EUROMARKET

ВХ-Е-424/ 07.02.2022 08:12

До: АЕЦ КОЗЛОДУЙ ЕАД	Изх. No: CIO00028644
E-mail: commercial@npp.bg	Дата: 04.02.2022г.
На вним. на: г-н Христо Пачев	Бр. Стр.: 7

Уважаеми г-н Пачев,

Във връзка с Ваша Покана за пазарна консултация № 48258/04.01.2022г. и съобразно Вашата необходимост от **мобилен дизелов електрогенератор по изпратено от Вас техническо задание,** производство на фирма **KOHLER – Франция**, имаме удоволствието да Ви представим нашето:

ТЕХНИКО-ИКОНОМИЧЕСКО ПРЕДЛОЖЕНИЕ

*Забележка: Настоящето технико-икономическо предложение е само за уточняване на техническите параметри и обща оценка на инвестициите и **не е крайна оферта**. Окончателните ценови нива и начин на плащане подлежат на договаряне след избор и одобрение на техническото предложение от Вас.

Мобилен дизелов електрогенератор за постоянно захранване
Модел T1540, 6 kV

№	Описание	Кол.	Ед. Цена ЕВРО без ДДС	ОБЩО ЕВРО без ДДС
1.	**Доставка на трифазен дизелов електрогенератор KOHLER, модел T 1540**, номинална мощност 1400 kVA / 1120 kW, напрежнение **6000V**, 50 Hz, монтиран в обезшумителен контейнер ISO 40" HC. В контейнера е монтирано следното оборудване: - Двигател MITSUBISHI S12R-PTA2 - Алтернатор KOHLER KH05461T(LSA52.3UL8 /4P C 6/4) с два лагера и клас на изолация H - Обезшумителен ауспух 30 dB(A), монтиран в контейнера - табло с контролер за ръчен старт на дизеловия двигател - резервоар за гориво с обем 3000 лт., осигуряващ 10 ч. автономна работа; - Комплект разпределително устройство за 6kV за защита на алтернатора - Външна клемна кутия, за свързване на кабели Camlock HV *Забележка: Подробно описание на обхвата на доставката ще намерите в края на офертата.	1 бр.	550 000,00	550 000,00
2.	**Доставка на полуремарке, 3-осно, мултифункционално контейнеровозно шаси, пригодено за 40" контейнер.**	1 бр.	49 630,00	49 630,00

ОБЩА ЦЕНА В ЕВРО БЕЗ ДДС:	**599 630,00**

Основни технически данни

Модел на агрегата	T 1540
Тип	Обезшумен тип, в контейнер ISO40" HC
Номинална мощност (PRP), kVA / kW	1400 / 1120
Номинална мощност на обекта, при температура 44^{o}C	1375 / 1100
Максимална мощност (ESP), kVA / kW	1540 / 1232
Напрежение, V	6000
Честота, Hz	50
Фактор на мощността	0.8
Дължина/Ширина/Височина, мм	12192 / 2438 / 2896
Тегло сух, кг.	Ще се уточни в зависимост от окомплектовката
Време за автономна работа (при натоварване 100%), часа	10,0

ОБЩИ УСЛОВИЯ:

- **Цена:** **ЕВРО, без ДДС**
- **Гаранция:** 12 месеца; осигурен гаранционен и извънгаранционен сервиз;

Условия на гаранцията: Гаранцията е валидна от датата на пуск, но не повече от 30 дни от датата на доставка, удостоверена с Приемо – предавателен протокол, при ползване на оборудването като резервно захранване. Оборудването се обслужва от оторизирания от завода производител сервиз, влагат се оригинални части и консумативи и се спазват часовете за сервизно обслужване. Срок за отстраняване на възникнали през гаранционния срок дефекти: до 10 работни дни. В случай, че е необходима доставка на специфични възли и дейтайли, които не са налични при производителя, срока ще бъде съгласуван допълнително.

- **Условие на доставка:** DDP Козлодуй
- **Срок на доставка:** до 30-40 работни седмици. Ще бъде потвърден при поръчка
- **Начин на плащане:** по банков път
- **Условия на плащане:** 30% аванс, 70% -до 30 дни след доставка
- **Производител:** KOHLER - Франция
- **Валидност на офертата:** 30 дни
- **Лице за контакт:** Бисер Ценков, тел. 02/9767201, факс: 02/9767211, моб. 0889219037, e-mail: compressors@euromarket.bg
- **Документи придружаващи стоката при доставка:**
  - **Общи инструкции и инструкции за безопастност**, включващи: Общи препоръки и мерки за безопастност; Общи правила, касаещи инсталирането на дизелови генератори; Общи инструкции, касаещи подготовката на дизеловите генератори преди пукс в експлоатация; Спецификации за техническа поддръжка и/или инструкции за определени опционни устройства;
  - **Ръководство за експлоатация на контролния панел**
  - **Електрически схеми**
  - **CE декларация**
  - **Рапорт за тестване на машина с въздействие на товара**
  - **Ръководство за експлоатация и инструкции за поддръжка на двигателя,** част от дизеловия генератор.
  - **Инструкции за поддръжка на генератора,** част от дизеловия генератор.
  - **Приемо-предавателен протокол**
  - **Гаранционна карта**

ЗАБЕЛЕЖКИ:

1. **В цената са включени:**
   - Доставка до обект на клиента гр. Козлодуй;
   - Зареждане на машината с двигателно масло и охладителна течност;
   - Функционални изпитания, настройка и пуск в експлоатация;
   - Обучение на персонал на клиента за работа с машината;

- Предоставяне на техническа и експлоатационна документация в оригинал/англ. език/.
- 1000 л. дизелово гориво за провеждане на функционалните изпитания на дизелагрегата;

2. **<u>В цената НЕ са включени:</u>**
   - Макара с 20 метра високо волтови кабели;
   - Посещение в завода производител и присъствие на тестовете на машината;

Вземайки в предвид начина на ползване на машината и без да имаме предварителна информация за изискваната спецификация на машината и в частност за документалния и регулаторен аспект, бихме искали да Ви информираме, че тази оферта е ограничена само до елементите, посочени в описанието на обхата на доставката.

Всякакво предоставяне на допълнителни опции или предоставяне на услуги (документален превод, План за тестване, План за контрол на качеството, инсталация, въвеждане в експлоатация и др), които не са посочени в офертата ще бъдат предмет на допълнително остойностяване и оферирane.

Моля, ако имате допълнителни въпроси, не се колебайте да контактувате с нас.

Бисер Ценков
Търговски Мениджър
EUROMARKET
COMPRESSORS & GENERATORS

Основна техническа информация на предложения агрегат:

Модел на агрегата	T 1540
Техническа информация	**Обезшумен тип**
Номинална мощност (PRP), kVA / kW	**1400 / 1120**
Максимална мощност (ESP), kVA / kW	**1540 / 1232**
Честота, Hz	50
Напрежение, V	6000 V
Фактор на мощността, cos ф	0,8
Тегло и размери (мм)	
Дължина	12 192
Ширина	2 438
Височина	2 896
Тегло сух, кг.	Ще се определи в зависимост от окомплектовката
Обем на горивния резервоар, литри	3000
Консумация на гориво	
При 100 % натоварване, l/h	284,0
При 75 % натоварване, l/h	213,0
Двигател	

Марка	MITSUBISHI
Модел	S12R-PTA2
Брой цилиндри	12 - V
Кубатура, cm^3	49 030
Управление на двигателя и оборотите	електронно
Регулиране на оборотите на двигателя в статичен режим	± 0,25%
Диаметър на буталото, mm	170
Ход на буталото, mm	180
Степен на сгъстяване	13,5:1
Охлаждане	водно
Тип на охладителната течност	GLYCOL
Обороти	1 500
Електрическа система	
Напрежение, V	24
Брой батерии	2
Генератор	
Тип	KOHLER (by Leroy Somer)
Модел	KH05461T-6000V-50-S (LSA52.3UL8/4p C 6/4)
Брой полюси	4
Мощност	1380 kVA
Изолация	H
Регулатор на изх. напрежение	D550
Система за възбуждане на генератора	AREP/PMG
Електрическо табло	
Контролни инструменти	
Контролен блок за управление	APM 802
Ръчно стартиране	Да

Подробна техническа информация за машината ще намерите в приложените към офертата файлове от производителя.

ПОДРОБНО ОПИСАНИЕ НА ОБХВАТА НА ДОСТАВКАТА

	ОПИСАНИЕ	Количество
Артикул	Дизелов електрогенератор	1
	Базов дизелов електрогенератор	
	Базов дизелов електрогенератор Т1540 с алтернатор KH05520T-400V-50-S(ECO43-VL/4A).	1
	Ъпгрейд на алтернатора: KH05461T-6000V-50-S(LSA52.3UL8 /4p C 6/4)	1
	Двигател за Т1540	1
	Опции за алтернатора	
	Стандартен кожух с IP 23	1
	Температурна защита PT100 преден лагер на HV алтернатор LSA522	1
	Температурна защита PT100 заден лагер на HV алтернатор LSA522 HTA	1
	Температурна защита PT100 намотки статор на HV алтернатор LSA522	1
	Полу-еластична връзка	1
	Измерителен и защитен токов трансформатор (ANSI 87G)	1
	Напреженов трансформатор – 6000V 50 Hz	1
	Разширителна кутия за LSA522 HTA	1
	Регулатор D 550 и възбуждане AREP за LSA 522 HTA	1
	Възбуждане с постоянно магнитен генератор (PMG)	1
	Подгревател против конденз 500W – 240V за LSA 522 HTA	1
	Охладителна система	
	Защитно устройство за ниво на охладителната течност в радиатора	1
	Радиатор с монтиран вентилатор темп. 50^{o}C	1
	Стартер	
	Базов електрически стартер 24V	1
	Оловни стартерни батерии 24V (4x170Ah) за Т1540	1
	Ключ маса	1
	Алтернатор за зареждане на акумулаторите	1
	Опции за дизеловия електрогенератор и двигател	
	Подгревател за охл. течност в блока на двигателя	1
	Горивен филтър – воден сепаратор	1
	Маслена помпа за предварително смазване на двигателя	1
	Филтриранен на маслоочистител за Т 1540	1
	Ръчна помпа за източване на маслото от двигателя	1
	Въздушен филтър на двигателя	1
	Блок за електронно регулиране на оборотите на двигателя	1
	Защитно устройство за температурата на маслото	1
	Електроннен регулатор PISC	1
	Ауспух	
	1x Компенсатор на изгорелите газове за Т1540 (300)	1
	Конзола на таблото за управление	
	Вградено табло с контролер APM 802 в електрогенератор_A651 ALT_ HV електрогенератор с кратковременна синхронизация и АВР за Т1540	1
	Трифазен детектор за трите фази на мрежовото напрежение	1
	Мрежов комплект (зарядно устройство, подгревател за охл. течност)	1
	APM Индикатор за зарядния ток на батериите	1
	3A- 1V Аналогов пакетен превключател – 1 Freq.-1CH	1
	APM Индикатор температурата на маслото	1
	Индикатор за нивото на горивото за APM	1
	Грешка за налягане на маслото – 2-ро ниво на сигурност	1
	Грешка за температура на охл. течност – 2-ро ниво на сигурност	1
	Аларма за запушване на горивния филтър	1
	Аларма за наличие на вода в горивния филтър	1
	Аларма за ниско ниво на двигателното масло	1
	Аларма за загуба на подгряване на охл. течност	1
	Аларма за ниско ниво на дневния резервоар	1
	Аларма за много ниско ниво на дневния резервоар	1
	Аналогов сигнал 4-20 mA	1

	Допълнителна безопастност	1
	Допълнително ETOR	1
	Четириполюсен прекъсвач 16A за осветлението на контейнера	1
	Електрически клапани 220 Vac – 50Hz или 24 Vdc	2
	Подгрев на контролния панел	1
	Контакти SCHUCO в контейнера	1
	Устройство за звуково предупреждение	1
	Списък на резервни части за електрическото оборудване на таблото	1
	Чертеж на таблото за управление	1
	Основна електрическа схема	1
	Контейнер Energy	
	ISO 40 SI контейнер за T 1540	1
	Механично инсталиране на електрогенератора	1
	Обезшумителен ауспух 30 db(A) в контейнера	1
	Радиатор с вентилатор за T 1540	1
	CSC сертифициран	1
	Решетка Inox 316L за извеждане на топлия въздух с защита срещу дъжд, Д=2.25m x В=2.5m	1
	Отделител на капчици – на отвора за засмукване на свеж въздух	1
	Електрически клапан Class 0 входящ въздух Ш=1900 x В=2400	1
	Електрически клапан Class 0 изходящ въздух Ш=1900 x В=1620	1
	Външна кутия за свързване + женски високоволтови конектори	1
	Двойни врати в края на контейнера	1
	Вертикално звуко-поглъщащо отделение	1
	Вертикално звуко-поглъщащо отделение с единична врата	1
	Двойностенен резервоар за гориво с обем 3000 л с нивопоказател	1
	Тръба за захранване с гориво между електрогенератор и дневния резервоар	1
	Ръчно пълнене с гориво от външната страна на контейнера	1
	Предпазен клапан	1
	Електрически контакт на предпазния клапан	1
	Обезшумяване с Rockwool 50 mm + перфорирани метални листа (40F cont)	1
	Комплект против замърсяване	4
	К-т Високо волтови кабели между разпределителното устройство и външната клемна кутия	1
	К-т Високо волтови кабели между алтернатора и разпределителното устройство	1
	Вътрешно осветление с 4 LED лампи	1
	Аварийно осветление	1
	1 допълнително осветление 220V	1
	Акумулаторна лампа (зареждане в 220V)	1
	Допълнителни контакти 2P+E 10/16A	1
	Отвор за силовите кабели на ниската секция	1
	Разпределително устройство (HV Cells)	1

TECHNICAL OFFER

NPP Kozloduy
Euromarket Compressors

SDMO Industries
Head Office: 270 rue de Kerervern
29490 Guipavas - France
Tel. + 33 (0)2 98 41 41 41
SDMO Industries CS 40047
29801 Brest Cedex 9 - France
www.kohler-sdmo.com

Quote No. S225857-1
01/02/2022

KOHLER

Ref No.: S225857-1
Subject: 1-unit T1540 genset – NPP KOZLUDUY project –

Dear Biser,

Further to your request, please find below our revised offer for the supply of 1-unit 1375 kVA containerized genset for the project mentioned in subject.

The solution of High Voltage mobile container we propose you in this offer has recently been designed and manufactured in our premises. Some units are operating in Northern Europe.

The proposed genset is the T1540 in our ISO40 container version fitted with the Mitsubishi S12R-PTA2 engine and the KHO5461T Kohler double bearing 6 kV alternator produced by Leroy Somer.
The engine is cooled by a mechanical fan driven radiator.

The whole assembly is proposed fitted inside a ISO40 feet container with the following equipment fitted inside :

- a silencer fitted inside the container.
- A 3000 liters daily tank which will give 10 hours of autonomy.
- A set of 6 kV switchgears for protection of the alternator and supply to the user
- An outside connecting box where the user will be able to connect Camlock HV cables

The following items remain out of our scope:

- Reel with 20 meters of HV cables
- Witness test at the factory
- …

Considering the final use of the generating set and having received no prior information on the global scope of supply and in particular on the documentary and regulatory aspect, we remind you that, this offer is only limited to the only elements listed in the description.

Any provision of additional option(s) or provision(s) of service (documentary remittance, Inspection Test Plan and Quality control plan, transport, installation, entry into service, etc.) not specified in our offer will be subject to additional costing on our part.

Yours faithfully

Jean-Christophe LANDURÉ

Заличено на основание ЗЗЛД

Contents

I. Technical description

This document describes the supply of 1 x T1540 generating set of rated power 1400 kVA.

Engine General Data	Specifications as per NF ISO 3046-1 standard. Complies with US EPA Tier 2 standards.
Brand	MITSUBISHI
Model	S12R-PTA2
Number of cylinders and arrangement	12 V
Engine mechanical power	1195 kWm
Alternator General Data	Specifications as per IEC 60034.
Brand	KOHLER
Model	KH04890T
Prime rated power @ 40°C	1380 kVA @ 40°C H / H

Site climatic conditions

Outside minimum temperature	0 °C
Outside maximum temperature	45 °C
Altitude	33 m

** The generating set is available with a prime power rating (PRP): Available in continuous operation under variable load for an unlimited number of hours per year, as per ISO 8528-1 standard.*

*** Engine reference may be partially modified depending on genset application, options selected, and lead time required.*

Rated power of the generating sets on site: 1100 kW - 1375 kVA at 44°C

Rated power factor: 0.8

Rated frequency: 50 Hz

Rated voltage: 6000 V

The technical description below is defined for one generating set.

1. ENGINE

The generating set will be equipped by a MITSUBISHI, S12R-PTA2 engine, 12, V, including the following equipment:

Refer to the specifications as per IEC 60034 standard in appendix.

Included additional engine options

- Semi-flexible coupling between the engine and the two-bearing alternator, engine/alternator connected via flexible flector coupling
- Intake air filter: this system should be necessary to supply clean air to the engine.
- Engine coolant pre-heated by a self-regulated resistor incorporated to the engine block
- Primary fuel filter installed upstream of the standard filtration for the separation of water in the engine fuel supply
- Electrical pre-lubrification pump
- Oil snifter for MITSUBISHI S12 & S16 engines
- Manual pump mounted on the engine allowing for easy drainage of the oil sump
- Electronic engine speed regulator including a logic controller, injection pump with actuator and speed measurement sensor mounted to the engine bell
- Replacing the basic controller with a PISC speed controller
- Emergency engine oil temperature sensor for the transmission of temperature information to the control unit for immediate stop

Starting up

- Electric starter
- Battery charging alternator
- 24 Volt lead starter batteries
- battery isolator switch for battery circuit 1

2. ALTERNATOR

The generating set will be equipped with an alternator Prime rated power **1375 kVA** @ 40°C, including the following equipment :

- 1 PT 100 sensor for Front alternator bearing
- 1 PT 100 sensor for Rear alternator bearing
- 1 set of 3 PT 100 sensors immersed in the alternator stator
- 3 current transformers
- 3 Voltage transformers inside the alternator box for 6000 V:√3/100V:√3 - 15 VA - cl.0.5
- Excitation system AREP
- Voltage regulator D 550
- Excitation system by the permanent magnet generator (PMG) allowing the machine a short-circuit current overload capacity of 3 IN during 10 seconds
- Alternator heating resistor 500W - 240Vmax

Refer to the specifications as per IEC 60034 standard in appendix.

II. HV Embedded cabinet

1. DESCRIPTION OF THE APM802

The APM802 enables user-friendly, ergonomic and autonomous operation of generating sets and power plants.
12-inch color touch screen
Navigation system
100% usable without the need for an external computer
Languages: French, English, Spanish, Portuguese, German, Dutch, Russian
The APM802 manages:
Control of the genset and/or the power plant in both manual and automatic mode, as well as tests off load or on load.
Mechanical and electrical measurement displays
Status and time-stamped event displays (up to 1000 events)
Adjustment of parameters accessible to the customer (timers, etc.)
The APM802 comes with built-in:

Embedded cabinet APM802 on genset.

software, accessible from an external computer, a tablet or smartphone, used for modifying certain parameters and displaying the APM802 data.
Configuration of site specific functions
The APM802 is designed for operation under the following conditions:
Operating temperature - 20°C to + 60°C
Humidity: 93% at 40°C
The APM802 is protected:
Protection index on front: IP65
Electronics protected against dust and humidity with tropicalized varnish

1.1. Ergonomics, user-friendliness and convenience of the APM802

Overview display | Detailed display | History/Trends

The ergonomics have been completely redesigned for improved user-friendliness and convenience.
The user is guided through how to operate the product according to their access level, making it easy to get started and reducing the risk of errors.

1.1.1. 3 profiles defines: User, Operator or Specialist



PROFILE	USER	OPERATOR*	SPECIALIST*
ACCESS	System monitoring	Trained in power plant operation	Trained by KOHLER-SDMO and approved partner
		End customer or maintenance company	
		Maintenance of wearing parts	Start-up, assistance, programming

**Profiles can be accessed using a password*

1.1.2. Mobile supervision (Please refer to optional communication)

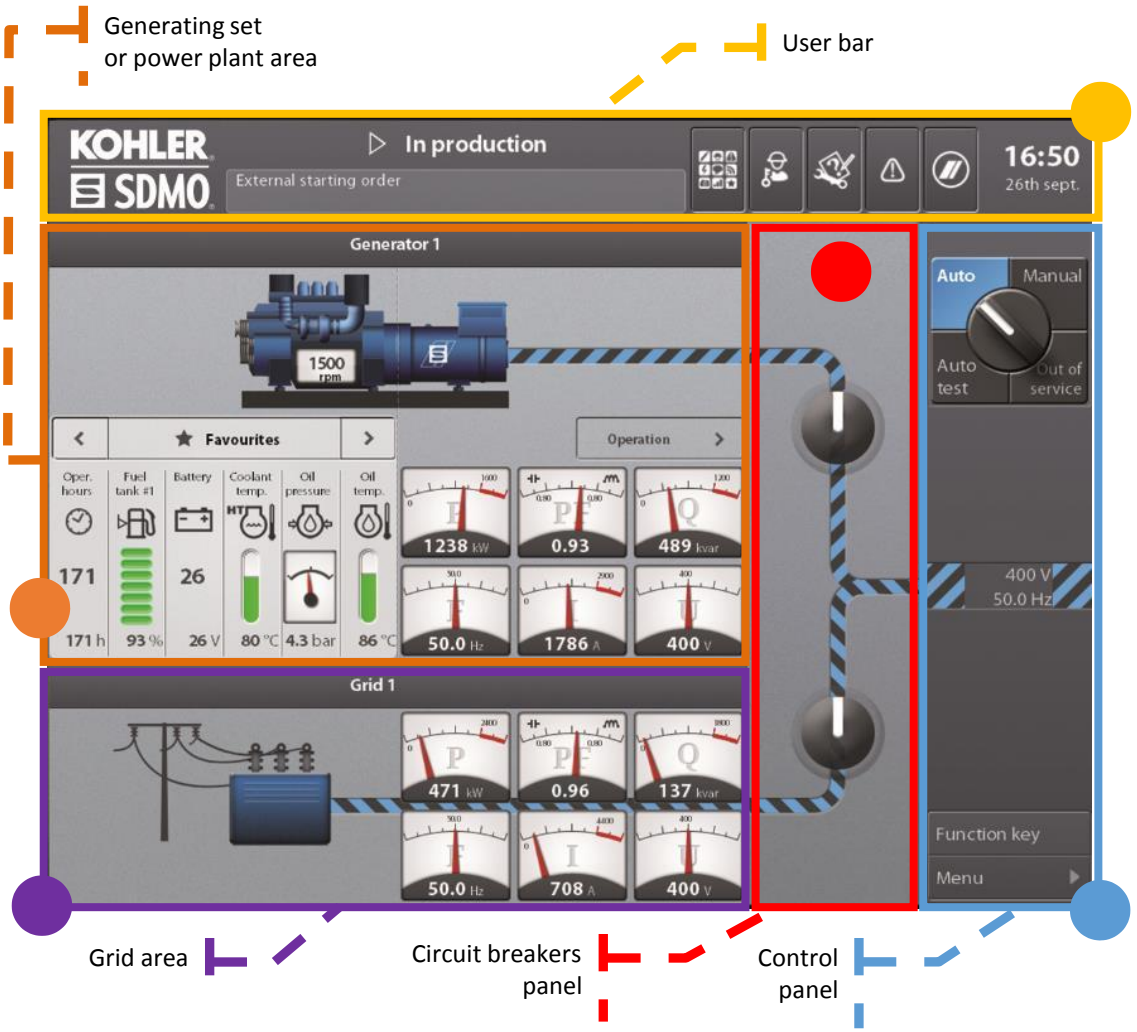

Remote access is easy in terms of the display and getting started with the installation (service, user).

1.2. Operating the APM802

Representation area Whatever the HMI **configuration**, the "**operation**" screen is always divided into 5 very distinct parts.
The example below shows a "**single generating set with grid**" configuration.

1.3. Operating the APM802

Representation area Whatever the HMI **configuration**, the "**operation**" screen is always divided into 5 very distinct parts.
The example below shows a "**single generating set with grid**" configuration.



1.3.1. User bar

The user bar is divided into 3 parts or screen areas:

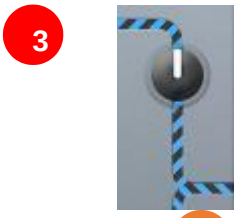
- Generating set, power plant and grid status messages
  - Generating set status
  - Time delay countdowns
  - Event displays, e.g.: external starting order, etc.
- Area with 5 keys:
  - Direct access to "User applications"
  - Identification for a password protected "Operator" access level
  - Access to maintenance functions
  - Access to all events, alarms and faults time-stamped for consultation, analysis and processing:
    - Oil pressure
    - Engine coolant temperature
    - Overspeed
    - Fail to start
    - Alternator protection triggered
    - Emergency stop triggered
  - Back to "Operation" screen
- Date and time display

1.3.2. Control panel

The control panel is divided into 5 parts or screen areas:

- Control and operation mode area: Auto, Manual, Auto test & Out of service
- Voltage and frequency indication during use
- Function key:
  - Access specific commands, if programmed
- Menu key:
  - Access the settings required for any aspect of generating set or power plant operation.
  - Complete display of all mechanical and electrical measurements (generating sets, power plant and grids)
  - Display of the history of all the electrical and mechanical values
    - Energy meters:
      - One active energy meter
      - One reactive energy meter
    - Counters:
      - A generating set operating hours meter
      - A generating set starting sequence meter
  - Run diagnostics on the status of any logic input and input, analog input or system input.
  - Complete system configuration (application, regulation, protection)
  - Description of complete system architecture

1.3.3. Circuit breakers panel



- Representation area of part of the electrical installation located downstream of the generating set, power plant and grid transformer.

1.3.4. Generating set or power plant area

- Generating set number or power plant name indicated in the title bar
- Generating set Start/Stop button present in Manual mode
- Alternator connection display – live and on load protection.
- Mechanical values display
- Electrical values display

1.3.4.1. Genset mechanical values

- Engine mechanical values
- Engine speed
- Oil pressure
- Coolant temperature
- Starting battery voltage
- Etc.

1.3.4.2. Generating set or power plant electrical values

- Electrical measurements of:
  - 3 line-to-neutral voltages
  - 3 line-to-line voltages
  - 3 phase currents
  - Alternator frequency
  - Active power per phase and overall active power
  - Reactive power per phase and overall reactive power
  - Power factor (Cos phi) per phase and average power factor
  - Voltage, frequency and phase differences for synchronisation

1.3.5. Grid area

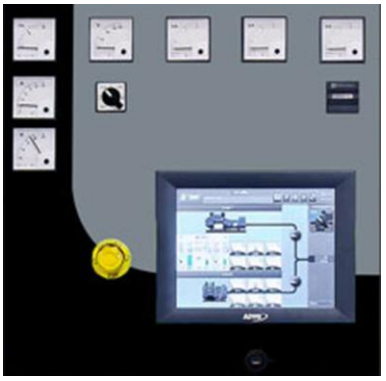
- Grid number indicated in title bar
- Grid connection display – live and on load protection.
- Electrical values display

1.3.5.1. Grid electrical values

- Electrical measurements of:
  - 3 line-to-neutral voltages
  - 3 line-to-line voltages
  - 3 phase currents
  - Alternator frequency
  - Active power per phase and overall active power
  - Reactive power per phase and overall reactive power
  - Power factor (Cos phi) per phase and average power factor

1.4. Front of embedded cabinet

1.4.1. Equipment



HMI (Human Machine Interface)
Selecting the various modes:
Manual
Auto
Auto test
Test off load
Test on load
End test
Out of service
Controlling the power supply devices (if motorised):

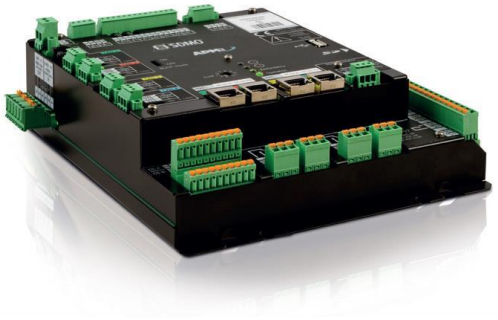
Closing the generating set power supply device
Opening the generating set power supply device
Closing the grid power supply device
Opening the grid power supply device
Stopping sound alarm
Acknowledging faults
Programming via touch screen, for:
Adjusting the parameters
Programming additional functions
Settings accessible via touch screen
A "genset emergency stop" push-button with a protective cover that locks when pressed

Measures additional equipment:

Additional 1 battery ammeter(s) installed on the front of the cabinet
analogue pack comprising:
3 dial-type ammeters installed on the front of the cabinet
1 dial-type voltmeter with a 7-position selector switch installed on the front of the cabinet
1 needle type frequency meter installed on the front of the cabinet
1 hour meter installed on the front of the cabinet
supply and installation of an oil temperature indicator (diameter 52) on the front of the control panel
fuel level indicator for APM.

1.4.2. Inside

1.4.2.1. A base module which manages the entire generating set



BASE Module

Main functions of base module:

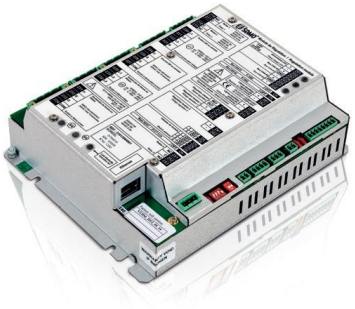
Executes the automatic function via integrated and application software
Manages the system communications
Manages the external communications (Modbus, Web)
Manages and saves the operating configuration
Saves up to 1000 time-stamped events (statuses, alarms, faults)
Provides and checks stabilized power supply to the HMI

Base module: Inputs and outputs

1 pick-up analog input (speed detection)
2 battery current analog inputs
One 24 VDC power supply input
4 resistive inputs
3 analog inputs, 1 of which isolated
18 digital inputs
One 24 VDC HMI power supply output
2 analog outputs, 1 of which isolated
18 relay outputs

Base module: Communication ports
4 CAN buses, of which 1 bus isolated
2 system Ethernet ports (intercommunication connection)
1 Ethernet port for user (e.g.: Connection for supervision)
1 HMI Ethernet port
1 isolated RS 485 serial link (e.g.: Connection for supervision)

1.4.2.2. A « Regulation card » Module



Main functions of regulation module:
Manages electrical measurements
Manages speed and voltage regulation
Manages synchronization, parallel operation and distribution
Manages power setpoints
Manages generating set, power plant and grid protection
Connection with the base module via CAN bus port
Synchronization and parallel operation:
Frequency regulation (with centering in isolated operation)
Voltage regulation (with centering in isolated operation)
Power factor regulation
Active power regulation
Reactive power regulation
Analog distribution of P and Q
Digital distribution of P and Q
Droop (Hz/V)
Grid detection:
Three-phase power cut detection
Rotating magnetic field checking
Protection:
(ANSI 49) thermal image
(ANSI 50) alternator overload
(ANSI 32PQ) Maximum reactive power
(ANSI 32PH) Maximum active power
(ANSI 32PL) Minimum active power
(ANSI 32RP) Active power reverse
(ANSI 32RQ) Reactive power reverse or excitation loss
(ANSI 78) Vector jump
(ANSI 81R) DF / DT
(ANSI 27) Minimum voltage
(ANSI 59) Maximum voltage
(ANSI 81L) Minimum frequency
(ANSI 81H) Maximum frequency
(ANSI 68L/H) Power supply voltage min/max checking

1.4.2.3. A « Safety guard » Module

Additional protection:
(ANSI 21) Minimum impedance
(ANSI 46) Maximum current negative component
(ANSI 51V) Maximum phase power at restraint of voltage
(ANSI 51N) Homo-polar current
(ANSI 59N) Homo-polar voltage

Protection Module

1.4.2.4. The module with 8 logic inputs and 4 logic outputs required for the application

1.4.2.5. Permanent isolation controller

an EM9 or similar permanent isolation controller (LV link between alternator and step-up transformer in IT neutral system)

1.4.3. Additional equipment

Mains pack:
A 3-phase control relay for **mains failure detection** (undervoltage and overvoltage, phase sequence, phase fault detection, asymmetry), adjustable trip thresholds +2 to + 20% in the range of 220 to 440 V AC, adjustable time delay 0.1 ... 10 s, +/- 10%

- Regulated charger of battery 24 V allowing to maintain the battery in good load conditions
- Driving preheating by resistance on the cooling circuit

Mechanical protections:

- 2nd level oil pressure safety device fault with:
  - 1 digital fault input(s) on APM802
- 2nd level coolant temperature safety device fault with:

1 digital fault input(s) on APM802

- Fuel filter clogging alarm
- alarm for water presence in the fuel filter
- oil low level alarm
- pre-heating temperature not reached alarm with 1 digital fault input(s) on APM802
- daily service tank low level alarm with 1 digital fault input(s) on APM802
- daily service tank very low level alarm with 1 digital fault input(s) on APM802
- **Auxiliary output:**
- container lighting unit output including 1 protection(s) per circuit breaker 16A
- start for container's security lighting
- 24Vdc power supply protection for motorized damper
- 230Vac protection for motorized damper power supply
- a digital output on APM802 for motorized damper control
- control panel preheating start
- SCHUKO domestic sockets
- **Miscellaneous and accessories:**
- buzzer
- parts list for electrical equipment in the cabinet
- cabinet terminal block drawing
- main wiring diagrams

1.4.4. Reports

This information is transmitted via dry potential-free contacts (specifications: 8A, 240 VAC, AC1)

- generator unavailable in automatic
- fault report
- alarm report
- generating set run
- Other information to be confirmed during studies

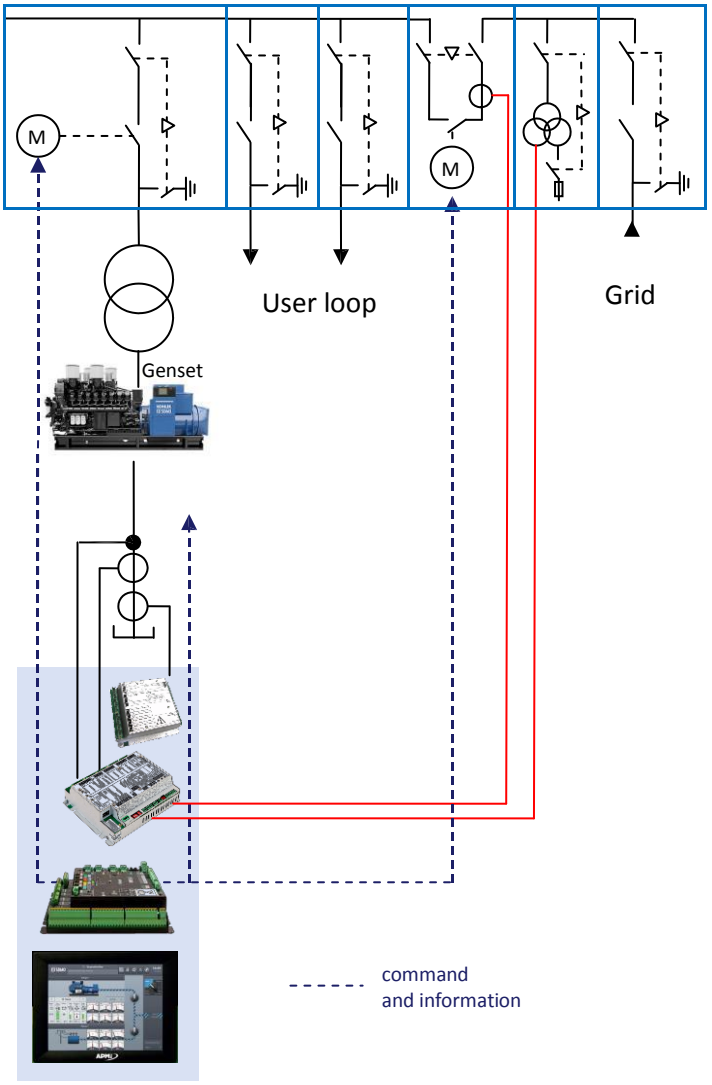
analogical remote(s) 4-20 mA including:
1 logic output(s) APM802 wired on terminals

- additional safety device comprising:
  - 1 digital fault input(s) on APM802

additional ETOR

2. A651 HIGH VOLTAGE CONFIGURATION WITH CABINET EQUIPPED WITH AN APM802

Designed to operate with a generating set in case of grid power cut.
In this configuration, the cabinet enables automatic starting of the generating set.
Temporary grid parallel operation enables:
operation to be restored without cutting off the installation
a test for testing without cutting off the installation
Designed to operate with a generating set **with temporary grid parallel operation, with load transfer and without cut-off.**



2.1. Functional description

This offer covers the supply of a generating set power plant cabinet designed to provide:

- emergency electrical supply to an installation following grid loss. The grid will be restored via temporary coupling with load transfer, and without cut-off.
- FORCED RUN operation on genset

2.2. Automatic operation

- **Loss of grid voltage**
  - grid loss adjustable acquisition time delay
  - generating set start demand
  - genset speed increases
  - alternator excitation
  - grid power supply device opened
  - genset power supply device closed after the voltage and frequency have stabilised
- **Grid voltage restoration**
  - grid restoration adjustable acquisition time delay
  - genset-grid synchronisation
  - grid power supply device closed
  - power transfer to the grid
  - genset power supply device opened
  - cooling time delay
  - genset shut down and set to standby

2.3. FORCED RUN operation (remote operation)

This operation mode is authorised in automatic mode. The operator has the option of starting up and shutting down the generating set via remote operation. The generating set safeties are active in this operation mode.

- **Start of FORCED RUN operation**
  - generating set start demand
  - genset speed increases
  - alternator excitation
  - genset-grid synchronisation request
  - genset power supply device closed
  - power transfer to the generating set
  - grid power supply device opened
- **End of FORCED RUN operation**
  - genset-grid synchronisation
  - grid power supply device closed
  - power transfer to the grid
  - genset power supply device opened
  - cooling time delay
  - genset shut down and set to standby

The installation is supplied by the grid.

2.4. MANUAL operation

This operation mode is selected by pressing the MANUAL button. The operator has the option of starting up and shutting down the generating set via the HMI. The generating set vital safeties are active in this operation mode.

The operator is responsible for this operation mode.

2.5. TEST operation for testing

This operation mode may be regularly used for operating checks.
The system is set to **Automatic** mode
The genset is started up and shut down using the **test off load/test on load/end test** keys, after setting the system to **Automatic Test** mode

- **Test off load**

This operation mode is selected on the APM802.
The duration of this test depends on when the end test button is pressed, or by default after a 10 minute time delay.

This operation makes it possible to run a genset starting test without a genset power supply device closing command.
Upon grid loss, the automatic function operates in the same way as automatic selection.

- **Test on load**

This operation mode is selected on the APM802.
The duration of this test depends on when the end test button is pressed.
This mode is used to test the complete execution of the genset automatic function as a FORCED RUN operation.
Upon grid loss, the automatic function operates in the same way as automatic selection.

III. 1 x 1 ISO 40 Silent High Cube Base Container

The technical description below is defined for one container.

The CONTENERGY concept offers a range of soundproof containers with a large selection of additional options or special arrangements to meet customers' needs.
Due to their standard dimensions, CONTENERGY containers are easy to transport and, once they are on site, they are very easy to install on an outdoor slab.
With its integrated cooling system, silencers and sound traps, the CONTENERGY is very cost effective and particularly autonomous, as its fuel capacity allows for quick operation.

1. STANDARDS AND REGULATIONS

ISO 668 Series 1 freight containers – Classification, dimensions and ratings
NF 90-005 – Series 1 freight containers – Corner fittings
NF ISO 1496-1 (ISO 8323) – Series 1 freight containers – Specification and testing – part 1: General cargo containers for general purposes.
This type of container is granted CSC Approval (Container Safety Convention) provided that the container's design has not been modified.

2. EQUIPMENT INSTALLATION

- Installation of the generating set inside the container

3. DIMENSIONS (EXCLUDING ADDITIONAL EQUIPMENT)

The container's dimensions comply with the standard NF 1496-11 5 ISO 8323, unless otherwise specified by KOHLER's drawings or nomenclature.

The containers will be built in EN 10025 S 235 JR steel.

Length:	12 192 mm
Width:	2 438 mm
Height:	2 896 mm
Weight:	Depends on the type of generating set

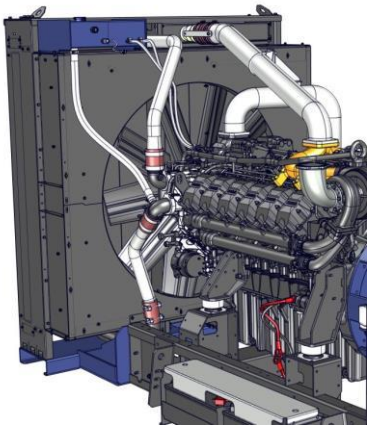
4. EXHAUST

- supply of 1 internal cylindrical silencer of approx. 30 dB(A)
  This silencer is installed on the container roof with the addition of a column base at each silencer outlet allowing to evacuate smokes upright.

5. COOLING

5.1. Specification

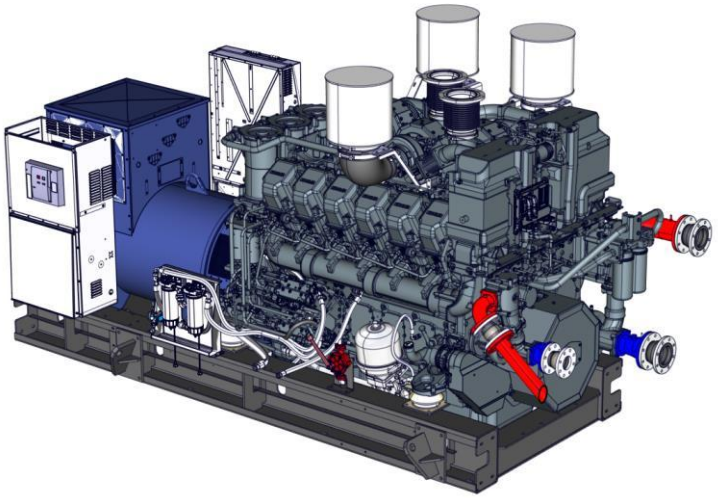
coupled two-circuits radiator with expansion tank and cap including:
fan driven by the diesel engine
water cooling battery
air cooling battery coolant
drain plug protective grid
for the fan connection
hoses

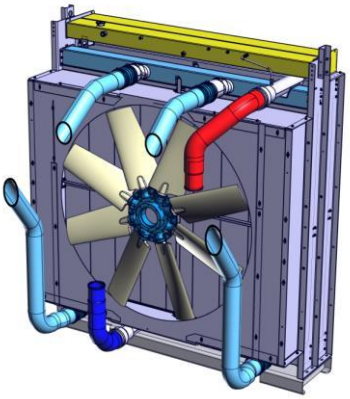


Radiator & Engine capacity	300 L
Fan power	30 kW
Fan air flow w/o restriction	25.9 m3/s
Available restriction on air flow	20 mm H2O

5.2. Working diagram

Cooling principle with two-circuit radiator:





6. SOUND INSULATION

Our power containers are made soundproof via:
Treatment of the ceiling by the installation of 50mm-thick mineral wool soundproof and fire-resistant panels (grade M1 minimum)
Treatment of walls or floor depending on noise level requirements
This mineral wool is covered with perforated sheet metal with a thickness between 0.5 and 1 mm.
The sound traps are in mineral wool covered with a surfacing mat. A fixed lip is made to reduce load losses.

7. CONSTRUCTION AND METALWORK

Our containers have single-panel doors on either side to enable easy access to the control panel.
Metalwork dimensions shall not exceed the container's dimensions as specified in the standards ISO 668 and ISO 1496-1.
Air inlets and outlets are protected by:
A soundproof and rainproof grid at the air inlet equipped with a bird guard
A grid (standard on all containers)
the floor is made up of EN 10025 S 235 JR steel bulb plates
8 corner fittings in compliance with ISO standards

ADDITIONAL MATERIALS

Ventilation:
2 stainless-steel dampers equipped with motor-driven blades preventing air circulation. These dampers are installed at the container's air inlet.
1 damper equipped with motor-driven blades preventing air circulation. This stainless-steel damper is installed at the container's air outlet.

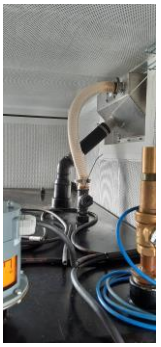
Mechanical equipping :

supply and installation of 3 extra soundproof modified single doors
supply and fitting of an extra double door at the end of the container
supply and fitting of a dedicated door for access to the control panel
retention tank for 40 F container with leak detector designed to
collect any fluid in case of leak
fixed frame for transformer with retention tank
transformer mesh protection around the transformer

Fuel circuit equipping:
supply and fitting of a 3 000 liters fuel tank with its retention bund
1 x 2 fuel pumps (1 m3/h) driven by an electric motor for the automatic filling of the daily service tank.
The level gauges provide information to the pumps for starting or stopping.
Emergency operation from one pump to the other.
Shut-off valves installed on the fuel system.
fuel supply and return pipework between the daily service tank and the generating set installed in the container cavity in the side of the container with connection pipe fitted with a cap to enable the supply of fuel to the tank from outside the container

- system blocking fuel inlet when the tank is full
- 1 fuel shut-off valve between tank and engine

1 main cut-off valve with remotely piloted position contacts



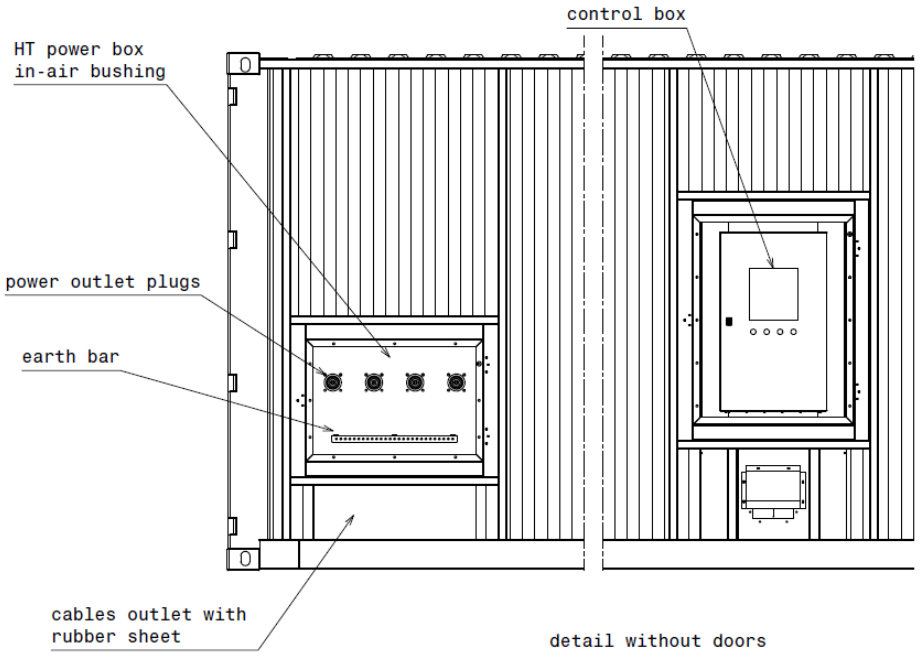
Additional equipment for soundproofing:

- walls of the 40 F container fitted with 2 mm-sheet metal + 50 mm rockwool panels and perforated sheet metal with a finishing coating. This reduces the noise level

HV CONNECTION BOX

Supply of a connection box fitted with HV power outlet plugs and earth bar.

This box has a lockable window.



8. TREATMENT AND PAINTWORK

treatment before painting:
One coat of zinc-rich anti-rust primer
One coat of polyurethane primer
paint with polyurethane finish for the container following the RAL 9010 base

9. LIGHTING INSIDE THE CONTAINER

standard offer: box including a timer to switch off the lights after 15-20 min
a light switch by the door inside the container
a bulkhead light with a 100 W 24 V lamp
transformer installation
auxiliary connection of the additional materials (Unit)
replacement of 2 spots by 4 led bars
security lighting
Supply and installation of an additional bulkhead light
1 220 V 50/60 Hz rechargeable portable lamp(s) placed on a fixed stand

- Supply and installation of 1 additional socket outlet 2-pole + earth 10/16 A
- Special cut-out in the floor of the container for the passage of electric cables

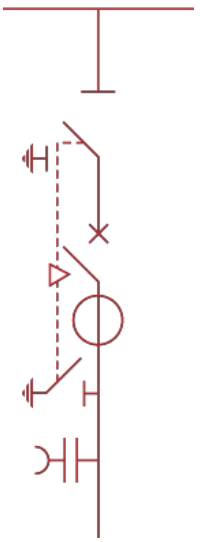
IV. HV cells and transformers

SCHNEIDER cells or similar

Basic cell using SF6 technology, Ith 12.5Ka_1s AI 12.5ka_1s
The switchboard assembly contains the end panels, manuals and crank
Each cell is equipped with an anti-condensation heater
The auxiliary contacts for the HVA circuit breakers and switches are included
The cells are configured for 1 HVA cable per phase

1. 1 X EQUIPMENT FOR AN MV POWER PLANT INCLUDING:

1 DM1-A cell

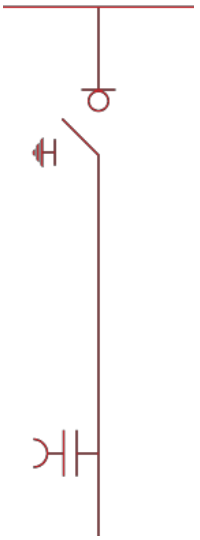


Generating set output: 400 A circuit breaker and 400 A busbar

Triple pole busbar
Disconnector and upstream earthing disconnector
Downstream earthing disconnector
CS disconnector control
Disconnectable SF1 circuit breaker
RI circuit breaker control
Auxiliaries contacts on circuit breaker (4O + 4C)
Mechanical interlock between the circuit breaker and disconnector
voltage on indicators
Connection adapters for dry cables (from underneath)
Heating element - 50 W 220 V 50 Hz
DM1-A basic dimensions: width 750 mm

- 1 current measurement(s), 3 cl 0.5 5P CT
- raised base limited to Al 12.5 kA 0.7 s
- 1 CSH 200 homo-polar current measurement(s)
- 1 SEPAM S40 protection relay
- Motorization with cut-out component with opening and closing coils

1 IM cell



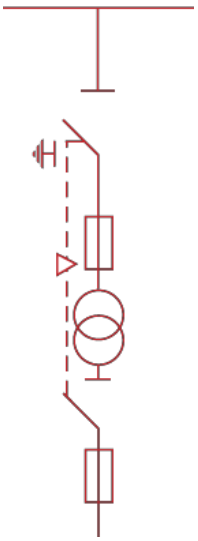
Mains power input: 400 A switch and 400 A busbar

Triple pole busbar
Earthing disconnector and switch
CIT switch control
Voltage on indicators
Connection adapters for dry cables from underneath
Heating element - 50 W 220 V 50 Hz
IM basic dimensions: width 375 mm
IMC basic dimensions: width 500 mm

- 1 current measurement(s), 3 cl 0.5 5P CT
- raised base limited to Al 12.5 kA 0.7 s

1 CM cell

50 A disconnector



Triple pole busbar
Disconnector and earthing disconnector
Downstream earthing disconnector
CS disconnector control
Mechanical signaling of blown fuse
Disconnector for LV circuits
LV fuses
3 UTE or DIN 6.3 A fuses
3 potential transformers (phase/ground)
Heating element - 50 W 220 V 50 Hz
Connection from underneath
CM basic dimensions: width 375 mm

- raised base limited to Al 12.5 kA 0.7 s

Example of previous job of HV mobile container manufactured for electricity company

V. Services

1. DOCUMENTATION

1.1. 1 French or English or Spanish or German documentation delivered in paper and USB device

The documentation supplied with the generating set(s) specifies the operations for use and maintenance of the generating set or the power plant.
This documentation provides information on the equipment, guides the user in operating and maintaining the equipment on a daily basis or periodically. The documentation relating to motors and alternators installed in the generating sets includes operating and maintenance instructions for the motors (from the manufacturer) and for the alternators (from the manufacturer).
The documentation consists of:
General and safety instructions, containing the following information:
General recommendations and safety requirements
General rules relating to the installation of generating sets
General instructions relating to the preparation of generating sets prior to commissioning
Maintenance specifications and/or instructions for certain optional pieces of equipment
User manual for the control panel (if applicable)
Wiring diagrams (these diagrams are supplied with the documentation or delivered with the generating set)
CE certification (if the equipment was sold under this application)
Test reports with load impacts
Operating and maintenance instructions for the engine forming part of the generating set
Maintenance instructions for the alternator forming part of the generating set

2. SPARE PARTS

"SERVICE FIRST" is a package enabling to reach the first maintenance level for the engine and includes :

- Oil filters
- 1 basic GO filter
- 1 air filter and water and GO pre-filter (depending on the assembling)

VI. Appendix

1. REFERENCE FRAME OF DIRECTIVES, STANDARDS AND REGULATION RELATING TO GENERATING SETS

Directives

Machinery Directive	2006/42/EC
Low Voltage Directive	2014/35/UE
EMC Directive	2014/30/UE
Outdoor Directive	2000/14/EC
RoHS 2 Directive*	2011/65/UE

Standards

General data on Generating sets

Engine power	ISO 3046-1
Performances, genset classes of application, methods of application, etc.	ISO 8528-1 to 10
Generating set safety	EN ISO 8528-13
General safety principles	ISO 12100
Electrical equipment of machines	IEC / EN 60204-1

Engine

Exhaust emissions measurement	ISO 8178
Engine safety	EN 1679-1

Alternator

Electric rotating machinery	IEC 60034

Electrical equipment

Electrical protection	
Switchgear and controlgear	IEC 60364-4-41
Low-voltage switchgear and controlgear	ISO 8528-4
Low-voltage switchgear and controlgear assemblies	IEC 60947-1 à 3 EN 61439-1
Degrees of protection provided by enclosures (IP code)	IEC 60529

Regulation

EC Regulation concerning the recording, the evaluation and the authorization of chemical substances, as well as the limitations applicable to these substances (REACH)	1907/2006/EC

**except the following generating sets: J250K-V275C2-V250U.*

2. CHARACTERISTICS OF FLUIDS

To guarantee the good working order of the generating set, the characteristics of fluids specified below must be adhered to.

2.1. DISTILLATE FUEL

Fuels	Designation	Details	Restrictions
ASTM D975	ASTM D975 1D (Road) ASTM D975 2D	0,0015 % Sulphur	Max HFRR 460 µm
		0,05 % Sulphur	Max HFRR 460 µm Without AEG
		0,5 % Sulphur	
EN590	EN590	Road diesel CSR 4.0.05	Biodiesel blend < 10%
		Non road diesel CSR 4.1.03	
BS2869 2010	BS2869 2010 class A2	Non Road use Diesel 0.001% sulphur content	Biodiesel blend < 10%
DFO	DFO available in France*	CSR 4.4.06 DIN51603	Without EATS Improve fuel pre-filtration with a water separator type pre-filter between the main storage tank and the day tank.
Bio diesel	On consulting		
Military grade fuels	On consulting		

- 0.5% sulphur = 5000 ppm and 1% sulphur = 10000 ppm.
- EATS = Exhaust After Treatment System.
- HFRR (High Frequency Reciprocating Rig) : testing method used to evaluate the lubricating properties of diesel fuels.
- DFO: Domestic fuel oil

**The engines performances will not be guaranteed, a power loss and a consumption increase can occur with an impact on the emissions.*

For regions with cold weather conditions, it is necessary to make sure that the fuel chosen with the supplier is compatible to avoid congeal and starting issues.

2.2. OIL

GENLUB EVOLUTION 15W-40 or similar*

Oil category	Minimum Standards	Recommended viscosity class
Oil category 2	ACEA E4 or ACEA E7 API CI-4 Plus	SAE 5W-40 SAE 10W-40 SAE 15W-40**
Oil category 3	ACEA E4-12	SAE 5W-40 SAE 10W-40

**For any other product, an approval of the manufacturer is necessary*
*** To use the 15W-40 oil, it is necessary to plan an engine water preheating for the series K175.*

Without engine preheating, it is possible to use the SAE 10W-40 or 5W-40.

2.3. COOLANT

GENCOOL PC-26 or similar:
- ready for use, high protection
- with Glysantin G48 antifreeze and inhibitors, nitrite, amine and phosphate free
- clear fluorescent orange liquid, conforms to the standard NF R 15.601

**For any other product, an approval of the manufacturer is necessary*

3. ENGINE

Specifications as per NF ISO 3046-1 standard

General Data

Brand	MITSUBISHI
Model	S12R-PTA2
Number of cylinders	12
Cylinder arrangement	V
Cylinder capacity	49.03 L
Stroke	180 mm
Bore	170 mm
Rated RPM	1500 tr/min
Piston speed	9 m/s
BMEP	19.5 bar
Compression ratio	13.5 ; 1
Engine mechanical power	1195 Wm
Charge Air coolant	AIR/WATER
Engine regulator	ELEC
Regulation	+/- 0.25 %

Fuel system

Maximum fuel pump flow	588 L/h
Max. restriction at fuel pump	1 m
Max head on fuel return line	2 m

Consumption with cooling system

Consumption 100 % PRP	202 g/kWh 284 L/h
Consumption 75 % PRP	202 g/kWh 213 L/h

Lubrication System

Oil capacity	180 L
Min. oil pressure	2 bar
Max. oil pressure	6.5 bar
Oil sump capacity	150 L

Air intake system

Max. intake restriction	400 mm H2O
Intake air flow	1750 L/s

Exhaust system

Heat rejection to exhaust	898 kW
Exhaust gas flow (PRP)	4217 L/s
Max. exhaust back pressure	600 mm H2O

Cooling System

Température ambiante de calcul	40°C
Chaleur rayonnée	92 kW
Chaleur rejetée dans l'eau HT	769 kW
Température d'eau en sortie	95 °C
Type de réfrigérant	GLYCOL
Début d'ouverture thermostat HT	71 °C
Pleine ouverture thermostat HT	85 °C

4. ALTERNATOR

See attached alternator data sheet

NPP KOZLODUY project

Sizing Program report

Version CDC1.14_BDM2.8

Euromarket Compressors
Biser Tsenkov
Sales Manager
compressors@euromarket.bg

Operating conditions

Altitude	33 m
Operating temperature	40°C

Requested electrical data

Requested class*	G4
Requested frequency (Hz) *Fn*	50
Max frequency dip	30 % of Fn
Frequency recovery time (s)	20
Requested volatge (V) *Un*	6000
Max voltage dip	30 % of Un
Voltage recovery time (s)	20

*** According to ISO 8528-5*

Comments

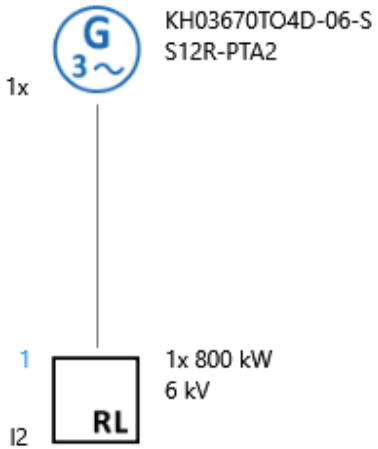
Summary

Number	S225687-1
Indice	1
Creating date	01/02/2022
Writer	Jean-Christophe LANDURÉ
Phone	+33 685 22 08 17
Email	jean-christophe.landure@kohler.com

1. Loads to supply

	Load type	Name	Label	Power (kW)	Power Factor	Quantity
Step n°1	Linear load	L1	resist	800	1	1

2. Single line diagram



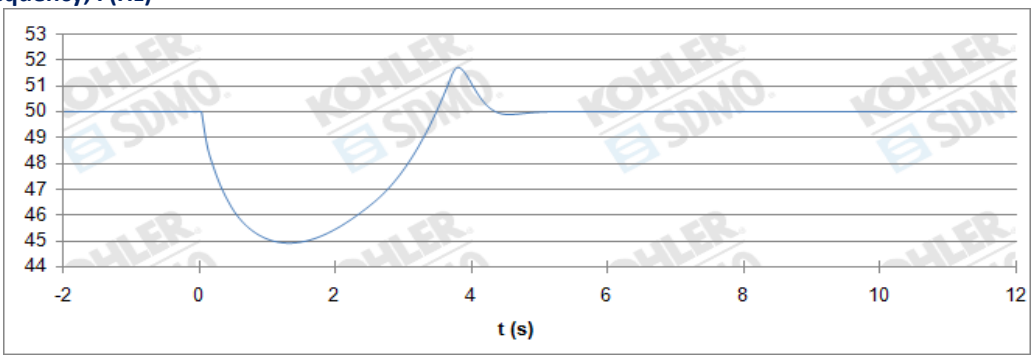
3. Step1

Load type	Name	Label	Power (kW)	Power Factor	Quantity
Linear load	l2	resist	800	1	1

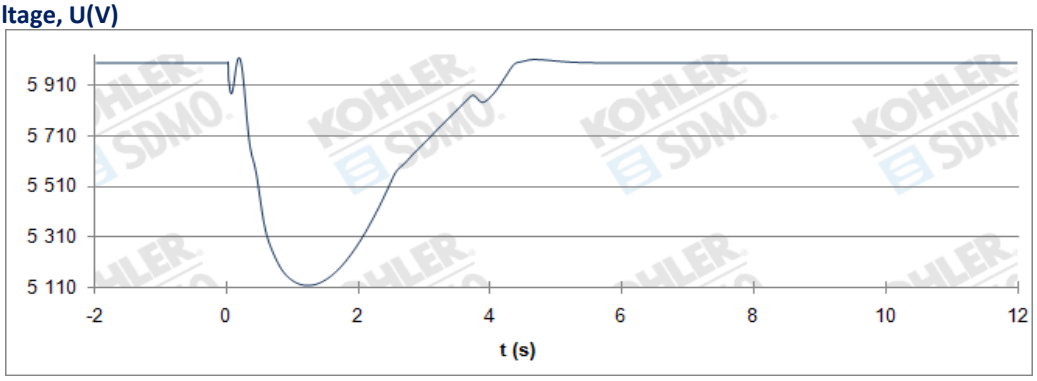
Results

Steady state			Impact			
Active power	800.00	kW	Frequency dip	10.15	%	44.92 Hz
Apparent power	800.00	kVA	Voltage dip	14.69	%	5 118.56 V
			Frequency recovery time	4.12	s	
			Voltage recovery time	4.19	s	

Alternator frequency, F(Hz)

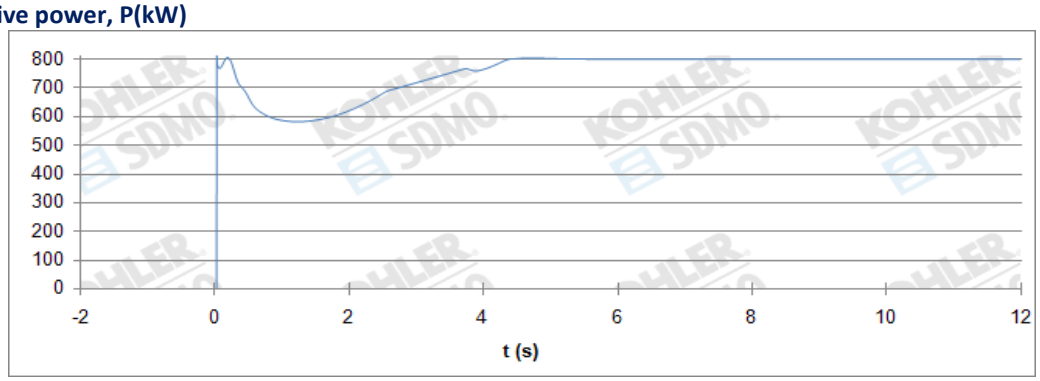


Alternator voltage, U(V)

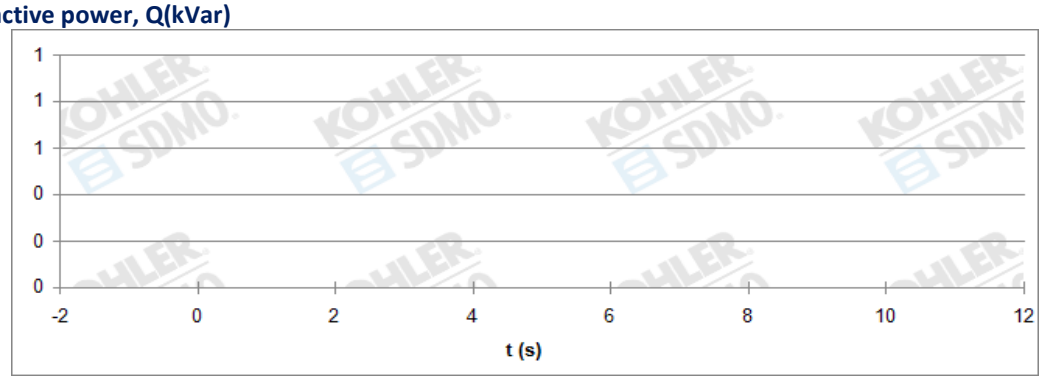


4. Global curves P, Q, U, F

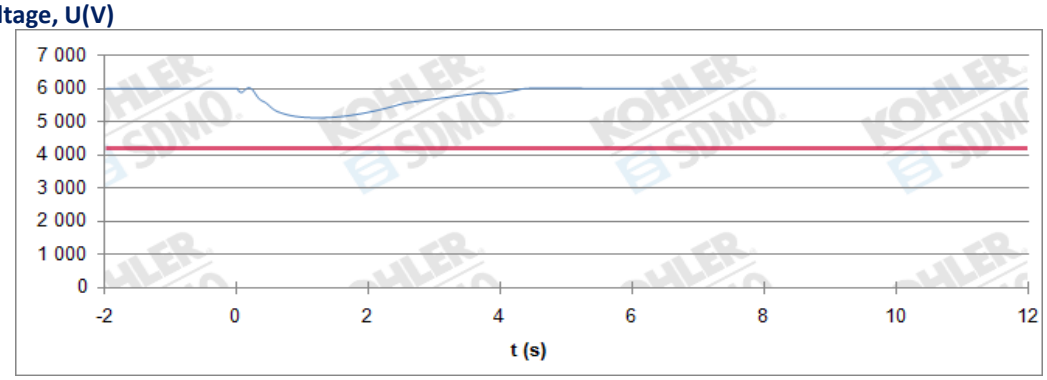
Alternator active power, P(kW)



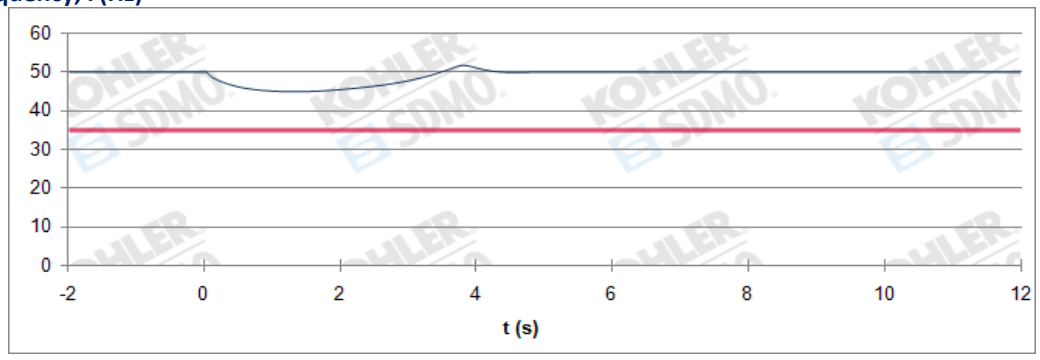
Alternator reactive power, Q(kVar)



Alternator voltage, U(V)

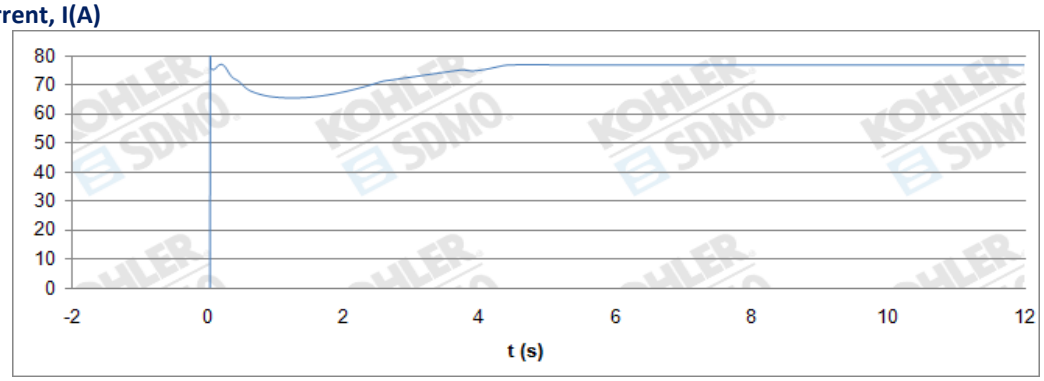


Alternator frequency, F(Hz)

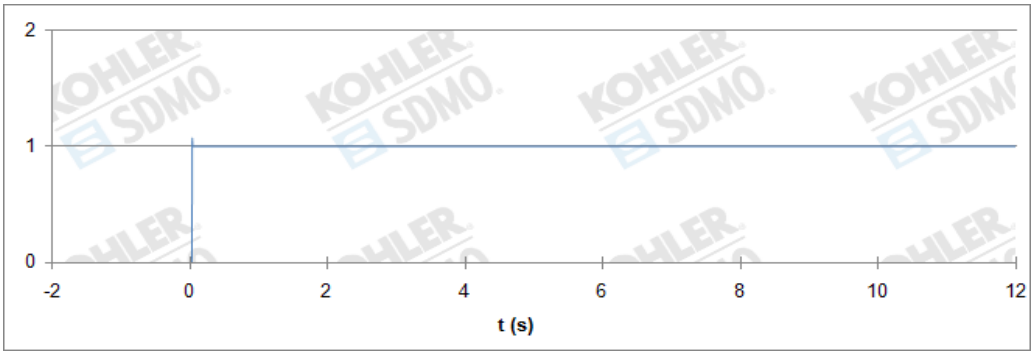


5. Global curves I, FP, U ex, C

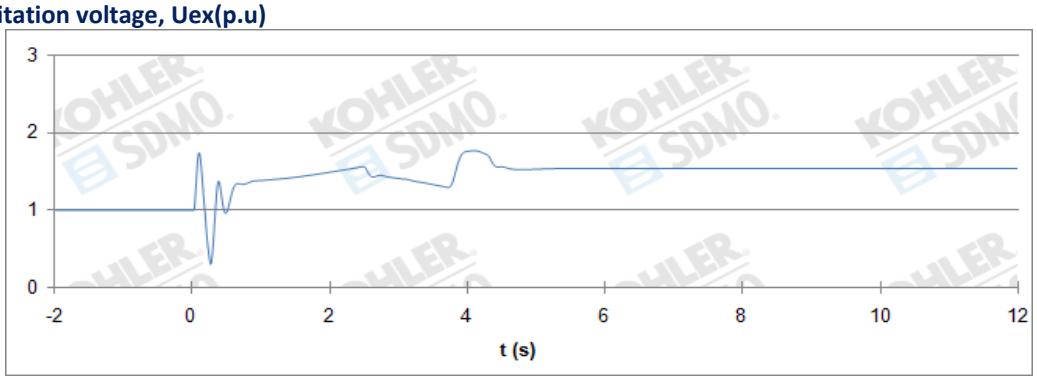
Alternator current, I(A)



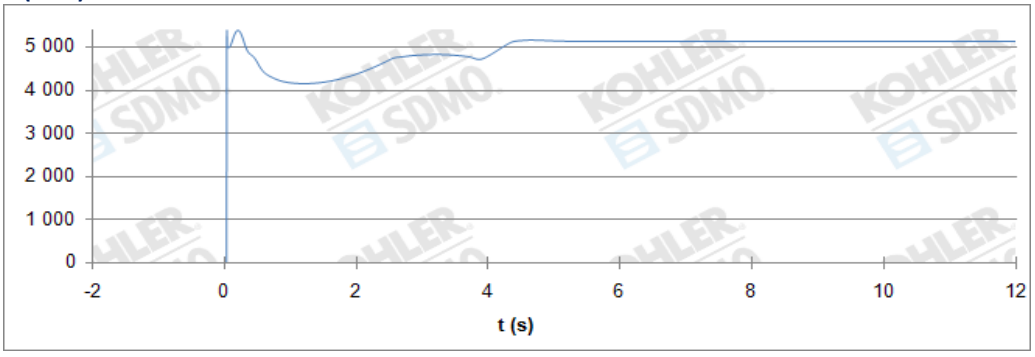
Power factor, PF



Alternator excitation voltage, Uex(p.u)



Engine Torque, C(N.m)



6. Asynchronous motors

7. Properties

Name	L1	
Label	Resist	
Nominal power	800000	W
Quantity	1	
Nominal power factor	1	
Nominal voltage	6000	V
Loading rate	100	%
Supply	Three phases	

8. Genset protections settings

Min. voltage		
Threshold	90	%
Delay	5.0	s

Min. motor speed		
Threshold	1000	tr/min
Delay	0.0	s

Max. motor torque		
Threshold 1	1.15	per unit
Delay 1	10.000	s
Threshold 2	1.500	per unit
Delay 2	0.100	s

9. Results

1 Generator T1540-01-KH03670TO4D-5M600

Power (prp) per generator	1375 kVA*
Engine	S12R-PTA2
Alternator	KH05461TO4D-06-S
THDi	3.02 %
THDu	3.02 %

** Generator is suggested depending on the standby power rating (ESP) : applicable for supplying emergency power in variable load applications in accordance with ISO 8528-1.*

The result obtained is the product of theoretical calculations made using technical data. The input data provided by the customer and the estimated values corresponding to applied loads must be confirmed by the customer prior to delivery of the equipment. SDMO Industries may not be held liable for input data that is incorrect or different at the time of installation of the equipment.

KOHLER SDMO

REF

Derating calculation note

T1540

REV	DATE	DESCRIPTION	WRITTER	SOFTWARE VERSION
A	18/01/21	FIRST ISSUE	FOLGOAS	

Genset features ISO conditions	RANGE	PACIFIC4	/	TEMPERATURE	25	°C
	FREQUENCY	50	Hz	ALTITUDE	100	masl
	TYPE / READINESS	T1540	O	PRP	1400	kVA
	VOLTAGE	400/230		ESP	1540	kVA
	ENGINE	S12R-PTA2		PRP	1120	kWe
	STANDARD ALTERNATOR	ECO43-VL-4A	KH05520TO4D	ESP	1232	kWe
	OVERSIZED ALTERNATOR	LSA502VL10	KH05090TO4D	COOLING	RADIA	A

Genset features on site conditions	RANGE		PACIFIC4	/	TEMPERATURE	43	°C
	FREQUENCY		50	Hz	ALTITUDE	33	masl
	TYPE		T1540	/	HUMIDITY	50	%
	ENGINE		S12R-PTA2	/	COOLING	RADIA-50°C-T1540	/
	ALTERNATEUR	Manufacturer	LS	/	VERSION	SILENT	/
		Range	KH05	/	NET GENSET PRP POWER	1100 / 1380	kWe / kVA (cosφ=0.8)
		Reference	KH05461TO4D	LSA523UL8	NET GENSET ESP POWER	1210 / 1510	kWe / kVA (cosφ=0.8)
		Voltage	6000/3464	/	WEAK COMPONENT PRP/ESP	ENGINE/ENGINE	/
		Winding	S	/	DERATING ON SITE/ISO PRP/ESP	98 % / 98 %	/

ALTERNATOR TECHNICAL DESCRIPTION
LSA 52.3 UL8 / 4p

V6.08 - 08/2021

Moteurs Leroy-Somer
Electric Power Generation - Orleans
13 Rue MAUPERTUIS - 29200 BREST- France

FM

Main data

				P	C
Generator type:	**LSA 52.3 UL8 / 4p**				
Power:	1 375	kVA	1 100 kWe	1 145	kWm
Voltage:	6 000	V	Star serial		
Rated voltage range:	+5/-5%				
Power factor - Lagging:	0,8				
Frequency:	50	Hz			
Speed:	1 500	rpm			
Nominal current:	132	A			
Winding type:	p5/6				
Classes (Insulation / Temperature Rise):	H / F				
Ambient temperature:	45	°C			
Altitude:	33	m			

Installation

IEC

Prime mover:	Reciprocating engine
Duty:	Base Rating

Mechanical construction

IM2001

Type of construction:	Two bearing
Mounting arrangement:	Horizontal Axis
Direction of rotation:	Clockwise (seen when facing the drive end - DE)
Bearing type:	Anti-friction
Bearing Lubrication:	Regreasable
Bearing insulation:	Not insulated
Shaft end type:	Cylindrical with keyway
Balancing - Class (ISO 1940/1):	Half key - G2,5 (std)
Flange:	SAE 00 / Length: 250 mm
Shaft height:	500 mm
Width:	750 mm

Additional specificities

Stabilized Runaway speed:	1 800	rpm - 2 min.

Cooling Method

IC01

Degree of protection:	IP23
Coolant:	Air / Temperature: 45 °C
Air quality:	Clean
Ventilation (internal):	Self-ventilated
Filters:	Without
Ducting for air inlet:	No
Ducting for air outlet:	No

ALTERNATOR TECHNICAL DESCRIPTION
LSA 52.3 UL8 / 4p

Connection, Excitation & Regulation

Parallel operation:	Island mode (0F) - no //CT
Excitation:	Self-excited - Brushless - Type: AREP + PMI
Sustained 3-phase Isc:	> 3 x FLC for 10s.
AVR type:	Leroy Somer - D550 - Digital
AVR location:	In terminal box
Alternator Voltage sensing:	Terminal box mounted voltage sensing VTs

Terminal box

Power connection:	4 connectors (brought out neutral)
Main terminal box location:	1 terminal box on the top
Line side outlet:	Left hand side (seen when facing the drive end - D)
Extension on phase side:	Angled 45° / Length = 480 mm / Angle = 45 °
Gland plate:	Non magnetic, Undrilled
Auxiliaries	In dedicated boxes
	-

Protection and measurement accessories

Temperature detection

Stator windings:	6 x 3-wire PT100 RTDs
Combined guide and thrust bearing - DE:	1 x 3-wire PT100 RTD
Guide bearing - NDE:	1 x 3-wire PT100 RTD

Anti-condensation heating

Voltage: 230 V - 1Ph / Power: 500 W

Various items

Paint:	C3M-P - Polyurethane - RAL 5007
Documentation:	PDF manual
Documentation Language:	English

Controls

QUAL/INES/006 001	Measurement of winding resistance
QUAL/INES/006 021	Insulation check on sensors (when fitted)
QUAL/INES/006 002	Voltage balance and phase order check
QUAL/INES/006 007	Overspeed test (according to test bench limitation)
QUAL/INES/006 009	High potential test
QUAL/INES/006 010	Insulation resistance measurement