3rd Party Accessories

Accessories easYgen-3000/P2

- J1939 Analog inputs

TC 4 (#AXTC4) 4x thermocouples

TC 20(#TC20) 20x thermocouples

Analog input 10 (#AX030100) free configurable, for advanced J1939 users only

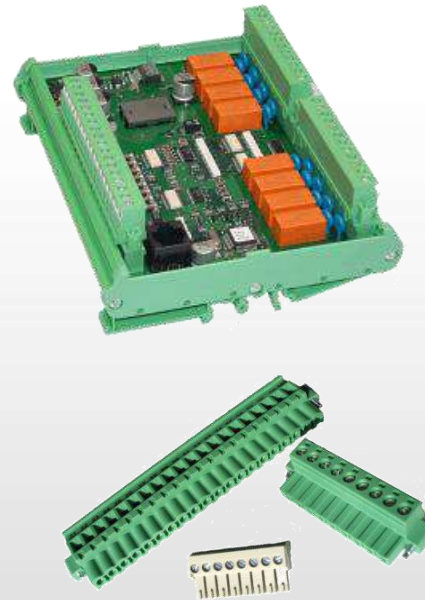
Axiomatic order # numbers in brackets



Accessories

Accessories easYgen-3000 all types

- IKD 1 Digital Expansion Card
[P/N 8440-1041]
- Terminal Strip Kit – Plug Set
[P/N 8923-1314]



3rd Party Accessories

Accessories easYgen-3000 all types

- CANopen bus coupler

IL CAN BK-TC-PAC (#2718701) [max 3 possible]

- Discrete inputs / outputs

IB IL 24/230 DOR4/W (#2836421) 4x discrete output, PDT (5-253V, 3 A)

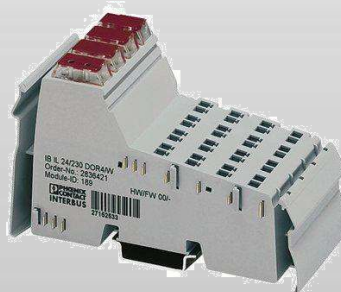
IB IL 24 DO2-2A-PAC (#2861263) 2x discrete output, (24V, 2A)

Supports **IB IL 24 DO 8**; **IB IL 24 DO 16** and **IB IL 24 DO 32** types

IB IL24 DI 2-PAC (#2861221) 2x discrete input (24V)

Supports **IB IL24 DI 4**; **IB IL24 DI 8**; **IB IL24 DI 16** and **IB IL24 DI 32** types

Phoenix order # numbers in brackets



Product Documentation

Product Specification

- English [P/N 37258] / German [P/N GR37258] / Chinese [P/N CH37258] / Portuguese [P/N PT37258]

Product Presentation

- [P/N 37397]

Manual

- Installation Manual
 - [P/N 37223]
- Configuration Manual
 - [P/N 37224]
- Operation Manual
 - [P/N 37225]
- Interface Manual
 - [P/N 37383]
- Application Manual
 - [P/N 37226]

P2

- Installation Manual
 - [P/N 37414]
- Configuration Manual
 - [P/N 37515]
- Operation Manual
 - [P/N 37416]
- Interface Manual
 - [P/N 37418]
- Application Manual
 - [P/N 37417]

Thank you for your attention

Note:

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B&A Services bv

Vleugelboot 30 - 3991 CL Houten

Telefoon (030) 657 94 86 - fax (030) 657 94 81

info@baservices.nl - www.baservices.nl

B&A Services
Noodstroomsystemen



easYgen-3100/3200 Genset Control for Multiple Unit Operation

DESCRIPTION

The easYgen-3000 Series are control units for genset applications. The numerous inputs and outputs, along with a modular software structure, permit you to use the easYgen-3000 Series for a wide range of applications. This includes stand-by, AMF, peak shaving, import-export, cogeneration or distributed generation, among others. Also the easYgen-3000 Series is compatible for isolated, island parallel, mains parallel and multiple unit mains parallel operations. The easYgen-3000 Series is able to control up to 32 gensets connected in a network with automatic sequencing.

The easYgen-3000 Series is available for simple paralleling as well as for complex paralleling applications. Choose easYgen-3200 should you want to take your fleet of gen-sets parallel to grid or choose easYgen-3500 with LS-5 for multi grid, multi segment applications. These controllers are also available without display, in a rugged metal housing suitable for back panel installation. A remote panel (RP-3000) can be used for visualization/control purpose in this case.

FlexApp™ – This feature provides the tools to easily configure the number of operated breakers: None, GCB, GCB and MCB.

LogicsManager™ – Woodward's LogicsManager enables to change the operation sequences and adapt them to specific needs. The LogicsManager accomplishes this by monitoring a range of measuring values and internal states, which are combined logically with Boolean operators and programmable timers. This enables to create and/or modify control and relay functions.

FlexIn™ – The analog inputs are configurable to operate with VDO, resistive, and/or 0 to 20 mA senders.

Flexible Outputs – Speed and voltage bias outputs are configurable to function with all speed governors and voltage regulators. The outputs can also be used as freely scalable outputs (e.g. for driving external meters).

FlexCAN™ – Advanced network interfaces ensure unsurpassed control performance – from engine control up to total plant operation. The easYgen-3000 Series is capable of working with common industrial interfaces, including CAN, RS-232, and RS-485. The multiple communication protocols permit the easYgen-3000 Series to communicate with a vast majority of engine control units (ECUs), external I/O boards, PLCs, and modems. CANopen, J1939, Modbus RTU, and Modem protocols are supported.

DynamicsLCD™ – The adaptive and interactive 5.7", 320x240 pixel color graphical LC display with soft keys and a clear menu structure ensures intuitive user operation and navigation.

FEATURES

- Operation modes: Auto, Stop, Manual, and Load/No Load test modes via discrete input possible
- Breaker control: Slip frequency / phase matching synchronization, open-close control, breaker monitoring
- Load transfer features: open / closed transition, interchange, soft loading / soft unloading, mains parallel
- Remote control via interface and discrete/analog inputs for adjusting speed, frequency, voltage, power, reactive power, and power factor set points
- Freely configurable PID controllers for various control purposes, such as heating circuit control (CHP applications), water level, fuel level, or pressure and/or other process values
- Supported ECU: Scania S6, MTU ADEC ECU7/8, Volvo EMS2 & EDC4, Deutz EMR2 & EMR3, MAN MFR/EDC7, SISU EEM, Cummins and Woodward EGS02 ECU
- Discrete and analog I/O expansion board connectivity (Woodward IKD 1 or Phoenix Contact IL series)
- Multi-lingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish, Slovakian, Finnish, Swedish
- Configurable voltage/frequency control allows manual control of breakers
- Neutral interlocking determines and controls one common neutral in a network of generators
- Cylinder temperature monitoring for in-line and V engines
- Reactive power regulation at the grid interchange point (kvar or PF)

- Master or Slave control capability
- Peak shaving operation
- Stand-by operation
- AMF operation
- Cogeneration (CHP)
- Islanded & mains parallel operation
- Load sharing and load-dependent start/stop for up to 32 units
- Import/export control
- Open/closed transition
- CANopen / J1939 ECU Control
- Free configurable alarms and texts
- Fast configuration by partial setting files
- Dynamic mains stabilization (as per BDEW)
- Adjustable vector groups for synchronization

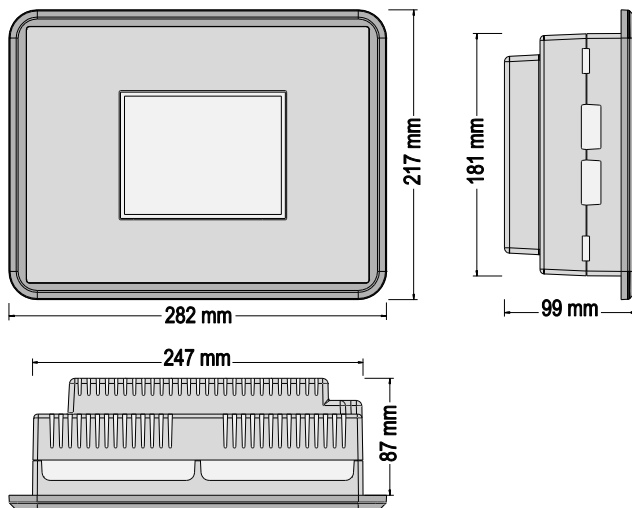
SPECIFICATIONS

Power supply	12/24 V _{DC} (8 to 40 V _{DC})
Intrinsic consumption	max. 17 W
Ambient temperature (operation)	-20 to 70 °C / -4 to 158 °F
Ambient temperature (storage)	-30 to 80 °C / -22 to 176 °F
Ambient humidity	95%, non-condensing
Voltage	($\sqrt{\Delta}$)
100 Vac [1]	Rated (V _{rated}) 69/120 V _{AC}
	Max. value (V _{max}) 86/150 V _{AC}
	Rated surge volt. (V _{surge}) 2.5 kV
and 400 Vac [4]	Rated (V _{rated}) 277/480 V _{AC}
	Max. value (V _{max}) 346/600 V _{AC}
	Rated surge volt. (V _{surge}) 4.0 kV
Accuracy	Class 1
Measurable alternator windings	3p-3w, 3p-4w, 3p-4w OD, 1p-2w, 1p-3w
Setting range	primary 50 to 650,000 V _{AC}
Linear measuring range	1.25×V _{rated}
Measuring frequency	50/60 Hz (40 to 85 Hz)
High Impedance Input; Resistance per path	[1] 0.498 M Ω , [4] 2.0 M Ω
Max. power consumption per path	< 0.15 W
Current (Isolated)	Rated (I _{rated}) [1] ..1 A or [5] ..15 A
Linear measuring range	I _{gen} = 3.0×I _{rated}
	I _{mains/ground} = 1.5×I _{rated}
Setting range	1 to 32,000 A
Burden	< 0.15 VA
Rated short-time current (1 s)	[1] 50×I _{rated} , [5] 10×I _{rated}
Power	
Setting range	0.5 to 99,999.9 kW/kvar
Discrete inputs	isolated
Input range	12/24 V _{DC} (8 to 40 V _{DC})
Input resistance	approx. 20 kOhms

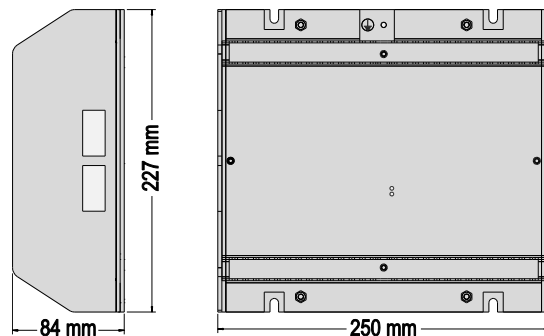
Relay outputs	isolated
Contact material	AgCdO
Load (GP)	2.00 A _{AC} @250 V _{AC}
	2.00 A _{DC} @24 V _{DC} / 0.36 A _{DC} @125 V _{DC} / 0.18 A _{DC} @250 V _{DC}
Pilot duty (PD)	1.00 A _{DC} @24 V _{DC} / 0.22 A _{DC} @125 V _{DC} / 0.10 A _{DC} @250 V _{DC}
Analog inputs (none isolated)	freely scalable
Type	0 to 500 Ohms / 0 to 20 mA
Resolution	11 Bit
Analog outputs (isolated)	freely scalable
Type	± 10 V / ± 20 mA / PWM
Insulation voltage (continuously)	100 V _{AC}
Insulation test voltage (1s)	500 V _{AC}
Resolution	11/12 Bit (depending on analog output)
± 10 V (scalable)	internal resistance ≤1 kOhms
± 20 mA (scalable)	maximum load 500 Ohms
Housing	Front panel flush mounting Plastic housing
Dimensions	WxHxD 282 × 217 × 99 mm
Front cutout	WxH 249 [+1.1] × 183 [+1.0] mm
Connection	screw/plug terminals 2.5 mm ²
Front	insulating surface
Sealing	Front IP66 (with screw fastening)
	Front IP54 (with clamp fastening)
	Back IP20
Weight	approx. 1,850 g
Housing	Switch cabinet back mounting Sheet metal housing
Dimensions	WxHxD 250 × 227 × 84 mm
Connection	screw/plug terminals 2.5 mm ²
Protection system	IP 20
Weight	approx. 2,150 g
Disturbance test (CE)	tested according to applicable EN guidelines
Listings	UL, cUL, CSA
Marine	LR (Type Approval), ABS (Design Assessment)

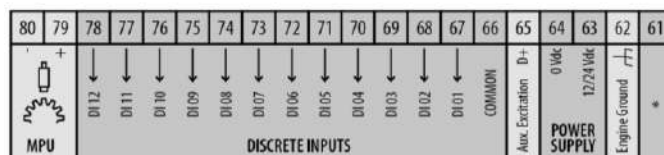
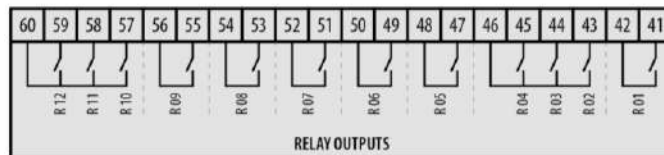
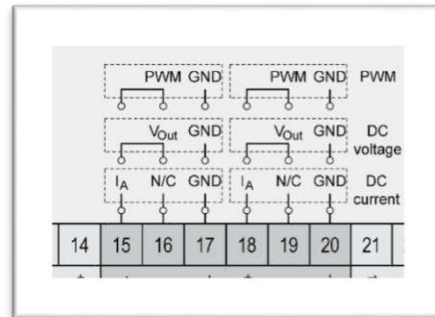
DIMENSIONS

Plastic housing for front panel mounting



Metal housing for cabinet mounting





easYgen-3100: No connection
easYgen-3200: Protective earth

- Engine Speed Control **actiVgen** (Product Specification # 03419): P/N 8440-2108
- Remote Panel **RP-3000** (Product Specification # 37446)
- **ToolKit** (Product Specification # 03366)
- I/O Expansion Board **IKD1** (Product Specification # 37171)
- Load Share Gateway **LSG** (Product Specification # 37451)
- Electronic Pickup Unit **EPU-100** (Product Specification # 37562)
- CANbus based Remote Annunciator (Product Specification # 37279): **easYlite 100** P/N 8446-1023
- **Power Generation Learning Module** (Product Specification # 03412): P/N 8447-1012
- Profibus Gateway (Application Note # 37577): **ESEPRO** P/N 8445-1046
- Ethernet (Modbus/TCP) Gateway (Application Note # 37576): **ESENET** P/N 8445-1044
- CANbus to Fiber Optic Converters (Application Note # 37598):
DL-CAN P/N 8445-1049 and **DL-CAN-R** P/N 8445-1048
- Remote Access Gateway (with HMS **Netbiter** EasyConnect **EC250**)
- Analog Expansion Card (**PHOENIX CONTACT** Inline terminal **IB IL**)
- Thermocouple Scanner (**AXIOMATIC AXTC20**)

CONTACT

North & Central America

Tel.: +1 970 962 7331

✉ SalesPGD_NAandCA@woodward.com

South America

Tel.: +55 19 3708 4800

✉ SalesPGD_SA@woodward.com

Europe

Tel. Stuttgart: +49 711 78954 510

Tel. Kempen: +49 2152 145 331

✉ SalesPGD_EUROPE@woodward.com

Middle East & Africa

Tel.: +971 2 6275185

✉ SalesPGD_MEA@woodward.com

Russia

Tel.: +7 812 319 3007

✉ SalesPGD_RUSSIA@woodward.com

China

Tel.: +86 512 8818 5515

✉ SalesPGD_CHINA@woodward.com

India

Tel.: +91 124 4399 500

✉ SalesPGD_INDIA@woodward.com

ASEAN & Oceania

Tel.: +49 711 78954 510

✉ SalesPGD_ASEAN@woodward.com

www.woodward.com

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For more information contact:

FEATURES OVERVIEW

	Model Package	easYgen-3000 Series			
		3100		3200	
		P1	P2	P1	P2
Measuring					
Generator voltage (3-phase/4-wire)		✓	✓	✓	✓
Generator current (3x true r.m.s.)		✓	✓	✓	✓
Mains voltage (3-phase/4-wire)		✓	✓	✓	✓
Mains or ground current (1x true r.m.s.; mains or ground current selectable)		✓	✓	✓	✓
Busbar voltage (1-phase/2-wire)		✓	✓	✓	✓
Control					
Breaker control logic (open and closed transition)	<i>FlexApp™</i>	2	2	2	2
Automatic, Manual, Stop, and test operating modes		✓	✓	✓	✓
Single and multiple-unit operation		✓	✓	✓	✓
Mains parallel multiple-unit operation (up to 32 units)		✓	✓ #2	✓	✓ #2
AMF (auto mains failure) and stand-by operation		✓	✓	✓	✓
Critical mode operation		✓	✓	✓	✓
GCB and MCB synchronization (slipping / phase matching)		✓	✓	✓	✓
Import / export control (kW and kvar)		✓	✓	✓	✓
Load-dependent start/stop		✓	✓	✓	✓
n/f, V, P, Q, and PF remote control via analog input or interface		✓	✓	✓	✓
Load/var sharing for up to 32 gensets		✓	✓	✓	✓
Freely configurable PID controllers		-	3	-	3
HMI					
Color Display with Softkey operation	<i>DynamicsLCD™</i>	-	-	✓	✓
Start/stop logic for diesel / gas engines		✓	✓	✓	✓
Counters for operating hours / starts / maintenance / active/reactive energy		✓	✓	✓	✓
Configuration via PC (serial connection and ToolKit software (included))		✓	✓	✓	✓
Event recorder entries with real time clock (battery backup)		300	300	300	300
Protection					
	ANSI#				
Generator: voltage / frequency	59 / 27 / 810 / 81U	✓	✓	✓	✓
Generator: overload, reverse/reduced power	32 / 32R / 32F	✓	✓	✓	✓
Generator: unbalanced load	46	✓	✓	✓	✓
Generator: instantaneous overcurrent	50	✓	✓	✓	✓
Generator: time-overcurrent (IEC 255 compliant)	51 / 51 V	✓	✓	✓	✓
Generator: ground fault (measured ground current)	50G	✓	✓	✓	✓
Generator: power factor	55	✓	✓	✓	✓
Generator: rotation field		✓	✓	✓	✓
Engine: overspeed / underspeed	12 / 14	✓	✓	✓	✓
Engine: speed / frequency mismatch		✓	✓	✓	✓
Engine: D+ auxiliary excitation failure		✓	✓	✓	✓
Engine: Cylinder temperature		-	✓	-	✓
Mains: voltage / frequency	59 / 27 / 810 / 81U	✓	✓	✓	✓
Mains: phase shift / rotation field / ROCOF (df/dt)	78	✓	✓	✓	✓
I/Os					
Speed input: magnetic / switching; Pickup		✓	✓	✓	✓
Discrete alarm inputs (configurable)		12 (10)	12 (10)	12 (10)	12 (10)
Discrete outputs, configurable	<i>LogicsManager™</i>	max. 12	max. 12	max. 12	max. 12
External discrete inputs / outputs via CANopen		16 / 16	32 / 32	16 / 16	32 / 32
Analog inputs #1, configurable	<i>FlexIn™</i>	3	3	3	3
Analog outputs: +/- 10V, +/- 20mA, PWM; configurable		2	2	2	2
External analog inputs / outputs via CANopen		-	16 / 4	-	16 / 4
Display and evaluation of J1939 analog values, "supported SPNs"		100	100	100	100
CAN bus communication interfaces #2	<i>FlexCAN™</i>	2	2	2	2
RS-232/485 Modbus RTU Slave interface(s)		1 / 1	1 / 1	1 / 1	1 / 1
Listings/Approvals					
UL / cUL Listing		✓	✓	✓	✓
CSA		✓	✓	✓	✓
LR & ABS Marine		✓	✓	✓	✓
BDEW / VDE-AR-N 4105		✓	✓	✓	✓
CE Marked		✓	✓	✓	✓
Part Numbers					
1A CT inputs / front panel mounting with display #3		-	-	8440-2049	8440-2051
5A CT inputs / front panel mounting with display #3		-	-	8440-2050	8440-2052
1A CT inputs / cabinet back mounting w/o display		8440-2055	8440-2057	-	-
5A CT inputs / cabinet back mounting w/o display		8440-2054	8440-2056	-	-
Spare connector kit		8923-1314	8923-1314	8923-1314	8923-1314

#1 selectable senders: VDO (0 to 180 Ohm, 0 to 5 bar), VDO (0 to 180 Ohm, 0 to 10 bar), VDO (0 to 380 Ohm, 40 to 120°C), VDO (0 to 380 Ohm, 50 to 150°C), Pt100, Pt1000, resistive input (one- or two-pole, 2pt. linear or 9pt. user defined)

#2 freely selectable during configuration between CANopen or J1939; please feel free to request more information

#3 a screw and a clamp kit are delivered with the unit for fastening