Instruction Manual
for AC Generators

QAS278 Gd

Registration code
Collection : APC Q
Tab : 38

Printed matter N°
2950 0112 01 EN

1998 – 01

Atlas Copco

ATLAS COPCO – PORTABLE AIR DIVISION
B-2630 AARTSELAAR BELGIUM

Congratulations on the purchase of your QAS278 AC generator. It is a solid, safe and reliable machine, built according to the latest technology. Follow the instructions in this booklet and we guarantee you years of troublefree operation. Please read the following instructions carefully before starting to use your machine.

While every effort has been made to ensure that the information in this manual is correct, Atlas Copco does not assume responsibility for possible errors. Atlas Copco reserves the right to make changes without prior notice.

CONTENTS

SAFETY PRECAUTIONS FOR GENERATORS QAS

Everyone who uses or maintains Atlas Copco equipment is expected to read the following safety precautions attentively and to act accordingly before installing, operating or repairing the generators.

The operator must employ safe working practices and observe all relevant local safety requirements.

The owner is responsible for maintaining the unit in a safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.

Installation, operation, maintenance and repair shall only be carried out by authorized, competent personnel.

Any modification on the unit shall only be performed in agreement with and after a written approval from Atlas Copco and under supervision of authorized, competent personnel.

If any statement in this book, especially with regard to safety, does not comply with local legislation, the stricter of the two shall apply.

Ignoring these safety precautions may result in injury or death of the operator and/or people in the vicinity.

In addition to normal safety rules which must be observed with generators, the following safety precautions listed hereafter are stressed.

INSTALLATION PRECAUTIONS

1. Generators shall be lifted only with adequate equipment in conformity with local safety rules. Loose or pivoting parts shall be securely fastened before lifting. It is forbidden to stay in the risk zone under a lifted load. Lifting acceleration and retardation shall be kept within safe limits.
2. The aspirated air shall be free from flammable or toxic fumes, e.g. paint solvents, that can lead to internal fire or explosion.
3. Generators shall be installed on an even, solid floor, in a clean location with sufficient ventilation. If the floor is not level or can vary in inclination, consult Atlas Copco. If the unit is installed on a trailer, immobilize the trailer and chock the wheels.
4. The engine exhaust is a lethal gas. Do not operate the unit in a confined, not-ventilated room.
5. Never remove or tamper with the safety devices, guards or insulations fitted on the machine.
6. The electrical connections shall correspond to the local codes. The machines shall be earthed and protected against short circuits by fuses or circuit breakers.
7. Damaged cables and insufficient tightening of connections may cause electric shocks. Replace damaged cables and make sure that all electric connections are securely tightened.

OPERATION PRECAUTIONS

1. Operate the unit as described in the Instruction book to ensure safe, efficient operation.
2. Never operate the generator in excess of its limits as indicated in the technical specifications and avoid long no-load sequences.
3. Never operate the generator in a humid atmosphere. Excessive moisture causes worsening of the generator insulation.
4. Never touch the power terminals during operation of the machine.
5. Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks. Wear ear protectors when opening a door.
6. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
7. Periodically check that:
   a. All guards are in place and securely fastened.
   b. All hoses, cables and/or pipes inside the generator are in good condition, secure and not rubbing.
   c. There are no leaks.
   d. All fasteners are tight.
   e. All electrical wirings are secure and in good order.
8. Do not remove any of, or tamper with, the sound-damping material.
9. Whenever an abnormal condition arises, e.g. excessive vibration, noise, odour, etc., switch the circuit breakers to OFF and stop the engine. Correct the faulty condition before re-starting.
10. Never refill fuel while the machine is running. Keep fuel away from hot pipes. Never smoke while fuelling. Do not spill or leave fuel, oil, coolant or cleansing agent in or around the unit.
11. Keep flammable material away from the machine. If required, provide a spark arrestor to trap incendiary exhaust sparks.
12. Earth the generator as well as the load properly.
13. Check the electric cables regularly. Whenever damaged wires or dangerous conditions are observed, switch the circuit breakers to OFF and stop the engine. Replace the damaged wires or correct the dangerous condition before re-starting.
14. Avoid overloading the generator. The generator is provided with circuit breakers for overload protection. When a breaker has tripped, reduce the concerned load before re-starting.
15. If the generator is used as stand-by for the mains supply, it must not be operated without control system which automatically disconnects the generator from the mains when the mains supply is restored.
16. Never remove the cover of the output terminals during operation. Before connecting or disconnecting wires, switch off the load and the circuit breakers, stop the machine and make sure that the machine cannot be started inadvertently or there is any residual voltage on the power circuit.
17. Never connect the generator outlets to an installation which is also connected to a public mains.
18. Before connecting a load, switch off the corresponding circuit breaker, and check whether frequency, voltage, current and power factor comply with the ratings of the generator.
19. Running the generator at low load for long periods will reduce the lifetime of the engine.

MAINTENANCE PRECAUTIONS

1. Use only the correct tools for maintenance and repair work.
2. Use only genuine spare parts.
3. All maintenance work, other than routine attention, shall only be undertaken when the generator is stopped and when all loads are disconnected from the machine. Ensure that the machine cannot be started inadvertently.
4. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
5. Protect the air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when cleaning. Take care that moisture does not penetrate any component.
6. Never remove a filler cap of the cooling water system of a hot engine. Wait until the engine has sufficiently cooled down.
7. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapours of cleaning liquids.
8. Take precautions against fire. Handle fuel, oil and anti-freeze with care because they are inflammable substances. Do not smoke or approach with naked flame when handling such substances. Keep a fire-extinguisher in the vicinity.
9. Make sure that no tools, loose parts or rags are left in or on the generator. Never leave rags or loose clothing near the engine air intake.
10. Before clearing the generator for use after maintenance or overhaul, submit it to a testrun, check that the AC power performance is correct and that the control and shut-down devices function correctly.
11. When servicing batteries, always wear protecting clothing and glasses. The electrolyte is a sulphuric acid which can cause severe burns. When charging batteries, an explosive gas forms above the cells and escapes through the vents. Do not smoke near batteries being, or recently having been charged. Never break live circuits or battery terminals, because a spark usually occurs.
12. Make sure that all sound-damping material is in good condition. If damaged, replace it by genuine Atlas Copco material to prevent the sound pressure level from increasing.

LEADING PARTICULARS

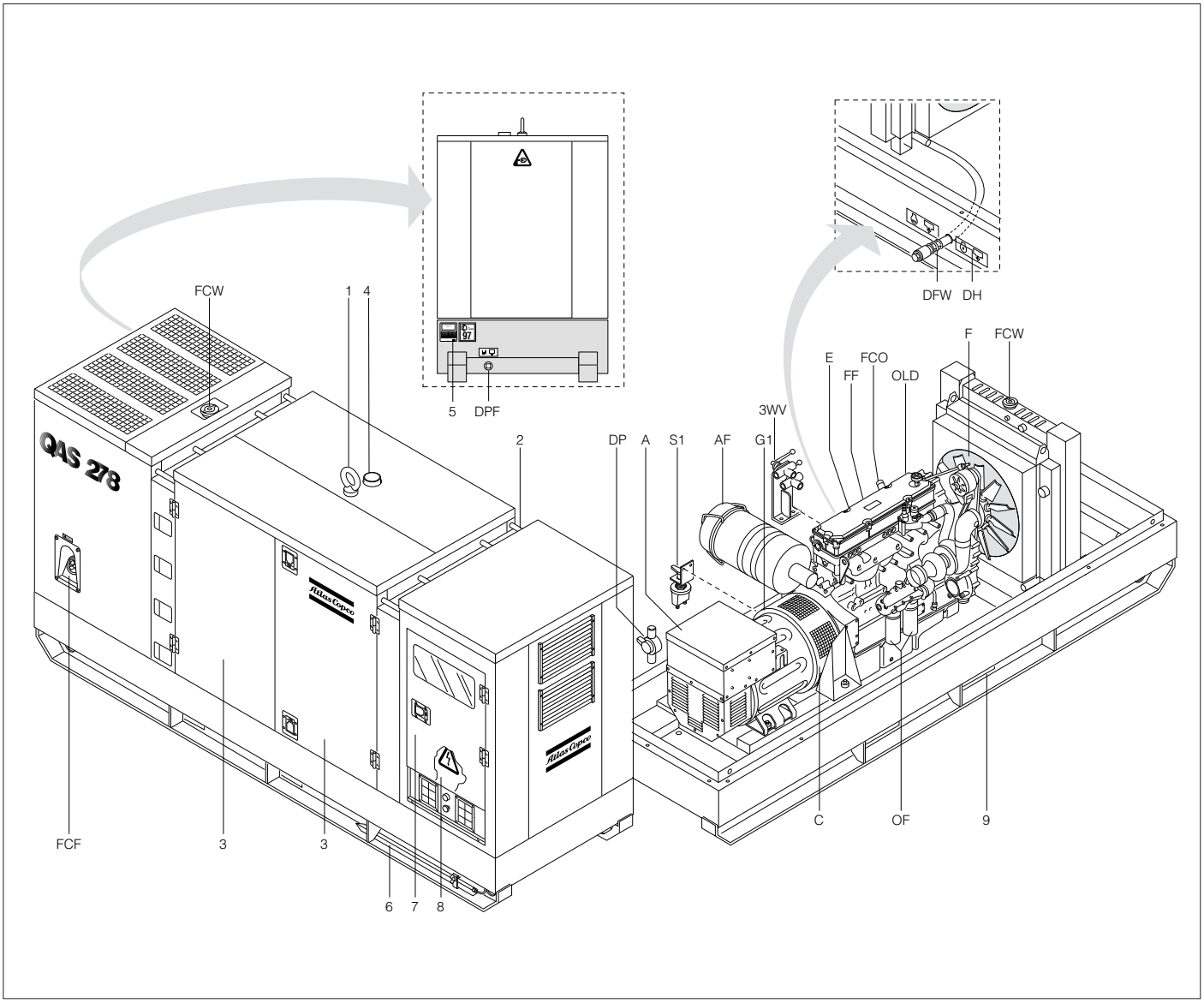
GENERAL DESCRIPTION

The QAS278 is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains.

The generator operates at 50 Hz/230 V or 60 Hz/240 V in line-to-neutral mode and at 50 Hz/400 V or 60 Hz/480 V in line-to-line mode. The rated output is 250 kVA at 50 Hz and 300 kVA at 60 Hz.

The QAS278 generator is driven by a water-cooled turbo charged diesel engine, manufactured by DETROIT DIESEL.

An overview of the main parts is given in the diagram below.



1	Lifting eye	A	Alternator	FCO	Filler cap engine oil
2	Guiding rod	AF	Air filter	FCW	Filler cap cooling water
3	Side doors, access to engine and alternator	C	Coupling	FF	Fuel filter
4	Engine exhaust	DFW	Drain flexible cooling water	G1	Battery
5	Data plate	DH	Drain and access hole (in the frame)	ODP	Oil drain pump
6	Earthing rod	DPF	Drain plug fuel	OF	Oil filter
7	Side door, access to control and indicator panel	E	Engine	OLD	Engine oil level dipstick
8	Output terminal board	F	Fan	S1	Battery switch
9	Hole for forklift	FCF	Filler cap fuel	3WV	3-way valve for external fueltank connection

Bodywork

The alternator, the engine, the cooling system, etc. are enclosed in a sound-insulated bodywork that can be opened by means of side doors (and service plates).

The generator's lifting eye is located in the middle of the roof. The recesses in the roof have guiding rods at both sides.

⚠ Never use the guiding rods to lift the generator.

To be able to lift the QAS278 by means of a forklift, rectangular holes are provided in the frame. The earthing rod, connected to the generator's earth terminal is located at the side of the frame.

Markings

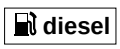
A brief description of all markings provided on the QAS278 is given hereafter.


Indicates that an electric voltage, dangerous to life, is present. Never touch the electric terminals during operation.


Indicates that the engine exhaust is a hot and harmful gas, which is toxic in case of inhalation. Always make sure that the unit is operated outside or in a well-ventilated room.


Indicates that these parts can become very hot during operation (eg. engine, cooler, etc.). Always make sure that these parts are cooled down before touching them.


Indicates that the guiding rods may not be used to lift the generator. Always use the lifting rod in the roof of the generator to lift it.



Indicates that the generator may be refueled with diesel fuel only.


Indicates the drain hole for the engine oil.

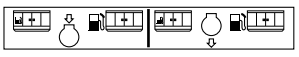

Indicates the drain hole for the coolant.

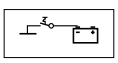

Indicates the drain plug for the engine fuel.


Indicates the different earthing connections on the generator.


Indicates the lifting eye of the generator.


Indicates that the unit may start automatically.


Indicates the 3-way valve.


Indicates the battery switch.

Drain plugs and filler caps

The drain holes for the engine oil, the coolant and the plug for the fuel, are located and labelled on the frame; the fuel drain plug at the front, the others at the service side.

⚠ The drain hole is used to guide external fuel tank connections. Refer to "External fueltank connection".

The filler cap for the engine coolant is accessible via an opening in the roof. The fuel filler cap is located in the side panel.

Battery switch

The battery switch is situated inside the sound-insulated bodywork. It allows to open or to close the electrical connection between the battery and the engine circuits.

⚠ Never turn the battery switch off while the engine is running.

External fueltank connection

The external fueltank connection allows to bypass the internal fueltank and to connect an external fueltank to the unit.

When using an external fuel tank, make sure to connect the fuel supply line as well as the fuel return line. Always put both valves in the same position (either internal or external tank) and make sure that they are in the extreme (horizontal) position. Connections to fuellines ought to be air-tight to prevent air from entering the fuel system.


Indicates the fuel supply line from the tank to the engine.


Indicates the fuel return line from the engine to the tank.


Indicates the internal fueltank.


Indicates the external fueltank.

Control and indicator panel

The control and indicator panel is located behind a door in the side panel. The hinged door is partly transparent and allows easy access to the parts mounted behind it. Panel light H1 goes on as soon as the starter switch is turned into position I.

Engine gauges

P6 .....Hourmeter

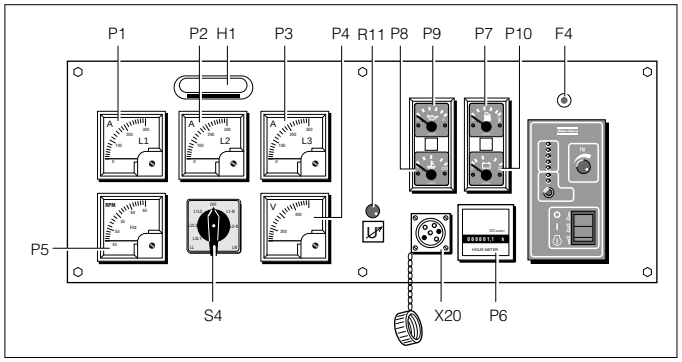
P7 .....Fuel level gauge

P8 .....Engine coolant temperature gauge

P9 .....Engine oil pressure gauge

P10 ...Battery voltage gauge

⚠ P7 and P10 are combined in one instrument, as well as P8 and P9.



Generator gauges

P1 .....Ammeter line L1

Indicates the outgoing current in the first phase (L1).

P2 .....Ammeter line L2

Indicates the outgoing current in the second phase (L2).

P3 .....Ammeter line L3

Indicates the outgoing current in the third phase (L3).

P4 .....Voltmeter

Indicates the voltage selected by means of voltage selector switch S4.

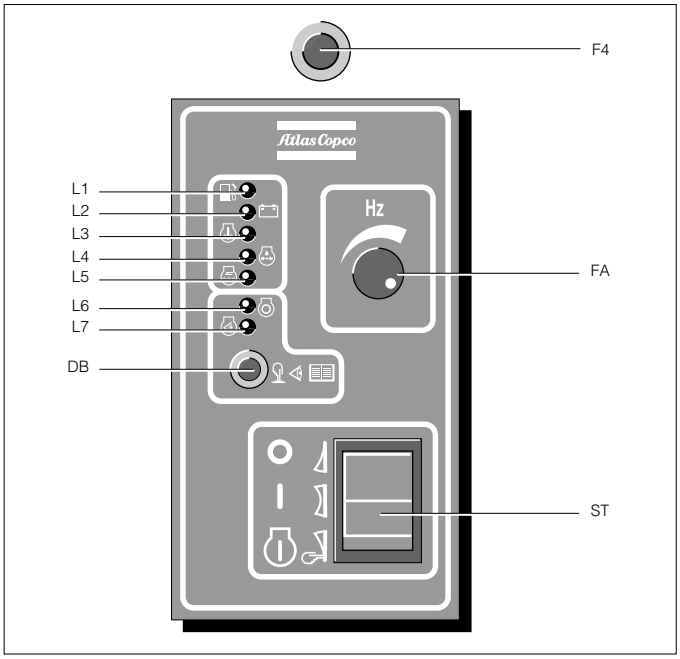
P5 .....Frequency / RPM meter

Indicates the frequency of the supply voltage and the speed of the engine.

S4 .....Voltmeter selector switch

Allows to measure the voltage between each of the phases and between each phase and the neutral. It also allows to switch off the voltmeter.

Engine controls and lamps



ST .....Starter switch

The starter switch is a three-position switch.

O : the voltage supply from the battery is switched off.

I : the electrical system of the engine, except the starting circuit is energized.

⏻ : the starter motor is energized. As soon as the engine fires, the switch can be released. The switch automatically returns to position I.

⚠ After approximately 20 seconds in position ⏻ without starting, the control system will automatically shut down (battery saving purpose) indicating a low oil pressure failure. In this case, a reset of the control system by putting the switch in position O is necessary.

DB ....Diagnostic request switch

With the ignition switch on and the engine at idle or not running, push and hold the switch to have the active codes flashing on the stop engine light (L6), followed by the inactive codes flashing on the check engine light (L7). For detailed information concerning the engine diagnostic codes, see chapter “Technical specifications – Engine diagnostic codes”.

F4 .....Fuse

The fuse activates when the current from the battery to the engine control circuit exceeds its setting. The fuse can be switched on and off by pushing the button.

FA .....Frequency adjust potentiometer

Allows to adjust the frequency of the output voltage. This adjustment has no influence on the output voltage. Voltage adjustment is done by means of potentiometer R11.

⚠ Changing the output frequency is only allowed after disconnecting the load.

L1 .....Fuel level indicator

Lights up when the fuel level is below 20 % of the maximum fuel tank capacity.

L2 .....Alternator charging indicator

Goes out after starting, indicating that the alternator is charging. A failing alternator however will not shut the engine down.

L3 .....Engine coolant temperature fault indicator

Lights up when the high engine coolant temperature was the cause of shutdown.

L4 .....Engine oil pressure fault indicator

Lights up when the low engine oil pressure was the cause of shutdown.

L5 .....Engine coolant level fault indicator

Lights up when the low engine coolant level was the cause of shutdown.

L6 .....Stop engine light

Lights up when a major fault occurred which shut down the engine. The cause of shutdown can be found using the diagnostic request procedure.

L7 .....Check engine light

Lights up when a minor fault occurred. This indicates that the problem should be diagnosed as soon as possible.

R11 ...Output voltage adjust potentiometer

Allows to adjust the output voltage.

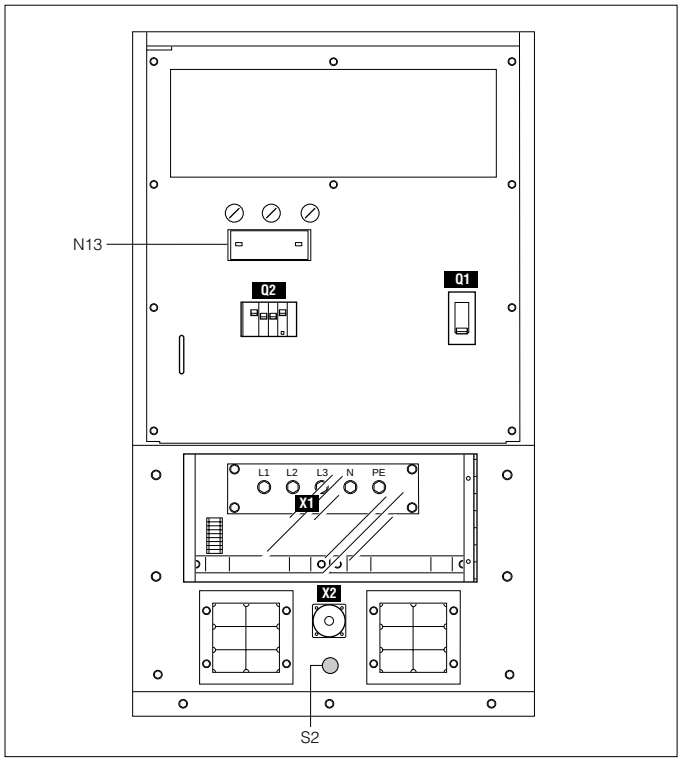
Separate diagnostic socket

X20 ...Diagnostic data socket

Allows to connect the diagnostic data reader. Refer to chapter "Technical specifications – Engine diagnostic codes".

OUTPUT TERMINAL BOARD

The output terminal board is situated below the control and indicator panel.



N13 ...Earth leak detector

Detects and indicates an earth fault current and activates the main circuit breaker Q1. The detection level can be set at 0.03 A fixed with instantaneous trip but can also be adjusted between 0.1 A and 1 A with time delayed (0 – 0.5 sec) trip. N13 has to be reset manually after eliminating the problem (reset button marked R). It can be overridden by means of the earth leak switch (S13, labelled IΔN) but has to be tested monthly (by pushing test button T).

S2 .....Emergency stop button

Push the button to stop the generator in case of an emergency. When the button is pressed, it must be unlocked, by turning it anti-clockwise, before the generator can be restarted.

S13 ...Lock-out switch for earth fault protection (N13)

This switch is located inside the cubicle and is labelled IΔN.

Position 0 : No de-energising of the main circuit breaker Q1 when an earth fault occurs.

Position 1 : De-energising of the main circuit breaker Q1 when an earth fault occurs.

Position 0 will only be used in conjunction with an external earth fault protection unit (e.g. integrated in a distribution board).

The earth fault protection on the single phase outlet socket is not affected by the switch S13.

If S13 is in position 0, proper earthing is of the utmost importance for the safety of the user. Eliminating any earth fault protection can lead to serious injury or even death for anybody touching the unit or the load.

Q1.....Main circuit breaker and minimum voltage relay

Interrupts the power supply to X1 when a short-circuit occurs at the load side, or when the overcurrent protection (360 A) is activated. When activated, Q1 interrupts the three phases and the neutral towards X1. It can be activated again after eliminating the problem.

Q2.....Circuit breaker for X2 and minimum voltage relay

Interrupts the power supply to X2 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q2 interrupts phase L3 and the neutral towards X2. It must be reset manually after eliminating the problem. Q2 can only be activated at 50 Hz.

X1 .....Main power supply (400 V AC)

Terminals L1, L2, L3, N (= neutral) and PE (= earthing), hidden behind the control panel door and behind a small transparent door.

X2 .....1-phase outlet socket (230 V AC)

Provides phase L3, neutral and earthing. X2 only provides power at 50 Hz because Q2 cannot be activated at 60 Hz.

OPERATING INSTRUCTIONS

In your own interest, always strictly observe all relevant safety instructions.

Do not operate the generator in excess of the limitations mentioned in the Technical Specifications.

Local rules concerning the setting up of low voltage power installations (below 1,000 V) must be respected when connecting site distribution panels, switch gear or loads to the generator.

At each start-up and at any time a new load is connected, the earthing of the generator must be verified. Earthing must be done either by the earthing rod or, if available, by an existing, suitable earthing installation. The protective system against excessive contact voltage is not effective unless a suitable earthing is made.

The generator is wired for a TN-system to IEC 364-3, i.e. one point in the power source directly earthed - in this case the neutral. The exposed conductive parts of the electric installation must be directly connected to the functional earth.

If operating the generator in another power system, e.g. an IT-system, other protective devices required for these types must be installed. In any case only a qualified electrician is authorized to remove the connection between the neutral (N) and earth terminals in the terminal box of the alternator.

INSTALLATION

- Place the generator on a horizontal, even and solid floor. The generator can operate in a slant position not exceeding 15° (in both senses: front/rear and left/right).
- Protect the generator against dust and rain if it is operated outside.
- Check that the engine exhaust is not directed towards people. If the generator is operated indoors, install an exhaust pipe of sufficient diameter to duct the engine exhaust towards the outside. Check for sufficient ventilation so that the cooling air is not recirculated. If necessary, consult Atlas Copco.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
- Check that the inner earthing system is in compliance with the local legislation.
- Install the earthing rod as near as possible to the generator and measure its diffusion resistance (max. 1 KΩ) in order not to have a contact voltage higher than 25 V at 30 mA leakage current.
- Check that the cable end of the earthing rod is connected to the earth terminal.
- Use coolant for the engine cooling system. Refer to the Engine instruction book for the proper coolant mixture.
- Check the tightness of the bolts and nuts.

CONNECTING THE GENERATOR

Precautions for non-linear and sensitive loads

⚠ Non-linear loads draw currents with high contents in harmonics, causing distortion in the wave form of the voltage generated by the alternator.

The most common non-linear, 3-phase loads are thyristor/rectifier-controlled loads, such as convertors supplying voltage to variable speed motors, uninterruptable power supplies and Telecom supplies. Gas-discharge lighting arranged in single-phase circuits generate high 3rd harmonics and risk for excessive neutral current.

Loads most sensitive to voltage distortion include incandescent lamps, discharge lamps, computers, X-ray equipment, audio amplifiers and elevators.

Consult Atlas Copco for measures against the adverse influence of non-linear loads.

Quality, minimum section and maximum length of cables

The cable connected to the terminal board of the generator must be selected in accordance with local legislation. The type of cable, its rated voltage and current carrying capacity are determined by installation conditions, stress and ambient temperature. For flexible wiring, rubber-sheathed, flexible core conductors of the type H07 RN-F (Cenelec HD.22) or better must be used.

The following table indicates the maximum allowable 3-phase currents (in A), in an ambient temperature of 40 °C, for cable types (multiple and single core PVC insulated conductors and H07 RN-F multiple core conductors, all with copper cores) and wire sections as listed, in accordance with VDE 0298 installation method C3. Local regulations remain applicable if they are stricter than those proposed below.

Wire section (mm^2)	25	35	50	70	95	120	150	185	240	300
Max. current (A)										
Multiple core	94	114	138	176	212	245	282	323	379	429
Single core	101	123	155	191	228	273	314	358	421	477
H07 RN-F	88	110	138	170	205	239	275	313	371	428

The lowest acceptable wire section and the corresponding maximum cable or conductor length for multiple core cable or H07 RN-F, at rated current (360 A), for a voltage drop e lower than 5 % and at a power factor of 0.80, are respectively 240 mm^2 and 440 m. In case electric motors must be started, oversizing the cable is advisable.

The voltage drop across a cable can be determined as follows:

$$e = \frac{\sqrt{3}.I.L.(R.\cos\varphi + X.\sin\varphi)}{1000}$$

e = Voltage drop (V)
I = Rated current (A)
L = Length of conductors (m)
R = Resistance (Ω/km to VDE 0102)
X = Reactance (Ω/km to VDE 0102)

Connecting the load

Site distribution panel

If outlet sockets are required, they must be mounted on a site distribution panel supplied from the terminal board of the generator and in compliance with local regulations for power installations on building sites.

Protection

⚠ For safety reasons, it is necessary to provide an isolating switch or circuit breaker in each load circuit. Local legislation may impose the use of isolating devices which can be locked.

- Check whether frequency, voltage and current comply with the ratings of the generator.
- Provide for the load cable, without excessive length, and lay it out in a safe way without forming coils.
- Open the door of the control and indicator panel and the transparent door in front of the terminal board X1.
- Provide the wire ends with cable lugs suited for the cable terminals.
- Loosen the cable clamp and push the wire ends of the load cable through the orifice and clamp.
- Connect the wires to the proper terminals (L1, L2, L3, N and PE) of X1 and tighten the bolts securely.
- Tighten the cable clamp.
- Close the transparent door in front of X1.

Before starting

- With the generator standing level, check the engine oil level and top up if necessary. The oil level must be near to, but not exceed the high mark on the engine oil level dipstick.
- Check the coolant level in the expansion tank of the engine cooling system. The water level must be near to the FULL mark. Add coolant if necessary.
- Drain any water and sediment from the fuel pre-filter. Check the fuel level and top up if necessary. It is recommended to fill the tank after the day's operation to prevent waterdamp in a nearly empty tank from condensing.
- Check the vacuum indicator of the air filter. If the red part shows completely, replace the filter element.
- Press the vacuator valve of the air filter to remove dust.
- Check the generator for leakage, tightness of wire terminals, etc. Correct if necessary.
- Check that circuit breaker Q1 is switched off.
- Check that fuse F4 is not activated and that the emergency stop is in the "OUT" position.
- Check that the load is switched off.
- Check that the earth fault potection (N13) has not tripped (reset if necessary).
- Turn the battery switch to ON.

Starting

- Put the starter switch in position I. Push down the starter switch into position ⏀ and release it as soon as the engine fires. The switch automatically returns to position I.

Do not keep the starter switch in its utmost position for more than 10 seconds (maximum 20 seconds in extremely cold conditions). Wait two minutes between each starting attempt.

⚠ If the engine fails to start and for starting in extremely cold conditions, consult your local Atlas Copco dealer.

- Check that the warning lamps on the control and indicator panel are out.
- Run the engine for approximately 5 minutes to warm up. Check the engine oil pressure (P9) and the cooling water temperature (P8).
- Check the voltmeter P4 (with voltmeter selector switch S4 in different positions) and the frequency meter P5.
- Switch circuit breaker Q1 on by pushing the lever fully down from TRIPPED (mid-position/white flag) to OFF ("0"/green flag) followed by pushing the lever fully up to ON ("1"/red flag).
- Switch on the load and check the ammeters P1, P2 and P3, voltmeter P4 (voltmeter selector switch in different positions) and frequency meter P5.

During operation

Following points should be carried out regularly:

- Check the engine gauges and the lamps for normal readings.

⚠ Avoid to let the engine run out of fuel. If it happened, priming is necessary for an easy start.

- Check for leakage of oil, fuel or cooling water.
- Avoid long low-load (< 30 %) periods. In this case, an output drop and higher oil consumption of the engine could occur.
- Check, by means of the generator gauges, that the voltage between the phases is identical and that the rated current per phase is not exceeded.
- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

⚠ Never turn the battery switch to OFF during operation.

If circuit breaker Q1 is activated during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

The generator's side doors may only remain opened for short periods during operation, to carry out checks for example.

Stopping

- Switch off the load.
- Switch off circuit breaker Q1.
- Let the engine run for about 5 minutes.
- Stop the engine by putting the starter switch in position OFF.
- Turn the battery switch to OFF.
- Lock the side doors and the door of the indicators and control panel to avoid unauthorized access.

MAINTENANCE

⚠ Before carrying out any maintenance activity, check that the start switch is in position O and that no electrical power is present on the terminals.

MAINTENANCE SCHEDULE	Daily	Initial	Small	Normal	Yearly
		50 hours	*250 hours*	*500 hours*	*2000 hours*

SERVICE PAK	–	With unit	2912 4201 05	2912 4204 06	2912 4205 07
For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at reduced price, compared to the loose components. Refer to figure 1 of the parts list for more information on the contents of the service kits.					
Coolant level	Check	Check	Check	Check	Check
Tension and condition of drive belt(s)		Check	Check	Check	Replace
Radiator and intercooler fins		Check/Clean	Check/Clean	Check/Clean	Check/Clean
Fuel pre-filter/Water separator	Check/Drain	Replace	Replace	Replace	Replace
Fuel filter element		Replace	Replace	Replace	Replace
Fuel injectors					Check
Oil level in sump	Check	Check	Check	Check	Check
Oil pressure on gauge (min. 1.5 bar)	Check	Check	Check	Check	Check
Lubrication oil		Change	Change	Change	Change
Oil filter(s)		Replace	Replace	Replace	Replace
Crankcase pressure (3mm WG at no load)				Check	Check
Vacuum indicator	Check	Check	Check	Check	Check
Air cleaner and dust bowl		Clean	Clean	Clean	Clean
Air filter element (1)			Clean	Replace	Replace
Safety cartridge					Replace
Turbocharger impeller and housing					Clean/inspect
Fan hub bearings					Lubricate
Oil, fuel and water leaks		Check	Check	Check	Check
Mechanical links (e.g. fuel solenoid link)			Grease	Grease	Grease
Level battery electrolyte (2)		Check	Check	Check	Check
Condition of vibration dampers		Check	Check	Check	Check
Alternator insulation resistance (*)					Measure
Tightness of nuts and bolts		Check			Check
Door hinges and locks		Grease			Grease
Fixation of hoses, cables and pipes				Check	Check
Inspection by Atlas Copco Service technician					⚠

(1) More frequently when operating in a dusty environment. Evacuate dust from the airfilter valve daily.

(2) A Service Bulletin (ASB) dealing elaborately with batteries and due care is available on request.

(*) MEASURING THE ALTERNATOR INSULATION RESISTANCE

A 500 V megger is required to measure the alternator insulation resistance.

If the N-terminal is connected to the earthing system, it must be disconnected from the earth terminal. Disconnect the AVR.

Connect the megger between the earth terminal PE and terminal L1 and generate a voltage of 500 V. The scale must indicate a resistance of at least 5 MΩ.

Refer to the alternator operating and maintenance instructions for more details.

ENGINE MAINTENANCE

Refer to the engine's operator manual for full maintenance, including instructions for changing the oil and cooling water and replacing the fuel, oil and air filters.

STORAGE OF THE GENERATOR

STORAGE

- Store the generator in a dry, frost-free room which is well ventilated.
- Run the engine regularly, e.g. once a week, until it is warmed up. If this is impossible, extra precautions must be taken:
  - Consult the engine's operator manual.
  - Remove the battery. Store it in a dry, frost-free room. Keep the battery clean and its terminals lightly covered with petroleum jelly. Recharge the battery regularly.
  - Clean the generator and protect all electrical components against moisture.
  - Place silica gel bags, VCI paper (Volatile Corrosion Inhibitor) or another drying agent inside the generator and close the doors.
  - Stick sheets of VCI paper with adhesive tape on the bodywork to close off all openings.
  - Enclose the generator, except the bottom, with a plastic bag.

PREPARING FOR OPERATION AFTER STORAGE

Before operating the generator again, remove the wrapping, VCI paper and silicagel bags and check the generator thoroughly (go through the checklist "Before starting").

- Consult the engine's operator manual.
- Check that the insulation resistance of the generator exceeds 5 MΩ.
- Replace the fuel filter and fill the fuel tank. Vent the fuel system.
- Reinstall and connect the battery, if necessary after being recharged.
- Submit the generator to a test run.

CHECKS AND TROUBLE SHOOTING

Never perform a test run with connected power cables. Never touch an electrical connector without a voltage check.

When a failure occurs, always report what you experienced before, during and after the failure. Information with regard to the load (type, size, power factor, etc.), vibrations, exhaust gas colour, insulation check, odors, output voltage, leaks and damaged parts, ambient temperature, daily and normal maintenance and altitude might be helpful to quickly locate the problem. Also report any information regarding the humidity and location of the generator (eg. close to sea).

CHECKING VOLTMETER P4

- Put a voltmeter in parallel with voltmeter P4 on the control panel.
- Check that the read-out of both voltmeters is the same.
- Stop the generator and disconnect one terminal.
- Check that the internal resistance of the voltmeter is high.

CHECKING FREQUENCYMETER P5

- Run the unit at normal speed.
- Put a voltmeter in parallel with frequencymeter P5.
- If the measured voltage is higher than 200 V, the frequencymeter has to work properly.

  If not, remove the frequencymeter, connect it with the mains (230 V) and check that it indicates 50 Hz.

CHECKING AMMETERS P1, P2 AND P3

- Measure by means of a clamp-on probe the current, during the load.
- Compare the measured currents with the currents indicated on the corresponding ammeters. Both readings should be the same.

ALTERNATOR TROUBLE SHOOTING

Symptom	*Possible cause*	*Corrective action*
Alternator does not excite.	Blown fuse. Insufficient residual voltage. No residual voltage.	Replace fuse. Increase the speed by 15 %. For an Instant apply on the + and – terminals of the electronic regulator a 12 V battery voltage with a 30 Ω resistor in series respecting the polarities.
After being excited alternator does not excite.	Connections are interrupted.	Check connection cables as per attached drawings.
Low voltage at no load.	Voltage potentiometer out of setting. Intervention of protection. Winding failure.	Reset voltage. Check rpm. Check windings.
High voltage at no load.	Voltage potentiometer out of setting. Failed regulator.	Reset voltage. Substitute regulator.
Lower than rated voltage at load.	Voltage potentiometer out of setting. Intervention by protection. Failed regulator. Rotating bridge failure.	Reset voltage potentiometer. Current too high, power factor lower than 0.8; speed lower than 4 % of rated speed. Substitute regulator. Check diodes, disconnect cables.
Higher than rated voltage at load.	Voltage potentiometer out of setting. Failed regulator.	Reset voltage potentiometer. Substitute regulator.
Unstable voltage.	Speed variation in engine. Regulator out of setting.	Check regularity of rotation. Regulate stability of regulator by acting on “STABILITY” potentiometer.

ENGINE TROUBLESHOOTING

A first fault diagnose can be read on the check engine light (L7) and the engine stop light (L6). For more detailled information refer to the Engine operating manual. An extensive Engine troubleshooting manual is available at Detroit Diesel. For more information contact Detroit Diesel.

The DDEC reader (for details see page 308) is a useful tool for troubleshooting.

OPTIONS AVAILABLE FOR QAS278 UNITS

OVERVIEW OF THE ELECTRICAL OPTIONS

The following “electrical” options are available for the QAS278 unit:

– parallel operation (PAR),
– “Electricité de France” (EDF),
– automatic mains failure (AMF).

The engine control circuit diagrams and the power circuit diagrams for the standard QAS278 unit, for the units with options and for the units with combined options are:

Unit	*Power circuit*	*Engine control circuit*
QAS278 Gd (standard unit)	9822 0704 43	9822 0705 21
QAS278 Gd PAR	9822 0773 95	9822 0705 21
QAS278 Gd EDF	9822 0773 67	9822 0705 21
QAS278 Gd AMF	9822 0773 92	9822 0774 29
	9822 0773 55	

DESCRIPTION OF THE ELECTRICAL OPTIONS

Automatic mains failure (AMF)

The “Automatic mains failure” option offers the following features:

– continuous monitoring of four input lines,
– an engine cooling water heating,
– an automatic battery charger, “trickle charge”,
– a connection block for monitoring,
– a control module,
– a remote start possibility.

Continuous monitoring

The “Automatic mains failure” option continuously monitors four input lines of the main power supply: the three phases and neutral.

When the mains (one or all phases) is not available for approximately 0.5 seconds, the following timing applies:

– The mains contactor opens and disconnects the load from the mains.
– The unit starts 3 seconds (preheat and crank delay) after the mains failure. If the unit does not start immediately, it will carry out another 3 starting attempts, each consisting of 10 seconds cranking and 5 seconds interval (crank time).
– After 10 seconds generator stabilisation time (plant settle time), the generator contactor is energised and the generator supplies power towards the load.

When the mains (all phases) is available again for at least 10 seconds (mains restore time), the following timing applies:

– The generator contactor opens and the mains contactor closes (1 second change over time).
– The generator shuts down 1 minute later (delay run on time).

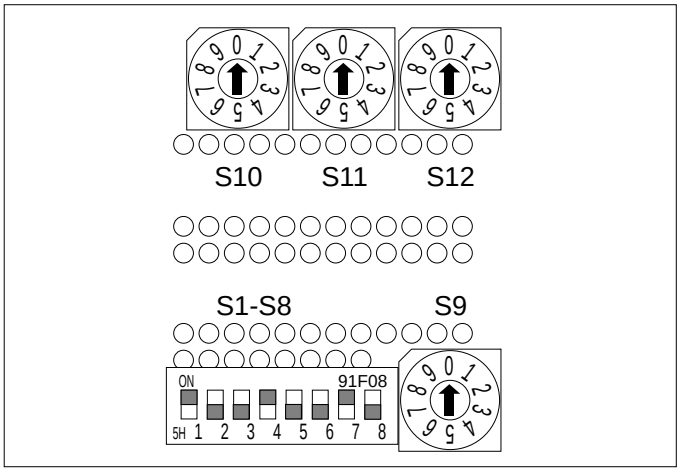
The timing can be adjusted by means of the potentiometers located at the back of the AMF control module:

S9 .....Crank timer

S10 ...Plant settle timer

S11 ...Mains restore timer

S12 ...Delay run on timer



The table below summarises the relation between the position of the potentiometers and the value of the timers.

Potentiometer Position	S9 Preheat and crank delay	S9 Crank time	S10 Plant settle time
0	3 sec	10 sec	10 sec
1	10 sec	10 sec	15 sec
2	10 sec	15 sec	20 sec
3	15 sec	10 sec	25 sec
4	15 sec	15 sec	30 sec
5	25 sec	10 sec	35 sec
6	25 sec	15 sec	40 sec
7	25 sec	25 sec	45 sec
8	50 sec	15 sec	50 sec
9	50 sec	25 sec	60 sec

Potentiometer Position	S11 Mains restore time	S12 Delay run on
0	10 sec	1 min
1	20 sec	2 min
2	40 sec	3 min
3	1 min	4 min
4	2 min	5 min
5	3 min	6 min
6	4 min	7.5 min
7	7.5 min	10 min
8	10 min	12.5 min
9	15 min	15 min

⚠ The timers are factory set at position 0.

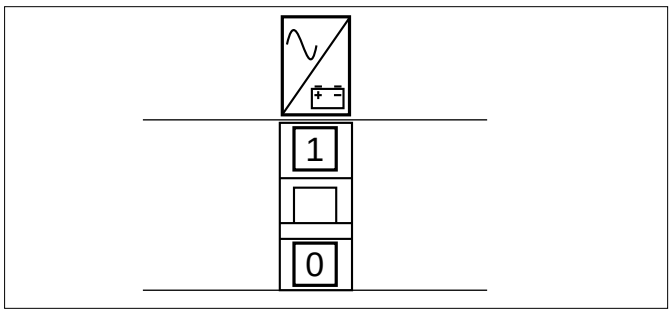
Engine cooling water heating

To make sure that the engine can start and accept load immediately, an external cooling water heating (2 x 1000 W, 240 V) is provided which keeps the engine temperature between 38 °C and 49 °C.

Automatic battery charger

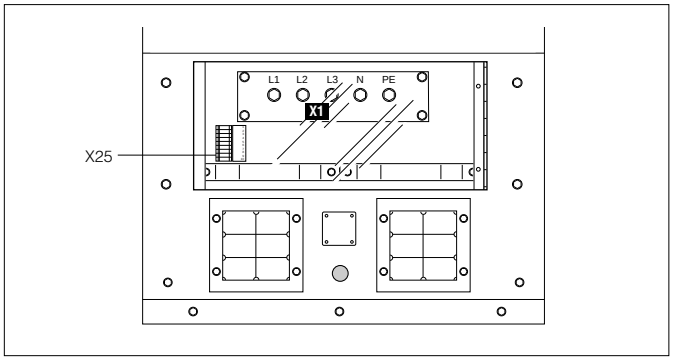
The “trickle charger” charges the battery completely and is disconnected once the unit starts up.

To prolong the lifespan of the batteries, the battery continuously discharges via the lock-out switch of the battery charger and a small resistor.



⚠ When the unit is disconnected from the mains for a longer period or will be stored, make sure to switch off the lock-out switch of the battery charger to prevent the battery from discharging completely.

Connection block for monitoring



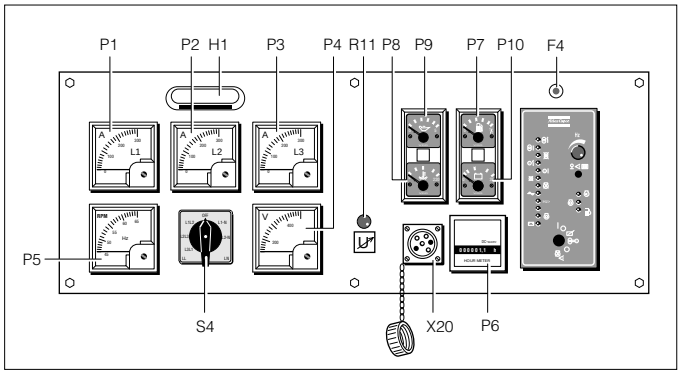
X25 ...Connection block

Allows easy connection for sensing of mains voltage and control of the mains and the plant contactor.

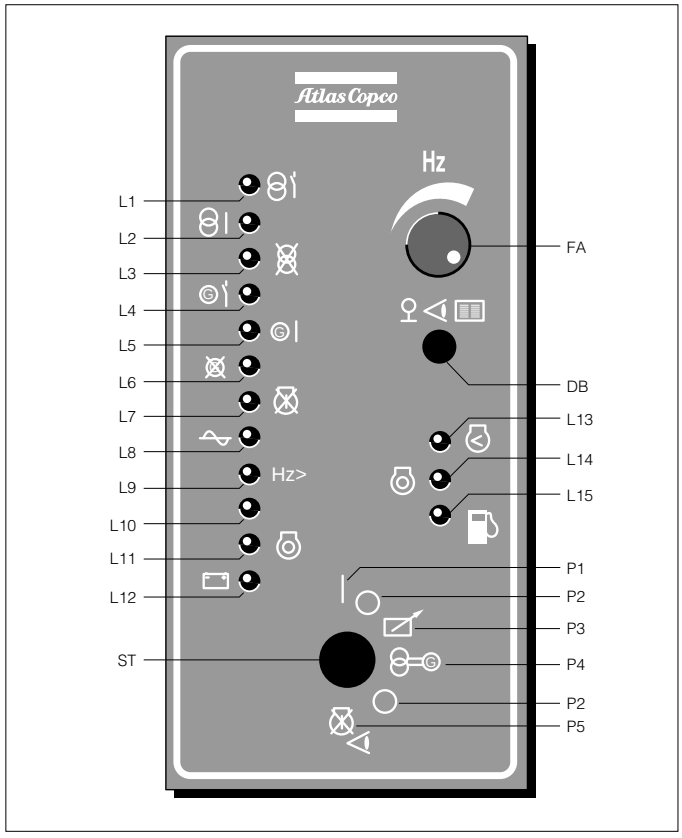
⚠ Refer to circuit diagram of the “Automatic mains failure” option for the correct connection.

Control module

The standard control module is replaced by a module which allows more detailed control of the unit.



The controls and indicators on the AMF control module are:



L1 .....Mains available

Lights up when the mains is available.

L2.....Mains on load

Lights up when the mains supplies power towards the load.

L3.....Mains failed

Lights up when a failure occured on the mains.

L4.....Plant available

Lights up when the generator is running.

L5.....Plant on load

Lights up when the generator supplies power towards the load.

L6.....Plant fail

Lights up when a failure occured on the generator.

L7.....Start fail

Indicates that four start attempts were not sufficient to start up the engine.

L8.....Undervoltage shutdown

Lights up when AC input interruption or failure was the cause of shutdown.

L9.....Overspeed shutdown

Lights up when the engine's speed has exceeded 115 % of the nominal speed. The nominal speed is determined by means of the dipswitch S8 at the back of the control module.

L10 Spare shutdown

Can be used to wire an extra shutdown. Delayed with 3 sec.

L11 ...Engine shutdown

Lights up when a major fault occurred which shuts down the engine.

L12 ...Charge fail indicator

Goes out after starting, indicating that the alternator is charging. A failing alternator however will not shut the engine down.

L13 ...Check engine light

Lights up when a minor fault occurred. This indicates that the problem should be diagnosed as soon as possible. In combination with the diagnostic request switch all engine faults that occurred in the past can be read; provided that the starter switch is in the inhibit position (P5).

L14 ...Stop engine light

Lights up when a major fault occurred which shut down the engine. The cause of an engine shutdown can be found using the diagnostic request procedure (see standard machine).

L15 ...Fuel level indicator

Lights up when the fuel level is below 20 % of the maximum fuel tank capacity.

DB ....Diagnostic request button

With the starter switch into the P5 position, push and hold the switch to have the active codes flashing on the stop engine light, followed by the inactive codes flashing on the check engine light.

FA .....Frequency adjust potentiometer

Allows to adjust the frequency of the output voltage. This adjustment has no influence on the output voltage. Voltage adjustment is done by means of potentiometer R11.

⚠ Changing the output frequency is only allowed after disconnecting the load.

ST .....Starter switch

P1 : the generator starts immediately. The load will be transferred if a mains failure occurs.

P2 : the generator will never start.

P3 : the generator will start when the remote start/stop contact is closed.

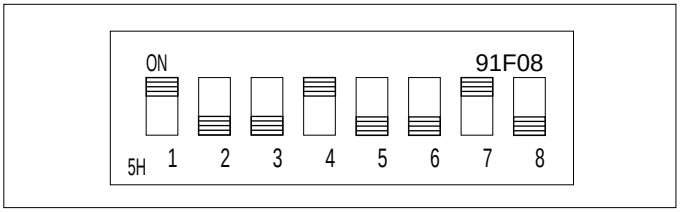
P4 : the generator will take over when a mains failure occurs.

P5 : the generator will not start when a mains failure occurs. Nevertheless, the mains remains monitored and the mains contactor will trip in case of a mains failure. When the starter switch is in this position, the engine faults can be read out by the diagnostic request button (DB).

Besides dipswitch S8, located at the back of the control module and used for the selection of the nominal speed (50 Hz or 60 Hz), dipswitch S1 can be used for enabling or disabling a spare shutdown contact.

⚠ The contactors between the mains, the unit and the load are not included in the option but should be sized according to the load. Nevertheless, they are also available as sales kit at Atlas Copco. Refer to circuit diagram 9822 0773 55 of the "Automatic mains failure" option for the correct connection.

For correct functioning of the module, the DIP switches at the back of the module should be positioned as follows:



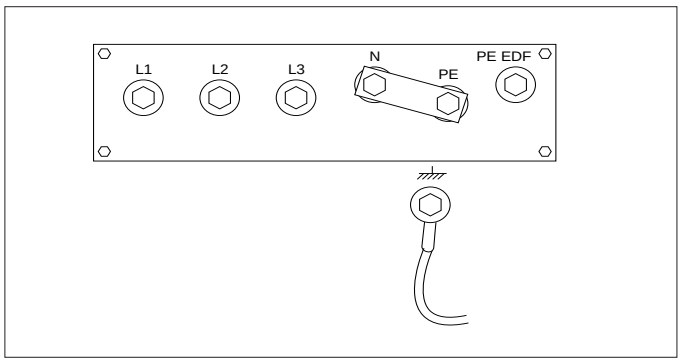
Remote start possibility

The "Remote start" feature of the "Automatic mains failure" option allows to switch the unit on or off without using the control panel located on the unit. For this purpose, the control module provides a voltage free contact for the connection of the remote start/stop switch (to be installed by the customer).

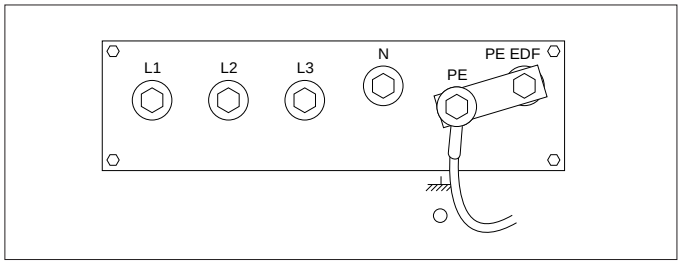
The unit will start in case the contact is closed (start/stop switch in position start) and the starter switch of the control module is in position ⊿ (position P3).

“Electricité de France” (EDF)

When the EDF-option is installed, the unit operates as a standard unit when the neutral and the PE terminals are connected to each other (see figure below). In this case, an earth leakage at the side of the generator or at the side of the load will switch off the circuit breaker.



When EDF-option is installed, the unit operates as EDF-unit when the earthing, the PE and the PE EDF terminals are connected to each other (see figure below). In this case, an earth leakage at the side of the generator will switch off the circuit breaker. An earth leakage at the side of the load will not switch off the circuit breaker.



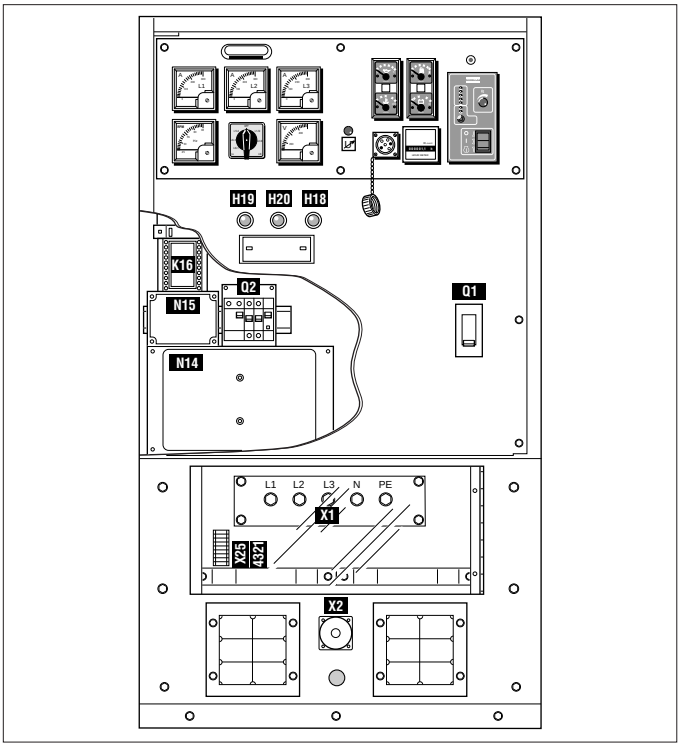
⚠ Changing the operation mode from standard unit to EDF-unit or vice versa has to be carried out by a qualified person from “Electricité de France”.

Parallel operation

The “Parallel operation” option is used in those cases where the load exceeds the nominal load of the generator in operation. Using this option, generators can be connected in parallel in order to share the load proportionally.

⚠ Each generator that is part of the parallel connection must be provided with the “Parallel operation” option (the base generator as well as each of the extra parallel generators). The generators do not have to be of the same type: any combination between QAS168, QAS228, QAS278 or QAS338 generators is possible.

Extra components



Check synchronizing lamp (H18)

The check synchronizing lamp is activated by an output of the check synchronizing relay. The lamp lights up when the generator is synchronized with the generator that is already in operation. The generator’s main circuit breaker, providing power to the load, can only be closed when the check synchronizing lamp lights up.

Synchronizing lamps (H19, H20)

The synchronizing lamp H19 (H20) is connected between phase L1 (L2) of the first generator and phase L1 (L2) of the second generator. When the generator is synchronized, both lamps will go out together and the check synchronizing lamp will light up, indicating that the generator’s main circuit breaker, providing power to the load, can be closed. When the two synchronizing lamps flash alternately, phases have to be switched.

The isochronous load sharing module (N14)

The isochronous load sharing module is located inside the cubicle. The module provides a proportional division of a common load between the generators in parallel while maintaining a fixed frequency. This means that the generators in the parallel connection will deliver equal percentages of their full load capacity. This also implies that due to the isochronous load sharing module and the proportional load sharing, the generators that are connected in parallel do not need to have the same rated output power.

Following connections are provided on the isochronous load sharing module:

- Interfacing connections to the electronic control module of the engine via the interface module.
- Connections (1, 2, 3 and 4) to the generators in parallel operation to detect their active load percentage and to distribute the total load evenly.
- An output connection which will be activated when the generators load exceeds a certain percent of its rated nominal load. This indicates that an extra generator needs to be added to the parallel operation. The load percentage used to activate this output is adjustable on the module by means of the FPON potentiometer.

  When the generators load drops below a certain percentage of its rated nominal load, the output will be deactivated. This percentage is adjustable on the module by means of the FPOFF potentiometer.

  This output can be used to activate an indication lamp, that will light up when an extra generator is needed.
- A reverse power output which will be activated when the circulating current between the generators is too big. The current on which the reverse power output is activated can be adjusted by means of the RPLVL potentiometer. When the reverse power output is activated, the generators main circuit breaker, which supplies power to the load, will trip and disconnect the generator from the parallel operation.

The interface module (N15)

The interface module is located inside the cubicle. The module provides interfacing capabilities between the isochronous load sharing module and the electronic control module of the engine.

The check synchronizing relay (K16)

The check synchronizing relay is located inside the cubicle. The relay measures the electrical phase angle between the generator output voltage and the voltage to which the generator needs to be connected. If both voltages are in phase, taking into account a certain tolerance, the state of the check synchronizing relay changes and the undervoltage relay of the generators main circuit breaker will be activated, allowing the main circuit breaker to be closed.

If the circuit breaker is not closed during the period of minimal electrical phase difference and the generator drifts out of synchronism again, the state of the check synchronizing relay will change. At this moment, the generator cannot be put in parallel operation.

The allowable electrical phase difference between the two frequencies is adjustable at the relay between 0° and 30° and is factory set at 20°. A time delay is adjustable between 0 sec and 2 sec and is factory set at 0 sec.

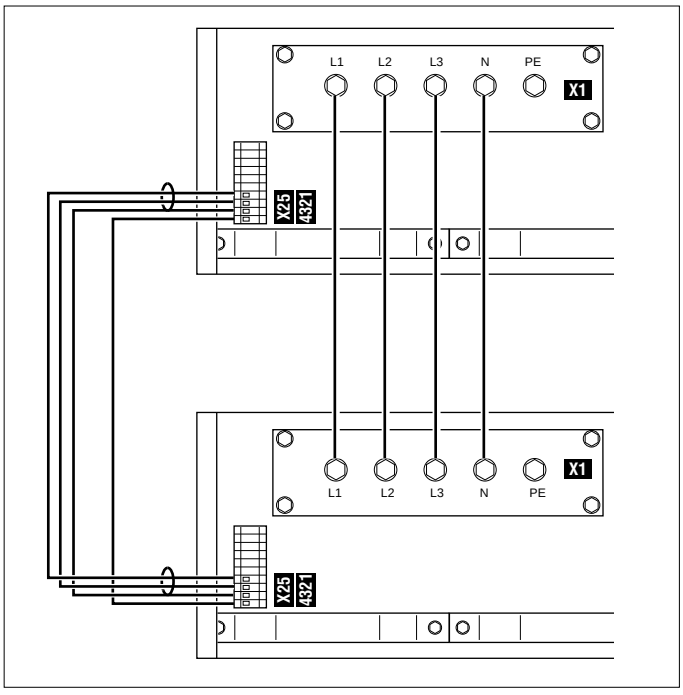
The moment the two generators are synchronized and the state of the check synchronizing relay changes, the check synchronizing lamp lights up, indicating that the generators main circuit breaker can be closed.

An override relay is mounted in parallel with the check synchronizing relay. The override relay enables closing the main circuit breaker when no voltage is available at the load side. This is the case when the first generator is started and synchronizing is not necessary yet.

Before starting parallel operation

Prior to starting parallel operation of two generators, the output voltage, the output frequency and the electrical phase angle of both generators have to be adjusted to the same values in no load conditions. Thereto, proceed as follows:

- Check that the circuit breakers Q1 are switched OFF.
- Connect the terminals L1, L2, L3 and N on the distribution panel (X1) of both generators. Make sure that no phases have been switched (L1-L1, L2-L2, L3-L3, N-N).



- Connect the terminals 1, 2, 3 and 4 of the isochronous load sharing modules (connections X25) of both generators. Use a coax cable to connect the terminals 1, 2 and 3. Terminals 1 and 2 are the data connections while terminal 3 is the screening of the coax cable. Terminal 4 is the battery negative. Make sure that the connections are made correctly (1-1, 2-2, 3-3, 4-4).
- Put the earth leakage relay lock out switches of both generators in the OFF position. This to make sure that the circuit breakers do not trip due to the small circulating current between the two generators.

⚠ By switching off the earth leakage relay lock out switches, the earth leakage protection at the generators side is disabled. Therefore, an earth leakage protection should be installed at the load side.

- Start each generator to warm it up.

– Adjust the output voltage of both generators until they are equal. This can be done by means of the voltage potentiometers and the voltmeters on the instrument control panel. For correct adjustment, it is recommended to measure the output voltage by means of a more accurate digital voltmeter. Practically, a voltage difference of 1 % between the two output voltages is acceptable.

When the output voltage difference between the two generators is too big, a circulating current will be delivered by the generator with the highest output voltage and will be absorbed by the generator with the lowest output voltage. The kVAr output of the generator with the highest voltage will increase. This can result in overheating the alternator windings. Therefore, it is important to limit the circulating currents by equaling the output voltages accurately.

– Adjust the output frequency of both generators until they are equal. This can be done by means of the frequency potentiometers on the engine control modules.
– Switch circuit breaker Q1 of the first generator ON. Further adjustments are done on the second generator.
– The electrical phase angle difference between the output voltages of both generators has to be zero. This phase angle difference can be checked by means of the synchronizing lamps (H19, H20) and the check synchronizing lamp (H18) on the second generator. The phase angle difference is zero when both synchronizing lamps are out and the check synchronizing lamp is on.

  Since the output frequency of both generators is not exactly the same, the phase angle difference will only be zero for a short period (2 to 5 sec). During this period both units can be connected in parallel (by closing circuit breaker Q1 of the second generator; adjust the frequencypotentiometer until the lamps stay out 2-5 sec).

When the two synchronizing lamps light up alternately, check the generator output cable connections and the phase sequence.

Failure to meet the required criteria for synchronization (same output voltage, same output frequency and same electrical phase angle) could result in serious damage.

Starting parallel operation

– When both the synchronizing lamps are out and the check synchronizing lamp is on, the generators are synchronized and circuit breaker Q1 of the second generator can be closed.

  The generators are now connected in parallel. Once the units are synchronized, the frequency of the output voltage will remain the same.
– Without applying any load to the generator, check the AC amperemeter on the generator. If the AC amperemeter deflects after the generators are connected in parallel, a circulating current is flowing from one unit to the other (reverse power). Adjust the amperemeter to zero again by means of the voltage potentiometer on the control panel of the generator.
– After starting parallel operation of the generators, turn the circuit breaker on the load side ON.

  The isochronous load sharing module will share the load evenly between the generators, according to the capacity of the units. It will also detect a circulating current and will deactivate one of the units if the circulating current exceeds the value set on the load sharing module.

Parallel operation of more than two generators

After connecting two generators in parallel, more generators can be added.

Once two (or more) generators are synchronized and connected in parallel, they can be treated as if they were one unit.

– Shut down or disconnect the load or make sure that the load is stable.
– Shut down the generators that are already in operation. Make sure not to change the settings on these generators.
– Connect the extra generator to the parallel connection of the first generators, treating these generators as one unit.
– Make sure that all circuit breakers Q1 are OFF.
– Start up the first generator and close its circuit breaker Q1.
– Start up the second (possibly third, fourth, ...) generator. Close its circuit breaker Q1 when the synchronizing lamps are out and the check synchronizing lamp is on. These units can now be considered as one unit.
– Carry out the actions described in “Before starting parallel operation” and “Starting parallel operation”, from “Adjust the output voltage…” onward, with the units that are already in operation treated as one unit. All adjustments have to be carried out on the extra generator.

Once the extra generator is synchronized, it can be used as a standby unit. If the load exceeds the nominal load of the first generator(s), the standby unit can be put in parallel operation by closing its circuit breaker Q1 when the synchronizing lamps are out and the check synchronizing lamp is on.

Stopping parallel operation

– Disconnect the load.
– Shut down the generators one by one.

TECHNICAL SPECIFICATIONS

READINGS ON GAUGES

Gauge	*Unit*	*Reading* 50 Hz	*Reading* 60 Hz
Ammeter L1 (P1)	A	Below max rating	Below max rating
Ammeter L2 (P2)	A	Below max rating	Below max rating
Ammeter L3 (P3)	A	Below max rating	Below max rating
Voltmeter (P4)	V	Depends upon selector switch	Depends upon selector switch
Frequencymeter (P5)	Hz	50	60
Hourmeter (P6)	h	Adding up	Adding up
Fuel level (P7)	Fuel tank full	Above 0	Above 0
Engine temperature (P8)	°C	Below 105	Below 105
Engine oil pressure (P9)	bar	Below max. rating	Below max. rating
Battery voltage gauge (P10)	V	Below max. rating	Below max. rating

SETTINGS OF SWITCHES

Switch	*Function*	*Activates at* 50 Hz	*Activates at* 60 Hz
Engine oil pressure	Shut-down	0.5 bar	0.5 bar
Engine coolant temperature	Shut-down	105 °C	105 °C

SPECIFICATIONS OF THE ENGINE/ALTERNATOR/UNIT

		50 Hz	60 Hz
Reference values	Absolute air inlet pressure	1 bar	1 bar
	Air inlet temperature	25 °C	25 °C
	Relative air humidity	30 %	30 %
	Generator load	Continuous	Continuous
Limitations without derating	Maximum ambient temperature	40 °C	40 °C
	Maximum altitude	1000 m	1000 m
	Maximum relative air humidity	85 %	85 %
	Minimum starting temperature	-18 °C	-18 °C
Engine	Type DETROIT DIESEL	S60	S60
	Rated net output	216 kW	253 kW
	Load speed	1500 rpm	1800 rpm
	Electrical system	24 V	24 V
	Battery (2x)	12 V / 143 Ah	12 V / 143 Ah
	Oil circuit capacity	36 l	36 l
	Cooling circuit capacity	44 l	44 l
	Fuel tank capacity	530 l	530 l
	Fuse F4	10 A	10 A
	Fuse F5	30 A	30 A
	Fuel consumption at full load/no load	40.8/7.2 kg/h	49.8/9.9 kg/h
	Maximum run time with fuel tank	11 h	9 h
Alternator	Type	ECN 37 LC	ECN 37 LC
	Rated net output	250 kVA	300 kVA
	Voltage line-to-neutral	230 V	240 V
	Voltage line-to-line	400 V	480 V
	Frequency	50 Hz	60 Hz
	Speed	1500 rpm	1800 rpm
	Power factor	0.8	0.8
	Number of phases	3 + neutral	3 + neutral
	Winding connections	Star	Star
	Insulation armature winding, class	H	H
	Insulation field winding, class	H	H
	Sensitivity of earth fault protection	0.03 A (0.1 A / 1 A)	0.03 A (0.1 A / 1 A)
	Setting of Q1	360 A	360 A
	Setting of Q2	16 A	16 A
	Fuses F1, F2 and F3 for voltmeter selector switch	4 A	4 A
	Maximum diffusion resistance of earthing rod	1 kΩ	1 kΩ
Unit	Dimensions (LxWxH)	3950x1440x2330 mm	3950x1440x2330 mm
	Weight net mass	4190 kg	4190 kg
	Weight wet mass	4700 kg	4700 kg

ENGINE DIAGNOSTIC CODES

To read the engine diagnostic codes, connect the diagnostic data reader to the diagnostic data socket (X20) or depress and hold the diagnostic request switch with the ignition on, the engine at idle or not running. Press and hold the switch.

Active codes will be flashed on the stop engine light, followed by the inactive codes being flashed on the check engine light. The cycle will repeat until the diagnostic request switch is released.

The flash code contains 2 digits:

– the first digit is the number of times L6 or L7 flashes slowly,

– the second digit is the number of times L6 or L7 flashes fast.

Flash code	Code description
11	VSG input low
12	VSG input high
13	Coolant level circuit low
14	Intercooler, coolant or oil temperature circuit high
15	Intercooler, coolant or oil temperature circuit low
16	Coolant level circuit high
17	Bypass position circuit high
18	Bypass position circuit low
21	TPS circuit high
22	TPS circuit low
23	Fuel temperature circuit high
24	Fuel temperature circuit low
25	No codes
26	Auxiliary shutdown #1 or #2 active
27	Air temperature circuit high
28	Air temperature circuit low
31	Auxiliary output short or open circuit (high side)
32	SEL short or open circuit
33	Boost pressure circuit high
34	Boost pressure circuit low
35	Oil pressure circuit high
36	Oil pressure circuit low
37	Fuel pressure circuit high
38	Fuel pressure circuit low
41	Too many SRS (missing TRS)
42	Too few SRS (missing SRS)
43	Coolant level low
44	Intercooler, coolant or oil temperature high
45	Oil pressure low
46	Battery voltage low

Flash code	Code description
47	Fuel pressure high
48	Fuel pressure low
52	A/D conversion fail
53	EEPROM write or nonvolatile checksum fail
54	Vehicle speed sensor fault
55	J1939 data link fault
56	J1587 data link fault
57	J1922 data link fault
58	Torque overload
61	Injector response time long
62	Auxiliary output open or short to battery
63	PWM open or short to battery
64	Turbo speed circuit failed
67	Coolant pressure circuit high or low
68	IVS switch fault, open or grounded circuit
71	Injector response time short
72	Vehicle overspeed
75	Battery voltage high
76	Engine overspeed with engine brake
81	Oil level or crankcase pressure circuit high
82	Oil level or crankcase pressure circuit low
83	Oil level or crankcase pressure high
84	Oil level or crankcase pressure low
85	Engine overspeed
86	Water pump or barometer pressure circuit high
87	Water pump or barometer pressure circuit low
88	Coolant pressure low

Circuit diagrams

Elektrische schema’s

Schémas de circuits

Schaltpläne

Esquema de conexiones

Kopplingsscheman

Diagrammi dei circuiti

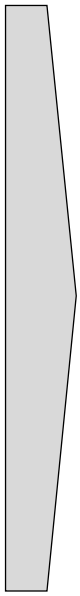
Kretsskjema

Kredsløbsdiagrammer

Διαγράμματα κυκλωμάτων

Esquemas eléctricos

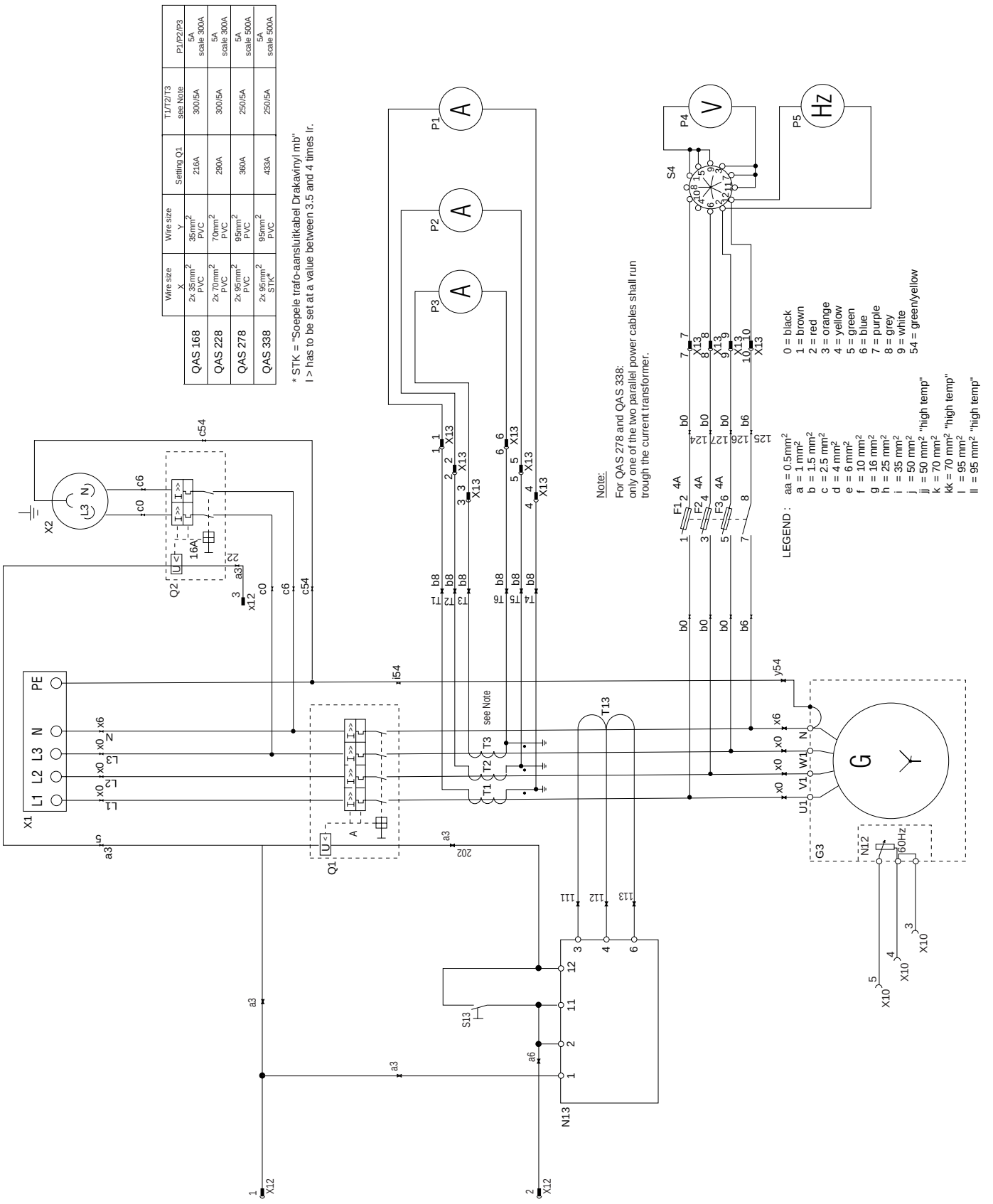
Sähkökaaviot



9822 0704 43
Applicable for QAS278 Gd

	Wire size X	Wire size Y	Setting Q1	T1/T2/T3 see Note	P1/P2/P3
QAS 168	2x 35mm² PVC	35mm² PVC	216A	300/5A	5A scale 300A
QAS 228	2x 70mm² PVC	70mm² PVC	290A	300/5A	5A scale 300A
QAS 278	2x 95mm² PVC	95mm² PVC	360A	250/5A	5A scale 500A
QAS 338	2x 95mm² STK*	95mm² PVC	433A	250/5A	5A scale 500A

* STK = "Soepele trafo-aansluitkabel Drakavinyl mb"
I > has to be set at a value between 3.5 and 4 times Ir.



CIRCUIT DIAGRAM
ELEKTRISCH SCHEMA
SCHEMA DE CIRCUIT
VERDRAHTUNGSPLAN
DIAGRAMA DE CIRCUITOS
KOPPLINGSSCHEMA

DIAGRAMMA DEL CIRCUITO
KRETSSKJEMA
STRØMDIAGRAM
ΔΙΑΓΡΑΜΜΑ ΚΥΚΛΩΜΑΤΟΣ
DIAGRAMA DOS CIRCUITOS
SÄHKÖKAAVIO

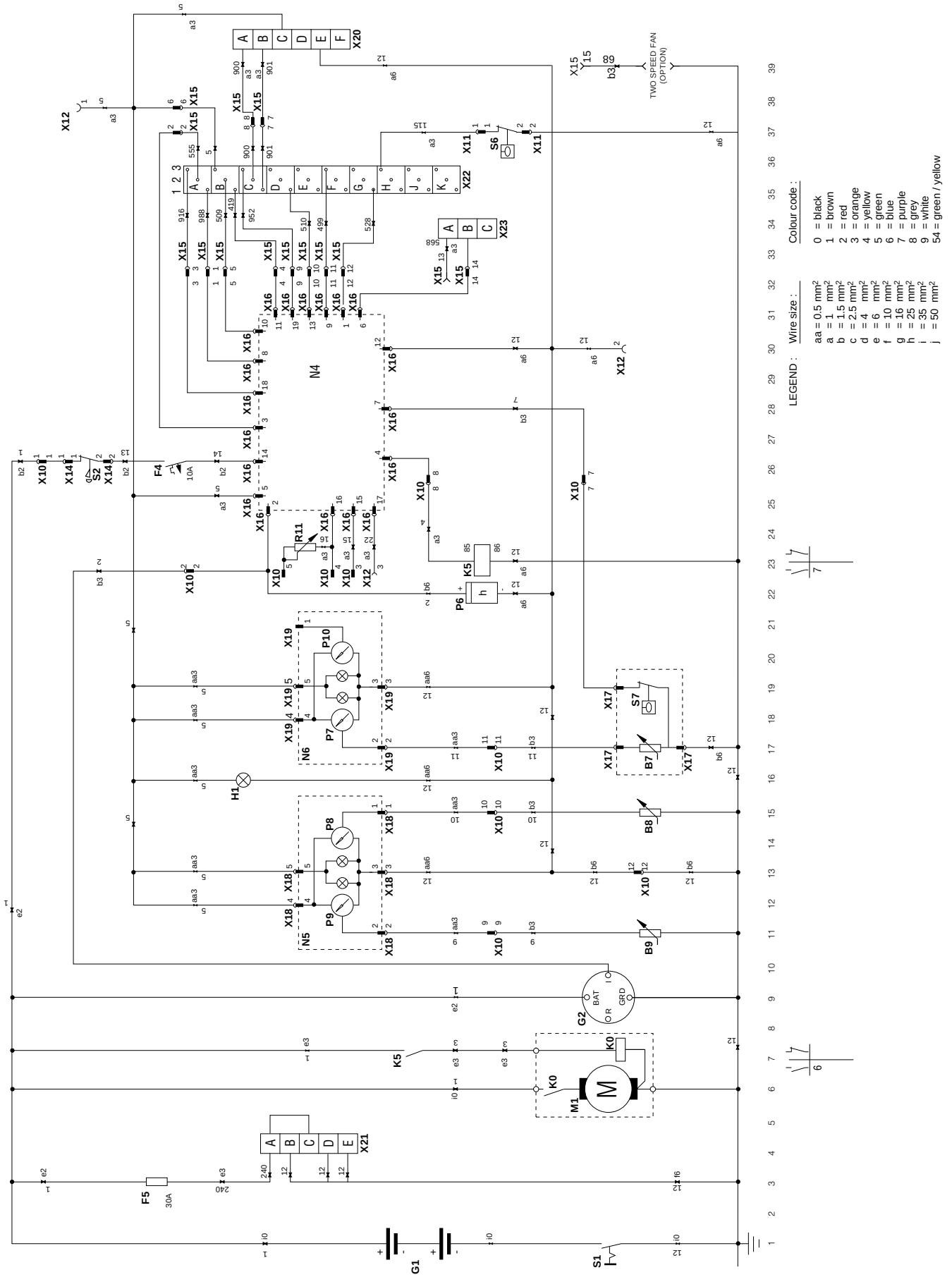
9822 0704 43

	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
F1-3	Fuse 4A	Zekering 4A	Fusible 4A	Sicherung 4 A
G3	Generator	Generator	Groupe électrogène	Generator
N12	Automatic voltage regulator	Automatische spanningsregelaar	Régulateur de tension automatique	Automatischer Spannungsregler
N13	Earth fault-current relay	Aardlekrelais	Relais de fuite à la terre	Erdschlußrelais
P1-3	Amperemeter 0-300A	Ampèremeter 0-300A	Ampèremètre 0-300A	Amperemeter 0 - 300A
P4	Voltmeter 0-500V	Voltmeter 0-500V	Voltmètre 0-500V	Voltmeter 0 - 500 V
P5	Frequencymeter 45-65Hz	Frekwentiemeter 45-65Hz	Fréquencemètre 45-65Hz	Frequenzmesser 45 - 65 Hz
Q1	Circuit breaker 216A/4-pole	Vermogenschakelaar 216A/4-polig	Disjoncteur 216A/4 pôles	Leistungsschalter 216A / vierpolig
Q2	Circuit breaker 16A/2-pole	Vermogenschakelaar 16A/2-polig	Disjoncteur 16A/2 pôles	Leistungsschalter 16A / 2-polig
S4	Voltmeter selector switch	Voltmeter keuzeschakelaar	Sélécteur de voltmètre	Voltmeter-Wahlschalter
S13	Earth fault relay lock-out switch	Blokkeerschakelaar verliesstroomrelais	Commutateur de verrouillage de relais des défauts à la terre	Riegelschalter Erdschlußrelais
T1-3	Current transformer 300A/5A	Stroomtransformator 300A/5A	Transformateur de courant 300A/5A	Stromwandler 300A / 5 A
T13	Earth fault-current detector	Aardlekdetector	Détecteur de fuite à la terre	Erdschlußanzeiger
X1	Main power supply	Hoofdstroomketen	Circuit d'alimentation principal	Hauptstromversorgung
X2	1-phase outlet socket	Uitlaatpunt - 1 fase	Prise - 1 phase	Einphasen-Steckdose
X10	15-pole connector	Konnektor, 15 stiften	Connecteur, 15 broches	Zwölfpoliger Stecker
X12	2-pole connector	Konnektor, 2 stiften	Connecteur, 2 broches	Zweipoliger Stecker
X13	12-pole connector	Konnektor, 12 stiften	Connecteur, 12 broches	Zwölfpoliger Stecker

	ESPAÑOL	SVENSKA	ITALIANO	NORSK
F1-3	Fusible 4A	Säkring 4A	Fusibile 4A	Sikring 4 A
G3	Generador	Generator	Generatore	Generator
N12	Regulador automático de voltaje	Automatisk spänningsregulator	Regolatore di tensione automatico	Automatisk spenningsregulator
N13	Relé de pérdida a tierra	Relä för jordläckage	Relè corrente di terra	Jordfeilrelé
P1-3	Amperímetro 0-300A	Amperemätare 0-300A	Amperometro 0–300A	Amperemeter 0-300 A
P4	Voltímetro 0-500V	Spänningsmätare 0-500V	Voltimetro 0–500V	Spenningsmåler 0-500 V
P5	Frecuencímetro 45-65Hz	Frekvensmätare 45-65 Hz	Frequenziometro 45-65 Hz	Frekvensmåler 45-65 Hz
Q1	Disyuntor 216A/cuadripolar	Strömbrytare 216A/4-polig	Interruttore 216A/4 poli	Kretsbryter 216 A/4-polet
Q2	Disyuntor 16A/2-polar	Strömbrytare 16A/2-polig	Interruttore 16A/2 poli	Kretsbryter 16 A/2-polet
S4	Selector de voltímetro	Spänningsmätarens kopplingsväljare	Interruttore di selezione del voltimetro	Valgbryter for spenningsmåler
S13	Interruptor de bloqueo del relé de pérdida a tierra	Avstängningsbrytare för jordfelsrelä	Interruttore chiusura relé guasto di terra	Avstengingsbryter for jordfeilrelé
T1-3	Transformador de corriente 300A/5A	Strömtransformator 300A/5A	Transformatore di corrente 300A/5A	Strøm 300 A/5 A
T13	Detector de pérdida a tierra	Detektor för jordläckage	Rilevatore corrente di terra	Jordfeilføler
X1	Suministro principal	Nätströmsenhet	Alimentazione principale	Nettstrøm
X2	Caja de contacto monofásica	1-fas uttag	Presa monofase	1-faset uttak
X10	Conector de 15 polos	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X12	Conector bipolar	2-poligt kontaktdon	Connettore a 2 poli	2-polet kontakt
X13	Conector de 12 polos	12-poligt kontaktdon	Connettore a 12 poli	12-polet kontakt

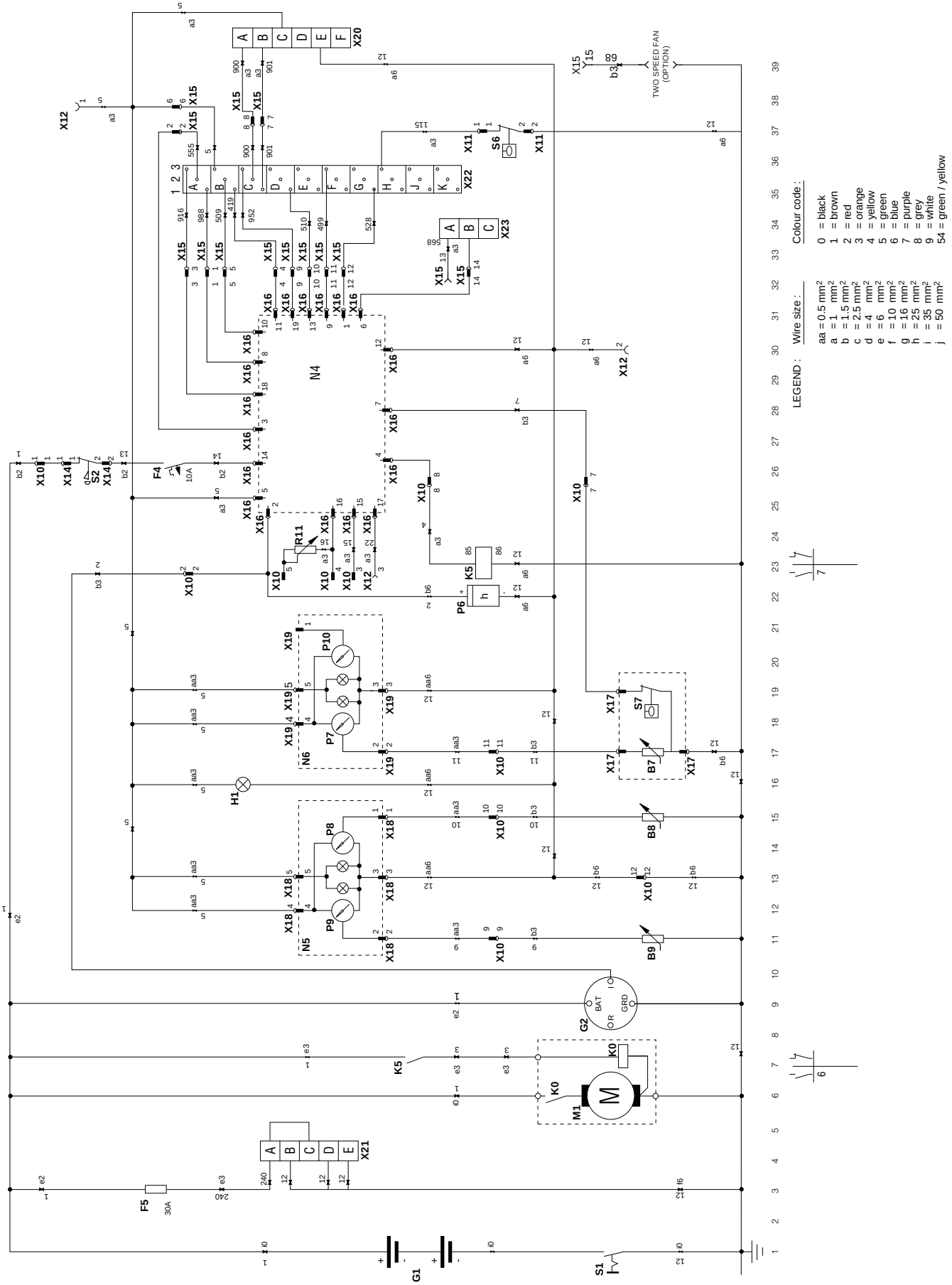
	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
F1-3	Sikring 4A	Ασφάλεια 4 Α	Fusível 4A	Varoke 4A
G3	Generator	Γεννήτρια	Gerador	Vaihtovirtageneraattori
N12	Automatisk spændingsregulator	Αυτόματος ρυθμιστής τάσης	Regulador automático da potência	Automaattinen jännitteensäädin
N13	Jordfejlstrømsrelæ	Ρελέ ρεύματος γείωσης	Relé de detecção de falha de terra	Maavuotorele
P1-3	Amperemeter 0-300A	Αμπερόμετρο 0 - 300Α	Amperímetro 0-300A	Ampeerimittari 0-300 A
P4	Voltmeter 0-500V	Βολτόμετρο 0 - 500 V	Voltímetro 0-500 V	Volttimittari 0-500 V
P5	Frekvensmåler 45-65Hz	Μετρητής συχνότητας 45 - 65 Hz	Frequencímetro 45-65Hz	Taajuusmittari 45-65 Hz
Q1	Afbryder 216A/4-polig	Διακόπτης κυκλώματος 216Α - 4πολικός	Disjuntor 216A/tetrapolar	Virrankatkaisin 216 A/4-napainen
Q2	Afbryder 16A/2-polig	Διακόπτης κυκλώματος 16Α - 2πολικός	Disjuntor 16A/2-polar	Virrankatkaisin 16 A/2-napainen
S4	Voltmeterets omskifterknap	Διακόπτης επιλογής βολτομέτρου	Comutador selector do voltímetro	Volttimittarin valintakytkin
S13	Afbryderkontakt til jordfejlstrømsrelæ	Διακόπτης αποκλεισμού μετάδοσης λάθους στη γείωση	Interruptor selector do relé de corrente de defeito à terra	Maavuodon tunnistimen sulkukytkin
T1-3	Strømtransformere 300A/5A	Μετασχηματιστής ρεύματος 300Α / 5Α	Transformador de corrente 300A/5A	Virtamuuntaja 300A/5A
T13	Jordfejlstrømsdetektor	Ανιχνευτής ρεύματος γείωσης	Detector de falha de corrente de terra	Maavuodon tunnistin
X1	Hovedkredsløb	Παροχή κυρίου ρεύματος	Fonte de alimentação principal	Päävirtalähde
X2	1-faset stikkontakt	Μπρίζα μονοφασικού ρεύματος	Tomada de saída monofásica	1-vaihepistorasia
X10	15-faset kontaktklemme	15πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X12	2-faset kontaktklemme	2πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X13	12-faset kontaktklemme	12πολικός σύνδεσμος	Ligação em 12 polos	12-napainen liitin

9822 0705 21
Applicable for QAS278 Gd, Gd EDF, Gd PAR



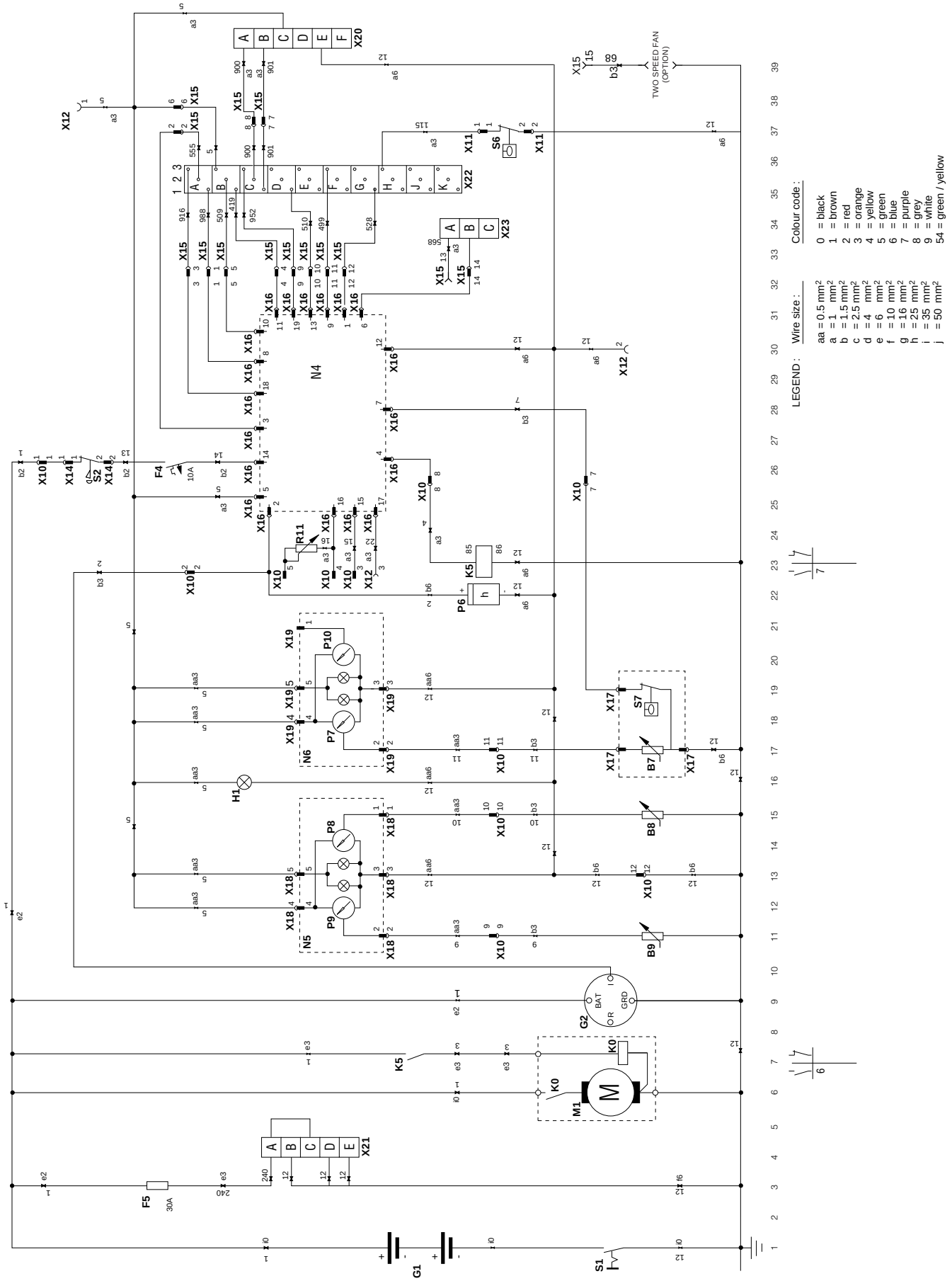
	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
B7	Fuel level sensor	Sensor, brandstofpeil	Capteur, niveau de carburant	Kraftstoffstandfühler
B8	Coolant temperature sensor	Sensor, koelwatertemperatuur	Capteur, température eau de refroidissement	Kühlwassertemperaturfühler
B9	Oil pressure sensor	Sensor, oliedruk	Capteur, pression d'huile	Öldruckfühler
F4	Fuse 10A	Zekering 10A	Fusible 10A	Sicherung 10A
F5	Fuse 30A	Zekering 30A	Fusible 30A	Sicherung 30A
G1	Battery 24V	Batterij 24V	Batterie 24V	Batterie 24V
G2	Charging generator	Laad alternator	Alternateur, charge	Lademaschine
H1	Panel light	Paneelverlichting	Eclairage panneau	Instrumentenleuchte
K0	Starter solenoid	Startersolenoïde	Solénoide du démarreur	Startermagnet
K5	Starter relay	Starterrelais	Relais de démarreur	Startrelais
M1	Starter motor	Startermotor	Démarreur	Startmotor
N4	Control module	Stuurmodule	Module de commande	Steuermodul
N5, 6	Instrument cluster	Instrumentengeheel	Instrumentation	Instrumentensatz
P6	Hourmeter	Urenteller	Compteur d'heures	Stundenzähler
P7	Fuel level gauge	Brandstofpeilindicator	Indicateur de niveau de carburant	Meßinstrument für Kraftstoffstand
P8	Coolant temperature gauge	Koelwater temperatuurmeter	Indicateur de temp., eau de refroid.	Meßinstrument für Kühlwassertemperatur
P9	Oil pressure gauge	Manometer, oliedruk	Indicateur, pression d'huile	Meßinstrument für Öldruck
P10	Battery voltage gauge	Batterijvoltmeter	Voltmètre de batterie	Batteriespannungsmesser
R11	Voltage adjust potentiometer	Spanningsinstelpotentiometer	Potentiomètre de réglage de tension	Spannungseinstellpotentiometer
S1	Battery switch	Batterijschakelaar	Interrupteur de batterie	Batterieschalter
S2	Emergency stop button	Noodstopknop	Bouton arrêt d'urgence	Not-Aus-Taste
S6	Low coolant level switch	Schakelaar laag koelwaterpeil	Commutateur de niveau de réfrigérant bas	Schalter für niedrigen Kühlmittelstand
S7	Low fuel level switch	Schakelaar, laag brandstofpeil	Interrupteur niveau de carburant bas	Schalter für niedrigen Kraftstoffstand
X10	15-pole connector	Konnektor, 15 stiften	Connecteur 15 broches	15-poliger Stecker
X11	Coolant level switch connector	Connector schakelaar koelwaterpeil	Connecteur du commutateur du niveau de réfrigérant	Stecker Kühlmittelstandschalter
X12	3-pole connector	Konnektor, 3 stiften	Connecteur 3 broches	Dreipoliger Stecker
X14	2-pole connector	Konnektor, 2 stiften	Connecteur 2 broches	Zweipoliger Stecker
X15	15-pole connector	Konnektor, 15 stiften	Connecteur 15 broches	15-poliger Stecker
X16	Control module connector	Connector besturingsmodule	Connecteur du module de commande	Stecker Steuermodul
X17	Fuel level unit connector	Konnektor brandstofpeil module	Connecteur du module de niveau d'huile	Stecker für Kraftstoffstandeinheit
X18, 19	Instrument cluster connector	Connector instrumentencluster	Connecteur de groupage d'instrument	Stecker Instrumentengruppe
X20	Diagnostic data socket (DDEC)	Contactdoos diagnosegegevens (DDEC)	Prise pour données de diagnostic (DDEC)	Diagnosedatenbuchse (DDEC)
X21	Power connector (DDEC)	Vermogensconnector (DDEC)	Connecteur de puissance (DDEC)	Starkstromstecker (DDEC)
X22	30-pole connector (DDEC)	30-polige connector (DDEC)	Connecteur 30 broches (DDEC)	30poliger Stecker (DDEC)
X23	Engine sensor harness connector (DDEC)	Connector motorsensor harnas (DDEC)	Connecteur du harnais de capteur de moteur (DDEC)	Stecker Motorsensorkabel (DDEC)

9822 0705 21
Applicable for QAS278 Gd, Gd EDF, Gd PAR



	ESPAÑOL	SVENSKA	ITALIANO	NORSK
B7	Sensor del nivel de combustible	Sensor - bränslenivå	Sensore del livello di combustibile	Føler for drivstoffnivå
B8	Sensor de temperatura del refrigerante	Sensor - kylvätskans temperatur	Sensore della temperatura del refrigerante	Føler for kjølevæsketemperatur
B9	Sensor de presión de aceite	Oljetryckssensor	Sensore della pressionde dell'olio	Oljetrykkføler
F4	Fusible 10A	Säkring 10A	Fusibile 10A	Sikring 10A
F5	Fusible 30A	Säkring 30A	Fusibile 30A	Sikring 30A
G1	Batería de 24V	Batteri 24V	Batteria a 24V	Batteri 24 V
G2	Generador de carga	Laddningsgenerator	Generatore di carica	Ladegenerator
H1	Luz de panel	Panelljus	Luci del pannello	Panellys
K0	Solenoide de arranque	Startsolenoid	Solenoide dell'avviatore	Magnetkontakt for starter
K5	Relé arrancador	Startrelä	Relé di avviamento	Startrelé
M1	Motor de arranque	Startmotor	Motore dell'avviatore	Starter
N4	Módulo de control	Kontrollmodul	Modulo di controllo	Kontrollmodul
N5, 6	Grupo de instrumentos	Instrumentgrupp	Gruppo degli strumenti	Instrumentgruppe
P6	Cuentahoras	Timmätare	Contaore	Timeteller
P7	Indicador del nivel de combustible	Bränslenivåmätare	Indicatore di livello del combustibile	Drivstoffmåler
P8	Indicador de temperatura del refrigerante	Kylvätsketemperaturmätare	Indicatore della temperatura del refrigerante	Måler for kjølevæsketemperatur
P9	Indicador de la presión de aceite	Oljetrycksmätare	Indicatore della pressione dell'olio	Oljetrykkmåler
P10	Medidor de tensión en la batería	Batterispänningsmätare	Indicatore del voltaggio della batteria	Batterispenningsmåler
R11	Potenciómetro de ajuste de voltaje	Potentiometer för spänningsjustering	Potenziometro regolazione voltaggio	Potensiometer for spenningskorrigering
S1	Interruptor de batería	Batteriströmställare	Interruttore della batteria	Batteribryter
S2	Botón de parada de emergencia	Knapp för nödstopp	Pulsante di arresto di emergenza	Knapp for sikkerhetsstopp
S6	Interruptor de nivel de refrigerante bajo	Brytare för låg kylvätskenivå	Interruttore basso livello del liquido refrigerante	Bryter for lavt kjølevæskenivå
S7	Interruptor bajo nivel de combustible	Brytare för låg bränslenivå	Interruttore di basso livello del combustibile	Bryter for lavt drivstoffnivå
X10	Conector de 12 polos	10-poligt kontaktdon	Connettore a 12 poli	12-polet kontakt
X11	Conector del interruptor de nivel de refrigerante	Brytaranslutning för låg kylvätskenivå	Connettore interruttore livello liquido refrigerante	Kontakt for kjølevæskenivåbryter
X12	Conector 3-polar	3-poligt kontaktdon	Connettore a 3 poli	3-polet kontakt
X14	Conector bipolar	2-poligt kontaktdon	Connettore a due poli	2-polet kontakt
X15	Conector 15-polar	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X16	Conector del módulo de control	Anslutning för kontrollmodul	Connettore modulo di controllo	Kontakt for kontrollmodul
X17	Conector unidad nivel de combustible	Bränslenivåenhetens kontaktdon	Connettore dell'unitá livello del combustibile	Kontakt for drivstoffnivåenhet
X18, 19	Conector del grupo de instrumentos	Anslutning för instrumentgrupp	Connettore quadro strumenti	Kontakt for instrumentgruppe
X20	Casquillo para datos de diagnóstico (DDEC)	Uttag för diagnostikdata (DDEC)	Presa dati diagnostici (DDEC)	Feilsøkingskontakt (DDEC)
X21	Conector de alimentación (DDEC)	Strömanslutning (DDEC)	Connettore di alimentazione (DDEC)	Strømkontakt (DDEC)
X22	Conector con 30 polos (DDEC)	30-polig anslutning (DDEC)	Connettore a 30 poli (DDEC)	30-polet kontakt (DDEC)
X23	Conector de cableado sensor del motor (DDEC)	Anslutning för motorns sensorkabel (DDEC)	Connettore cablaggio sensore motore (DDEC)	Kontakt for maskinføler (DDEC)

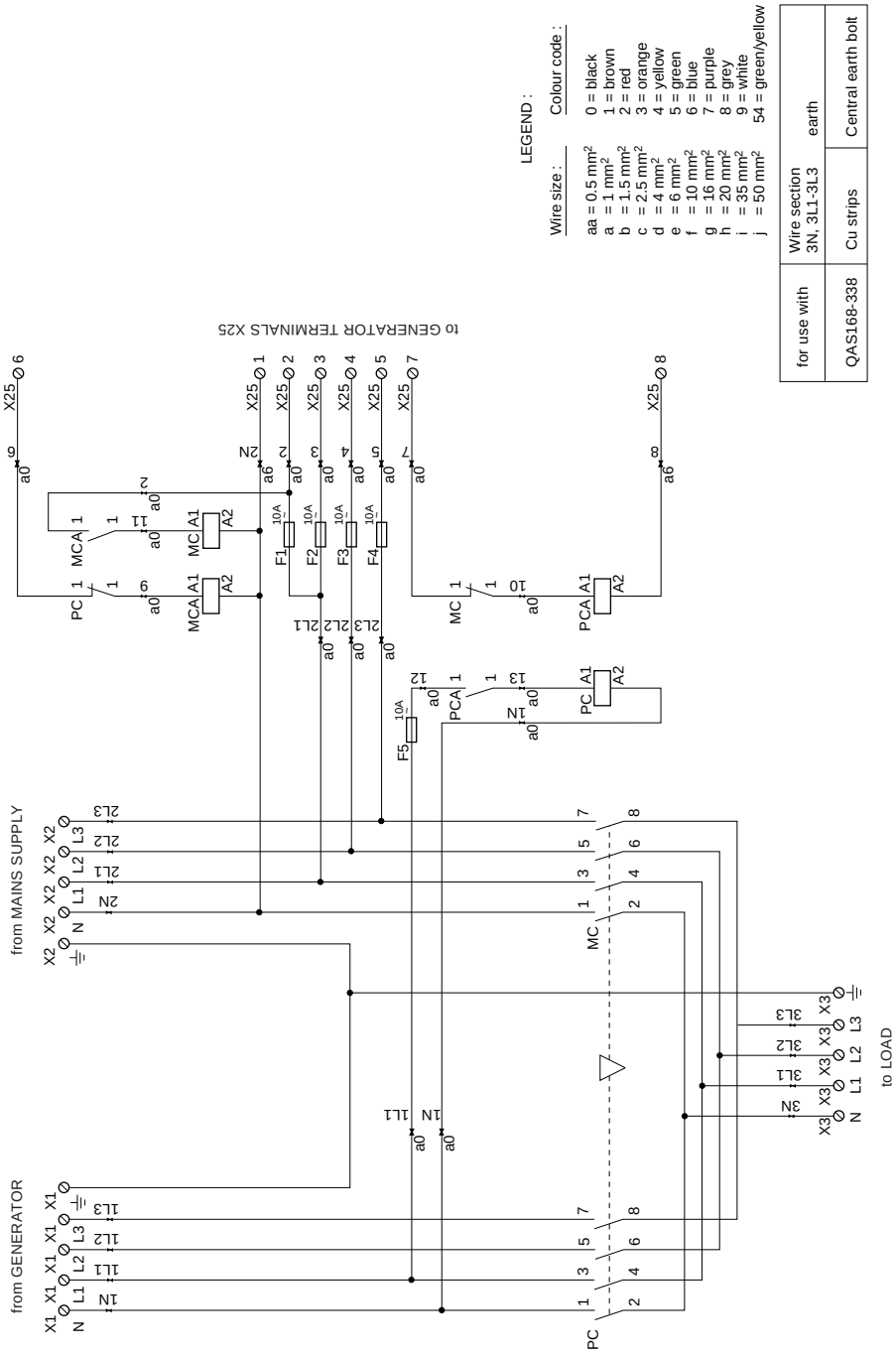
9822 0705 21
Applicable for QAS278 Gd, Gd EDF, Gd PAR



9822 0705 21

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
B7	Brændstofniveaufører	Αισθητήρας στάθμης καυσίμου	Sensor do nível de combustível	Polttoainemäärän anturi
B8	Kølevandstemperaturfører	Αισθητήρας θερμοκρασίας ψυκτικού	Sensor da temperatura do refrigerante	Jäähdytysnesteen lämpötilan anturi
B9	Olietrykfører	Αισθητήρας πίεσης λαδιού	Sensor da pressão do óleo	Öljynpainearturi
F4	Sikring 10A	Ασφάλεια 10Α	Fusível 10A	Varoke 10A
F5	Sikring 30A	Ασφάλεια 30Α	Fusível 30A	Varoke 30A
G1	Batteri 24V	Μπαταρία 24V	Bateria 24 V	Akku 24 V
G2	Ladegenerator	Φορτιστής γεννήτριας	Gerador de carga	Latausgeneraattori
H1	Lampe	Λυχνία πίνακα	Luz do painel	Kojetaulun valo
K0	Startmagnet	Σωληνοειδές εκκίνησης	Solenóide do motor de arranque	Käynnistyssolenoidi
K5	Startrelæ	Αναμετάδοση Μίζας	Relé do motor de arranque	Käynnistysrele
M1	Startermotor	Μίζα	Motor de arranque	Käynnistysmoottori
N4	Kontrolmodul	Στοιχείο ελέγχου	Módulo de controlo	Ohjainmoduli
N5, 6	Instrumentgruppe	Σύμπλεγμα οργάνων	Grupo de instrumentos	Kojeisto
P6	Timetæller	Ωρομετρητής	Contador de horas	Käyttöuntimittari
P7	Brændstofniveaumeter	Όργανο μέτρησης στάθμης καυσίμου	Indicador do nível de combustível	Polttoainemittari
P8	Kølevandstermometer	Όργανο μέτρησης θερμοκρασίας ψυκτικού	Indicador da temperatura do refrigerante	Jäähdytysnesteen lämpömittari
P9	Manometer, olietryk	Όργανο μέτρησης πίεσης λαδιού	Indicador da pressão de óleo	Öljynpainemittari
P10	Måler for batteriets spænding	Όργανο μέτρησης της τάσης της μπαταρίας	Voltímetro da bateria	Akkujännitemittari
R11	Potentiometer til justering af spændingen	Μετρητής δυνατότητας προσαρμογής τάσης	Potenciómetro de ajustamento da voltagem	Jännitteensäätöpotentiometri
S1	Batterikontakt	Διακόπτης μπαταρίας	Comutador da bateria	Akkukytkin
S2	Nødstopknap	Μπουτόν σβησίματος έκτακτης ανάγκης	Botão de paragem de emergência	Hätäpysäytyskytkin
S6	Kontakt for lavt kølevæskeniveau	Διακόπτης χαμηλής στάθμης ψυκτικού	Interruptor do nível baixo do líquido de arrefecimento	Alhaisen jäähdytysnestemäärän kytkin
S7	Brændstofniveaukontakt	Διακόπτης χαμηλής στάθμης καυσίμου	Comutador do nível baixo de combustível	Alhaisen polttoainemäärän merkkivalon kytkin
X10	12 -faset kontaktklemme	12-πολικός σύνδεσμος	Ligação em 12 polos	12-napainen liitin
X11	Kontakkonnektor for kølevæskeniveau	Συνδεσμος διακόπτη στάθμης ψυκτικού	Dispositivo de ligação do interruptor do nível do líquido de arrefecimento	Jäähdytysnestemäärän kytkin
X12	3 -faset kontaktklemme	3-πολικός σύνδεσμος	Ligação em 3 polos	3-napainen liitin
X14	2 -faset kontaktklemme	2-πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X15	15 -faset kontaktklemme	15-πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X16	Kontrolmodulkonnektor	Συνδεσμος ελέγχου κατεύθυνσης	Dispositivo de ligação do módulo de controlo	Ohjausliitteen liitin
X17	Kontakklemme for brændstofniveau	Σύνδεσμος μονάδος στάθμης καυσίμου	Ligação da unidade do nível de combustível	Polttoainemäärän ilmaisimen liitin
X18, 19	Gruppeinstrumentkonnektor	Συνδεσμος συστάδας οργάνου	Dispositivo de ligação do grupo de instrumentos	Kojeiston liitin
X20	Fejlfindingsstikkontakt (DDEC)	Υποδοχή διαγνωστικών πληροφοριών (DDEC)	Ficha de dados de diagnóstico (DDEC)	Diagnoosipistorasia (DDEC)
X21	Strømkonnektor (DDEC)	Συνδεσμος ενέργειας (DDEC)	Ligação da corrente (DDEC)	Virtaliitin (DDEC)
X22	30-pols konnektor	Συνδεσμος 30 πόλων (DDEC)	Dispositivo de ligação de 30 pinos (DDEC)	30-napainen liitin
X23	Følekonnektor ved motorens ledningsnet	Συνδεσμος αισθητήρα στήριξης μηχανής (DDEC)	Dispositivo de ligação da instalação eléctrica do sensor do motor (DDEC)	Moottorintunnistinjohtosarjan liitin (DDEC)

9822 0773 55
Applicable for QAS278 Gd AMF



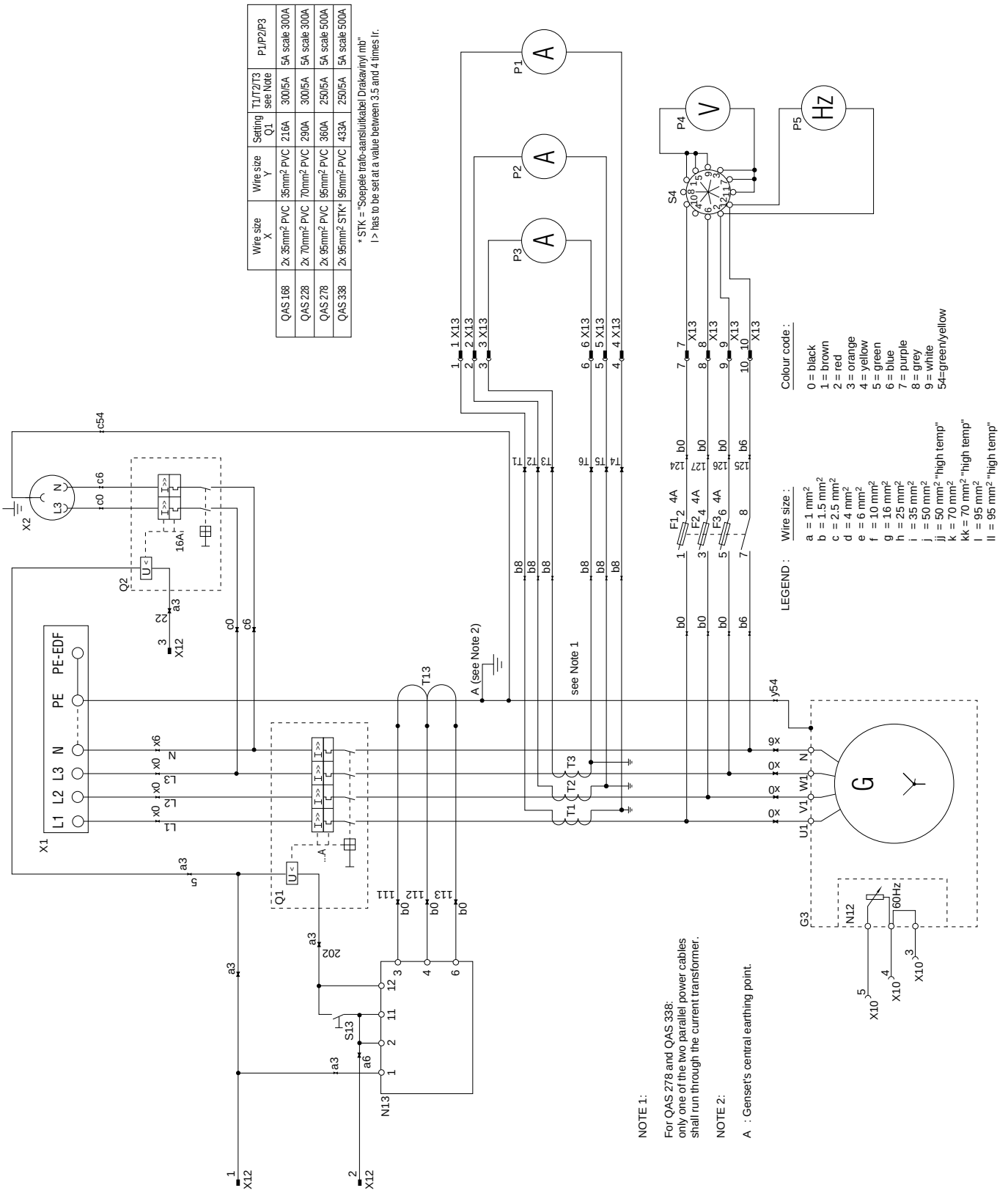
	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
F1-5	Fuse 10A	Zekering 10A	Fusible 10A	Sicherung 10A
MC	Contactor mains supply	Contactor voor de netspanning	Alimentation secteur de contacteur	Schütz Netzanschluß
MCA	Auxiliary relay for MC	Bijkomende relais MC	Relais auxiliaire MC	Hilfsrelais MC
PC	Contactor generator	Contactor voor de generator	Générateur de contacteur	Schütz Generator
PCA	Auxiliary relay for PC	Bijkomende relais PC	Relais auxiliaire PC	Hilfsrelais PC
X1-3	Terminal strip	Klemmenstrook	Barrette de raccordement	Klemmenleiste
X25	Terminal strip	Klemmenstrook	Barrette de raccordement	Klemmenleiste

	ESPAÑOL	SVENSKA	ITALIANO	NORSK
F1-5	Fusible 10A	Säkring 10A	Fusibile 10A	Sikring 10A
MC	Suministro principal del contactor	Nätströmsanslutning	Alimentazione contattore	Kontaktorstrømforsyning
MCA	Relé auxiliar MC	Hjälprelä MC	Relé ausiliario MC	Hjelperelé MC
PC	Dínamo del contactor	Generatoranslutning	Generatore del contattore	Kontaktorgenerator
PCA	Relé auxiliar PC	Hjälprelä PC	Relé ausiliario PC	Hjelperelé PC
X1-3	Bloque de terminales	Anslutningslist	Morsettiera	Koplingssplint
X25	Bloque de terminales	Anslutningslist	Morsettiera	Koplingssplint

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
F1-5	Sikring 10A	Ασφάλεια 10A	Fusível 10A	Varoke 10A
MC	Kontaktor til strømforsyning	Παροχή ηλεκτρικών αγωγών επαφέα	Contactor de corrente principal	Verkkosyötön liitin
MCA	Hjælperelæ MC	Βοηθητικός ρελέ MC	Relé auxiliar MC	Apureleen MC
PC	Kontaktor til generator	Γεννήτρια επαφέα	Contactor do gerador	Generaattorin liitin
PCA	Hjælperelæ PC	Βοηθητικός ρελέ PC	Relé auxiliar PC	Apureleen PC
X1-3	Klemliste	Λωρίδα ακροδέκτη	Faixa de terminais	Liitäntärima
X25	Klemliste	Λωρίδα ακροδέκτη	Faixa de terminais	Liitäntärima

9822 0773 55

9822 0773 67
Applicable for QAS278 Gd EDF



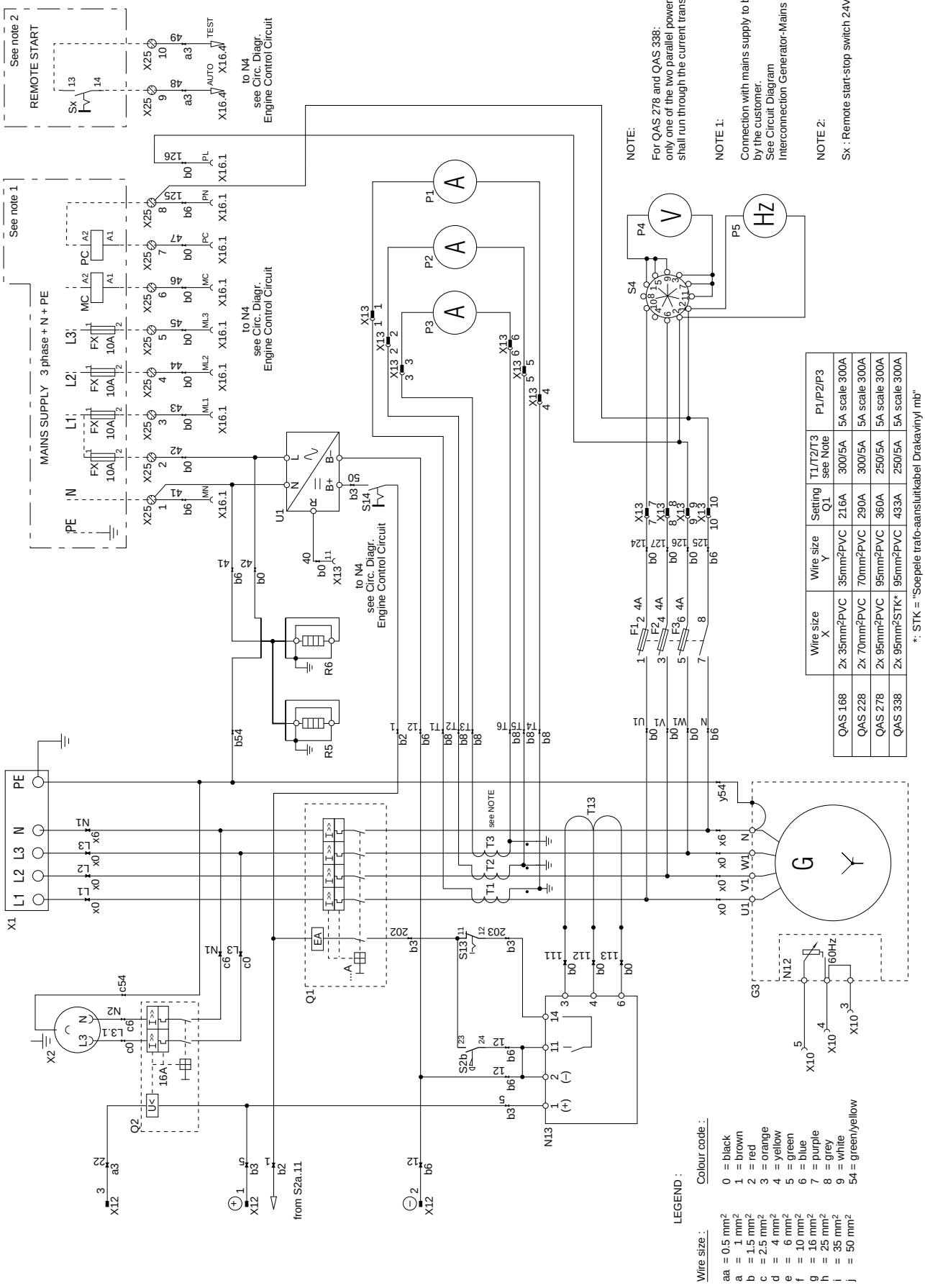
	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
F1-3	Fuse 4A	Zekering 4A	Fusible 4A	Sicherung 4 A
G3	Generator	Generator	Groupe électrogène	Generator
N12	Automatic voltage regulator	Automatische spanningsregelaar	Régulateur de tension automatique	Automatischer Spannungsregler
N13	Earth fault-current relay	Aardlekrelais	Relais de fuite à la terre	Erdschlußrelais
P1-3	Amperemeter	Ampèremeter	Ampèremètre	Amperemeter
P4	Voltmeter	Voltmeter	Voltmètre	Voltmeter
P5	Frequencymeter	Frekwentiemeter	Fréquencemètre	Frequenzmesser
Q1	Circuit breaker 4-pole	Vermogenschakelaar 4-polig	Disjoncteur 4 pôles	Leistungsschalter vierpolig
Q2	Circuit breaker 2-pole	Vermogenschakelaar 2-polig	Disjoncteur 2 pôles	Leistungsschalter vierpolig
S4	Voltmeter selector switch	Voltmeter keuzeschakelaar	Sélécteur de voltmètre	Voltmeter-Wahlschalter
S13	Earth fault relay lock-out switch	Blokkeerschakelaar verliesstroomrelais	Commutateur d'arrêt de relais des défauts à la terre	Riegelschalter Erdschlußrelais
T1-3	Current transformer	Stroomtransformator	Transformateur de courant	Stromwandler
T13	Earth fault-current detector	Aardlekdetector	Détecteur de fuite à la terre	Erdschlußanzeiger
X1	Terminal board	Klemmenbord	Tablette à bornes	Klemmenbrett
X2	Outlet socket	Uitlaatpunt	Prise femelle	Anschlußdose
X10	15-pole connector	Konnektor, 15 stiften	Connecteur, 15 broches	15-poliger Stecker
X12	2-pole connector	Konnektor, 2 stiften	Connecteur, 2 broches	Zweipoliger Stecker
X13	12-pole connector	Konnektor, 12 stiften	Connecteur, 12 broches	Zwölfpoliger Stecker

	ESPAÑOL	SVENSKA	ITALIANO	NORSK
F1-3	Fusible 4A	Säkring 4A	Fusibile 4A	Sikring 4 A
G3	Generador	Generator	Generatore	Generator
N12	Regulador automático de voltaje	Automatisk spänningsregulator	Regolatore di tensione automatico	Automatisk spenningsregulator
N13	Relé de pérdida a tierra	Relä för jordläckage	Relè corrente di terra	Jordfeilrelé
P1-3	Amperímetro	Amperemätare	Amperometro	Amperemeter
P4	Voltímetro	Spänningsmätare	Voltimetro	Spenningsmåler
P5	Frecuencímetro	Frekvensmätare	Frequenziometro	Frekvensmåler
Q1	Disyuntor cuadripolar	Strömbrytare 4-polig	Interruttore 4 poli	Kretsbryter 4-polet
Q2	Disyuntor 2-polar	Strömbrytare 2-polig	Interruttore 2 poli	Kretsbryter 2-polet
S4	Selector de voltímetro	Spänningsmätarens kopplingsväljare	Interruttore di selezione del voltimetro	Valgbryter for spenningsmåler
S13	Interruptor de bloqueo del relé de pérdida a tierra	Avstängningsbrytare för jordfelsrelä	Interruttore chiusura relé guasto di terra	Avstengingsbryter for jordfeilrelé
T1-3	Transformador de corriente	Strömtransformator	Transformatore di corrente	Strøm
T13	Detector de pérdida a tierra	Detektor för jordläckage	Rilevatore corrente di terra	Jordfeilføler
X1	Cuadro de bornas	Anslutningsplint	Morsettiera	Koplingstavle
X2	Casquillo de toma de corriente	Uttag	Presa esterna	Uttak
X10	Conector de 15 polos	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X12	Conector bipolar	2-poligt kontaktdon	Connettore a 2 poli	2-polet kontakt
X13	Conector de 12 polos	12-poligt kontaktdon	Connettore a 12 poli	12-polet kontakt

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
F1-3	Sikring 4A	Ασφάλεια 4 A	Fusível 4A	Varoke 4A
G3	Generator	Γεννήτρια	Gerador	Vaihtovirtageneraattori
N12	Automatisk spændingsregulator	Αυτόματος ρυθμιστής τάσης	Regulador automático da potência	Automaattinen jännitteensäädin
N13	Jordfejlstrømsrelæ	Ρελέ ρεύματος γείωσης	Relé de detecção de falha de terra	Maavuotorele
P1-3	Amperemeter	Αμπερόμετρο	Amperímetro	Ampeerimittari
P4	Voltmeter	Βολτόμετρο	Voltímetro	Volttimittari
P5	Frekvensmåler	Μετρητής συχνότητας	Frequencímetro	Taajuusmittari
Q1	Afbryder 4-polig	Διακόπτης κυκλώματος 4πολικός	Disjuntor tetrapolar	Virrankatkaisin 4-napainen
Q2	Afbryder 2-polig	Διακόπτης κυκλώματος 2πολικός	Disjuntor 2-polar	Virrankatkaisin 2-napainen
S4	Voltmeterets omskifterknap	Διακόπτης επιλογής βολτομέτρου	Comutador selector do voltímetro	Volttimittarin valintakytkin
S13	Afbryderkontakt til jordfejlstrømsrelæ	Διακόπτης αποκλεισμού μετάδοσης λάθους στη γείωση	Interruptor selector do relé de corrente de defeito à terra	Maavuodon tunnistimen sulkukytkin
T1-3	Strømtransformere	Μετασχηματιστής ρεύματος	Transformador de corrente	Virtamuuntaja
T13	Jordfejlstrømsdetektor	Ανιχνευτής ρεύματος γείωσης	Detector de falha de corrente de terra	Maavuodon tunnistin
X1	Klembrædt	Πίνακας ακροδέκτη	Quadro de terminais	Liitäntälevy
X2	Stikkontakt	Ακροδέκτη εξόδου	Tomada de saída	Pistorasia
X10	15-faset kontaktklemme	15πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X12	2-faset kontaktklemme	2πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X13	12-faset kontaktklemme	12πολικός σύνδεσμος	Ligação em 12 polos	12-napainen liitin

9822 0773 67

9822 0773 92
Applicable for QAS278 Gd AMF



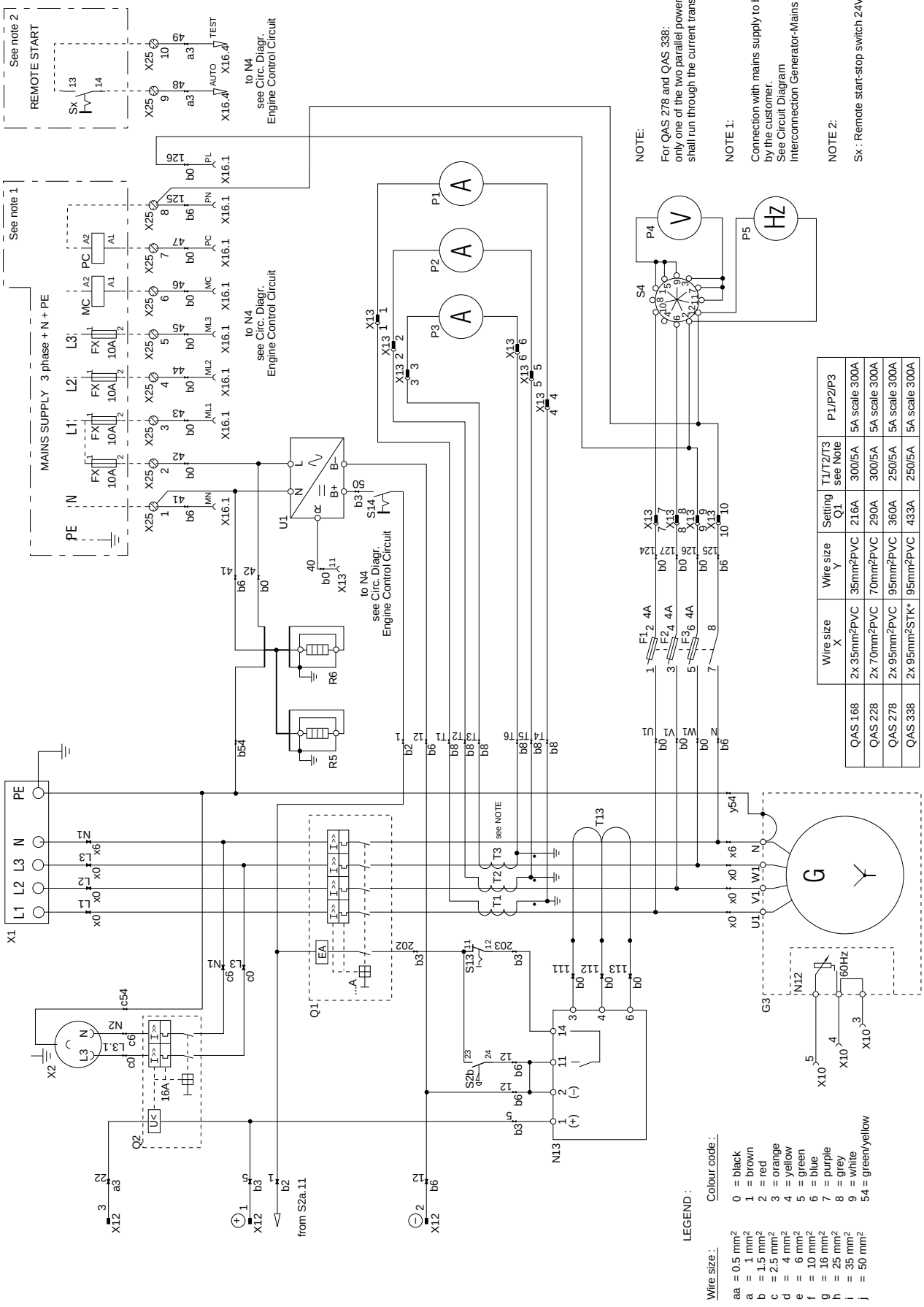
	Wire size X	Wire size Y	Setting Q1	T1/T2/T3 see Note	P1/P2/P3
QAS 168	2x 35mm²PVC	35mm²PVC	216A	300/5A	5A scale 300A
QAS 228	2x 70mm²PVC	70mm²PVC	290A	300/5A	5A scale 300A
QAS 278	2x 95mm²PVC	95mm²PVC	360A	250/5A	5A scale 300A
QAS 338	2x 95mm²STK*	95mm²PVC	433A	250/5A	5A scale 300A

*: STK = "Soepele trafo-aansluitkabel Drakavinyl mb"
I> has to be set at a value between 3.5 and 4 times Ir.

	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
F1-3	Fuse 4A	Zekering 4A	Fusible 4A	Sicherung 4 A
G3	Generator	Generator	Groupe électrogène	Generator
N12	Automatic voltage regulator	Automatische spanningsregelaar	Régulateur de tension automatique	Automatischer Spannungsregler
N13	Earth fault-current relay	Aardlekrelais	Relais de fuite à la terre	Erdschlußrelais
P1-3	Amperemeter	Ampèremeter	Ampèremètre	Amperemeter
P4	Voltmeter	Voltmeter	Voltmètre	Voltmeter
P5	Frequencymeter	Frekwentiemeter	Fréquencemètre	Frequenzmesser
Q1	Circuit breaker 4-pole	Vermogenschakelaar 4-polig	Disjoncteur 4 pôles	Leistungsschalter vierpolig
Q2	Circuit breaker 2-pole	Vermogenschakelaar 2-polig	Disjoncteur 2 pôles	Leistungsschalter 2-polig
R5,6	Engine Coolant Heater	Verwarmer motorkoelvloeistof	Réchauffeur de réfrigérant du moteur	Heizelement Motorkühlmittel
S2b	Emergency stop	Noodstopknop	Arrêt d'urgence	Notabschaltung
S4	Voltmeter selector switch	Voltmeter keuzeschakelaar	Sélécteur de voltmètre	Voltmeter-Wahlschalter
S13	Earth fault relay lock-out switch	Blokkeerschakelaar verliesstroomrelais	Commutateur d'arrêt de relais des défauts à la terre	Riegelschalter Erdschlußrelais
S14	Battery charger lock-out switch	Blokkeerschakelaar batterijlader	Commutateur d'arrêt de chargeur de batterie	Riegelschalter Batterieladegerät
T1-3	Current transformer	Stroomtransformator	Transformateur de courant	Stromwandler
T13	Earth fault-current detector	Aardlekdetector	Détecteur de fuite à la terre	Erdschlußanzeiger
U1	Static battery charger	Statische bartterijlader	Chargeur de batterie statique	Feststehendes Batterieladegerät
X1	Terminal board	Klemmenbord	Tablette à bornes	Klemmenbrett
X2	Outlet socket	Uitlaatpunt	Prise femelle	Anschlußdose
X10	15-pole connector	Konnektor, 15 stiften	Connecteur, 15 broches	15-poliger Stecker
X12	2-pole connector	Konnektor, 2 stiften	Connecteur, 2 broches	2-poliger Stecker
X13	12-pole connector	Konnektor, 12 stiften	Connecteur, 12 broches	12-poliger Stecker
X15	10-pole connector	Konnektor, 10 stiften	Connecteur,10 broches	10-poliger Stecker
X25	Terminal strip	Klemmenstrook	Barrette de raccordement	Klemmenleiste

	ESPAÑOL	SVENSKA	ITALIANO	NORSK
F1-3	Fusible 4A	Säkring 4A	Fusibile 4A	Sikring 4 A
G3	Generador	Generator	Generatore	Generator
N12	Regulador automático de voltaje	Automatisk spänningsregulator	Regolatore di tensione automatico	Automatisk spenningsregulator
N13	Relé de pérdida a tierra	Relä för jordläckage	Relè corrente di terra	Jordfeilrelé
P1-3	Amperímetro	Amperemätare	Amperometro	Amperemeter
P4	Voltímetro	Spänningsmätare	Voltimetro	Spenningsmåler
P5	Frecuencímetro	Frekvensmätare	Frequenziometro	Frekvensmåler
Q1	Disyuntor cuadripolar	Strömbrytare 4-polig	Interruttore 4 poli	Kretsbryter 4-polet
Q2	Disyuntor 2-polar	Strömbrytare 2-polig	Interruttore 2 poli	Kretsbryter 2-polet
R5,6	Calentador del refrigerante del motor	Motorns kylvätskevärmare	Riscaldatore del liquido refrigerante del motore	Kjølevæskevarmer for motor
S2b	Parada de emergencia	Nödstopp	Arresto di emergenza	Nødstopp
S4	Selector de voltímetro	Spänningsmätarens kopplingsväljare	Interruttore di selezione del voltimetro	Valgbryter for spenningsmåler
S13	Interruptor de bloqueo del relé de pérdida a tierra	Avstängningsbrytare för jordfelsrelä	Interruttore chiusura relé guasto di terra	Avstengingsbryter for jordfeilrelé
S14	Interruptor de bloqueo del cargador de batería	Avstängningsbrytare för batteriladdare	Interruttore chiusura carica batteria	Avstengingsbryter for batterilader
T1-3	Transformador de corriente	Strömtransformator	Transformatore di corrente	Strøm
T13	Detector de pérdida a tierra	Detektor för jordläckage	Rilevatore corrente di terra	Jordfeilføler
U1	Cargador estático de batería	Statisk batteriladdare	Carica batteria statica	Statisk batterilader
X1	Cuadro de bornas	Anslutningsplint	Morsettiera	Koplingstavle
X2	Casquillo de toma de corriente	Uttag	Presa esterna	Uttak
X10	Conector de 15 polos	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X12	Conector bipolar	2-poligt kontaktdon	Connettore a 2 poli	2-polet kontakt
X13	Conector de 12 polos	12-poligt kontaktdon	Connettore a 12 poli	12-polet kontakt
X15	Conector de 10 polos	10-poligt kontaktdon	Connettore a 10 poli	10-polet kontakt
X25	Bloque de terminales	Anslutningslist	Morsettiera	Koplingssplint

9822 0773 92
Applicable for QAS278 Gd AMF



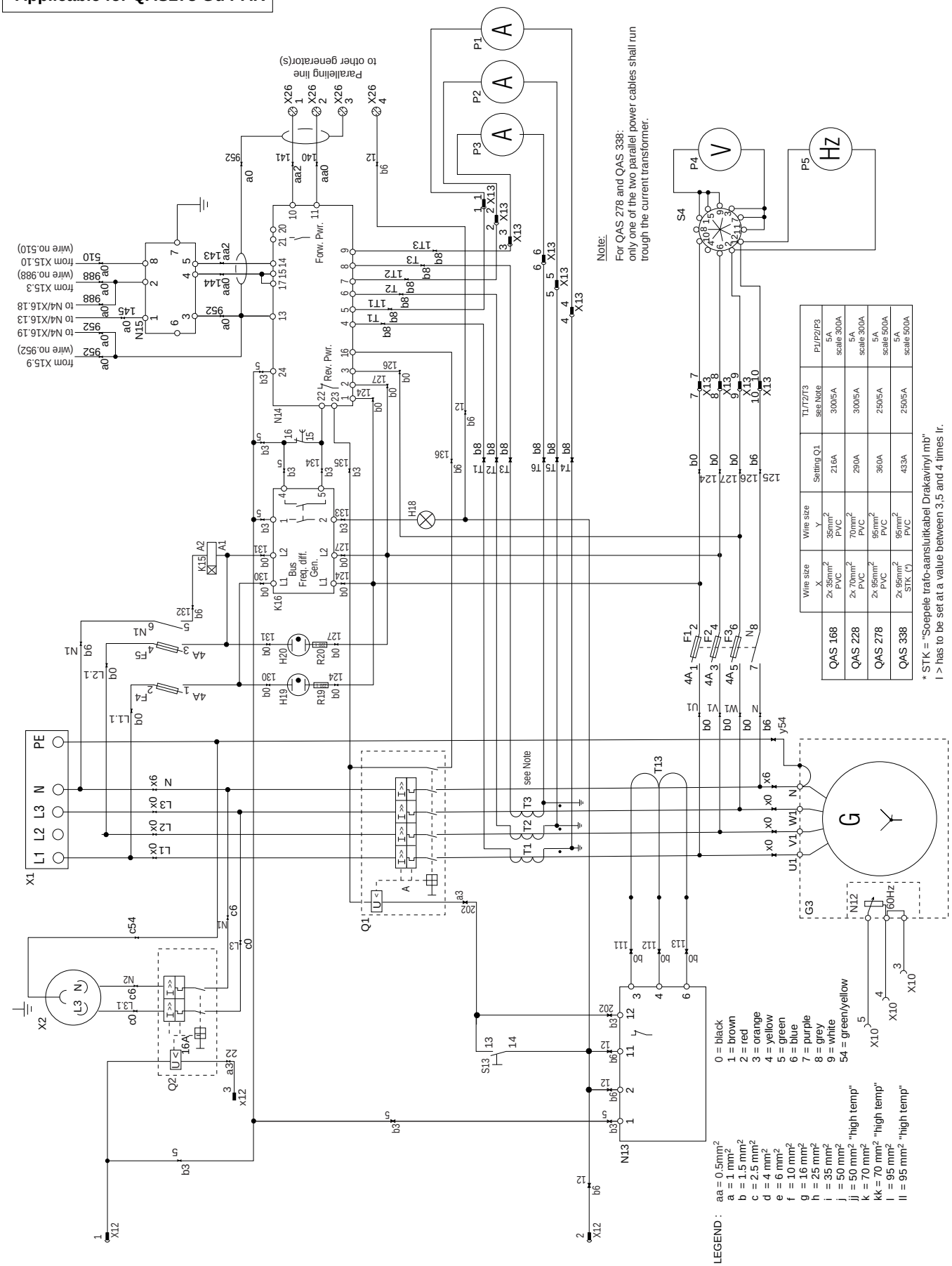
Wire size X	Wire size Y	Setting Q1	T1/T2/T3 see Note	P1/P2/P3
QAS 168	2x 35mm²PVC	35mm²PVC	216A	300/5A	5A scale 300A
QAS 228	2x 70mm²PVC	70mm²PVC	290A	300/5A	5A scale 300A
QAS 278	2x 95mm²PVC	95mm²PVC	360A	250/5A	5A scale 300A
QAS 338	2x 95mm²STK*	95mm²PVC	433A	250/5A	5A scale 300A

*: STK = "Soepele trafo-aansluitkabel Drakavinyl mb"
I> has to be set at a value between 3.5 and 4 times Ir.

9822 0773 92

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
F1-3	Sikring 4A	Ασφάλεια 4 Α	Fusível 4A	Varoke 4A
G3	Generator	Γεννήτρια	Gerador	Vaihtovirtageneraattori
N12	Automatisk spændingsregulator	Αυτόματος ρυθμιστής τάσης	Regulador automático da potência	Automaattinen jännitteensäädin
N13	Jordfejlstrømsrelæ	Ρελέ ρεύματος γείωσης	Relé de detecção de falha de terra	Maavuotorele
P1-3	Amperemeter	Αμπερόμετρο	Amperímetro	Amperimittari
P4	Voltmeter	Βολτόμετρο	Voltímetro	Volttimittari
P5	Frekvensmåler	Μετρητής συχνότητας	Frequencímetro	Taajuusmittari
Q1	Afbryder 4-polig	Διακόπτης κυκλώματος 4πολικός	Disjuntor tetrapolar	Virrankatkaisin 4-napainen
Q2	Afbryder 2-polig	Διακόπτης κυκλώματος 2πολικός	Disjuntor 2-polar	Virrankatkaisin 2-napainen
R5,6	Opvarmning af kølemiddel til motor	Θερμαντήρας ψυκτικού μηχανής	Aquecedor do líquido de arrefecimento do motor	Moottorin jäähdytysnesteen lämmitysvastus
S2b	Nødstop	Στοπ έκτακτης ανάγκης	Paragem de emergência	Hätäpysäytys
S4	Voltmeterets omskifterknap	Διακόπτης επιλογής βολτομέτρου	Comutador selector do voltímetro	Volttimittarin valintakytkin
S13	Afbryderkontakt til jordfejlstrømsrelæ	Διακόπτης αποκλεισμού μετάδοσης λάθους στη γείωση	Interruptor selector do relé de corrente de defeito à terra	Maavuodon tunnistimen sulkukytkin
S14	Afbryderkontakt til batterioplader	Διακόπτη λοκ άουτ του φορτιστή της μπαταρίας	Comutador de fecho do carregador de baterias	Akkulaturin suojauskytkimen
T1-3	Strømtransformere	Μετασχηματιστής ρεύματος	Transformador de corrente	Virtamuuntaja
T13	Jordfejlstrømsdetektor	Ανιχνευτής ρεύματος γείωσης	Detector de falha de corrente de terra	Maavuodon tunnistin
U1	Statisk batterioplader	Γαμωτής στατικής μπαταρίας	Carregador de baterias estático	Kiinteä akkulaturi
X1	Klembrædt	Πίνακας ακροδέκτη	Quadro de terminais	Liitäntälevy
X2	Stikkontakt	Μπρίζα ρεύματος	Tomada de saída	Pistorasia
X10	15-faset kontaktklemme	15πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X12	2-faset kontaktklemme	2πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X13	12-faset kontaktklemme	12πολικός σύνδεσμος	Ligação em 12 polos	12-napainen liitin
X15	10-faset kontaktklemme	10πολικός σύνδεσμος	Ligação em 10 polos	10-napainen liitin
X25	Klemliste	Λωρίδα ακροδέκτη	Faixa de terminais	Liitäntärima

9822 0773 95
Applicable for QAS278 Gd PAR



	Wire size X	Wire size Y	Setting Q1	T1/T2/T3 see Note	P1/P2/P3
QAS 168	2x 35mm² PVC	35mm² PVC	216A	300/5A	5A scale 300A
QAS 228	2x 70mm² PVC	70mm² PVC	290A	300/5A	5A scale 300A
QAS 278	2x 95mm² PVC	95mm² PVC	360A	250/5A	5A scale 500A
QAS 338	2x 95mm² STK (*)	95mm² PVC	433A	250/5A	5A scale 500A

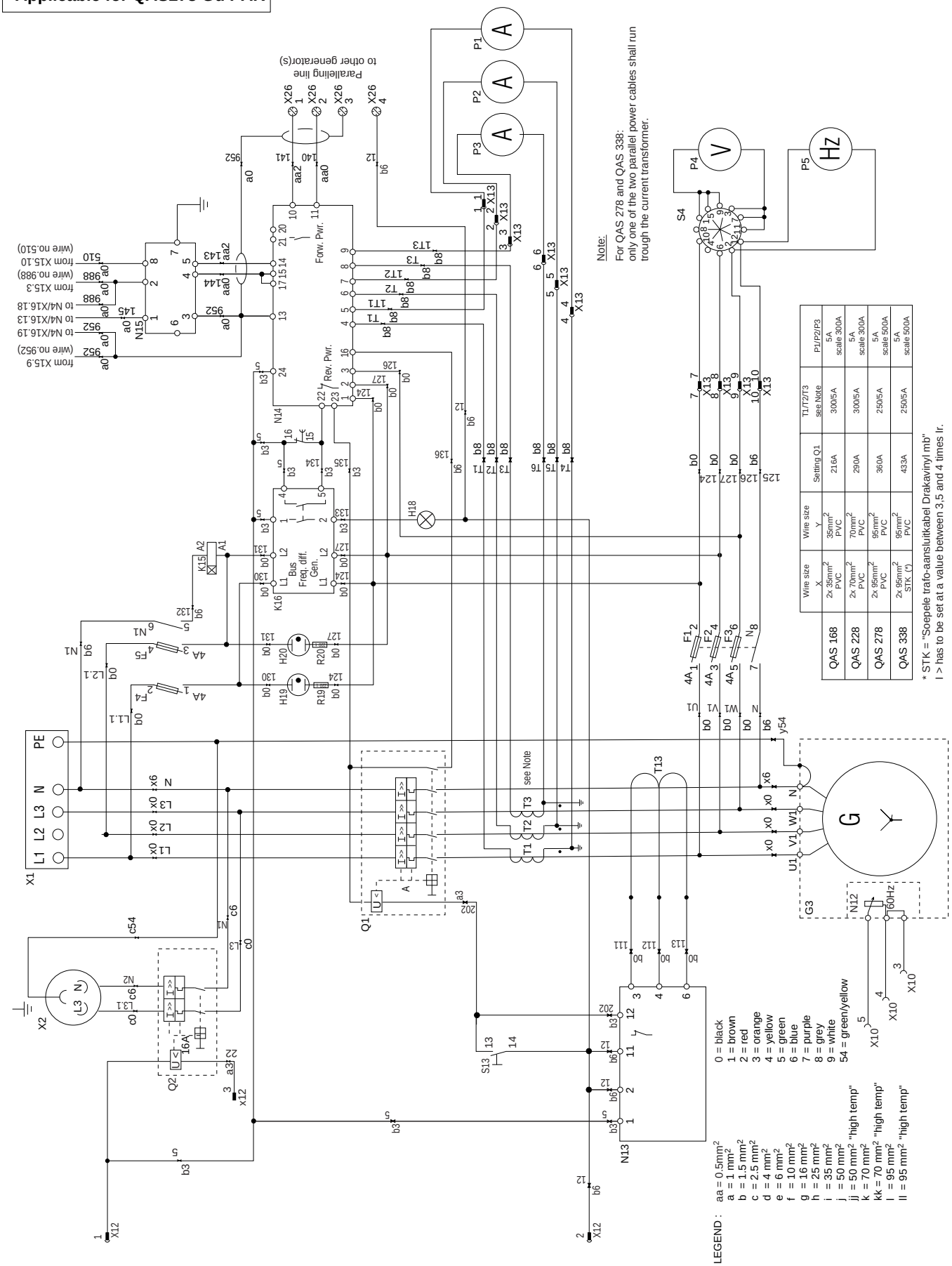
* STK = "Soepele trafo-aansluitkabel Drakavinyl mb"
I > has to be set at a value between 3,5 and 4 times Ir.

	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
F1-5	Fuse 4A	Zekering 4A	Fusible 4A	Sicherung 4 A
G3	Generator	Generator	Groupe électrogène	Generator
H18	Check synchronising lamp	Synchronisatiecontrolelampje	Témoin de contrôle de synchronisation	Synchronsier-Prüflampe
H19-20	Synchronising lamp	Synchronisatielampje	Témoin de synchronisation	Synchronisierlampe
K15	Aux. relay CSR override (set at 2 sec)	Hulprelais overbrugging CSR (ingesteld op 2 sec)	Relais auxiliaire CSR prioritaire (réglé sur 2 sec)	Hilfsrelais CSR-Übersteuerung (eingestellt auf 2 Sek)
K16	Check synchronising relay	Synchronisatiecontrolerelais	Relais de contrôle de synchronisation	Synchronsier-Prüfrelais
N12	Automatic voltage regulator	Automatische spanningsregelaar	Régulateur de tension automatique	Automatischer Spannungsregler
N13	Earth fault-current relay	Aardlekrelais	Relais de fuite à la terre	Erdschlußrelais
N14	Isochrone load sharing module	Isochrone belastingverdelingsmodule	Module de partage de charge isochrone	Isochroner Belastungsteilungsmodul
N15	Interface module (DDEC-ILS)	Interfacemodule (DDEC-ILS)	Module d'interface (DDEC-ILS)	Schnittstellenmodul (DDEC-ILS)
P1-3	Amperemeter	Ampèremeter	Ampèremètre	Amperemeter
P4	Voltmeter	Voltmeter	Voltmètre	Voltmeter
P5	Frequencymeter	Frekwentiemeter	Fréquencemètre	Frequenzmesser
Q1	Circuit breaker 4-pole	Vermogenschakelaar 4-polig	Disjoncteur 4 pôles	Leistungsschalter vierpolig
Q2	Circuit breaker 2-pole	Vermogenschakelaar 2-polig	Disjoncteur 2 pôles	Leistungsschalter 2-polig
R19	Dropping resistor for H19	Voorschakelweerstand voor H19	Résistance chutrice pour H19	Vorwiderstand für H19
R20	Dropping resistor for H20	Voorschakelweerstand voor H20	Résistance chutrice pour H20	Vorwiderstand für H20
S4	Voltmeter selector switch	Voltmeter keuzeschakelaar	Sélécteur de voltmètre	Voltmeter-Wahlschalter
S13	Earth fault relay lock-out switch	Blokkeerschakelaar verliesstroomrelais	Commutateur d'arrêt de relais des défauts à la terre	Riegelschalter Erdschlußrelais
T1-3	Current transformer	Stroomtransformator	Transformateur de courant	Stromwandler
T13	Earth fault-current detector	Aardlekdetector	Détecteur de fuite à la terre	Erdschlußanzeiger
X1	Terminal board	Klemmenbord	Tablette à bornes	Klemmenbrett
X2	Outlet socket	Uitlaatpunt	Prise femelle	Anschlußdose
X10	15-pole connector	Konnektor, 15 stiften	Connecteur, 15 broches	15-poliger Stecker
X12	2-pole connector	Konnektor, 2 stiften	Connecteur, 2 broches	Zweipoliger Stecker
X13	12-pole connector	Konnektor, 12 stiften	Connecteur, 12 broches	Zwölfpoliger Stecker

	ESPAÑOL	SVENSKA	ITALIANO	NORSK
F1-5	Fusible 4A	Säkring 4A	Fusibile 4A	Sikring 4 A
G3	Generador	Generator	Generatore	Generator
H18	Lámpara de comprobación de sincronización	Lampa för synkroniseringskontroll	Controllare la lampada di sincronizzazione	Lampe for synkroniseringskontroll
H19-20	Lámpara de sincronización	Synkroniseringslampa	Lampada di sincronizzazione	Synkroniseringslampe
K15	Relé auxiliar de cancelación CSR (ajustado en 2 seg)	Hjälprelä för CSR överbryggning (inställd för 2 sek)	Meccanismo CSR del relè ausiliario (fissato a 2 sec)	CSR-overstyring av hjelperelé (innstilt på 2 sek)
K16	Relé de comprobación de sincronización	Relä för synkroniseringskontroll	Relè di controllo sincronizzazione	Relé for synkroniseringskontroll
N12	Regulador automático de voltaje	Automatisk spänningsregulator	Regolatore di tensione automatico	Automatisk spenningsregulator
N13	Relé de pérdida a tierra	Relä för jordläckage	Relè corrente di terra	Jordfeilrelé
N14	Módulo isócrono de carga compartida	Modul för isokron lastfördelning	Modulo isocrono di condivisione del carico	Modul for isokron deling av belastning
N15	Módulo de interconexión (DDEC-ILS)	Anslutningsmodul (DDEC-ILS)	Modulo interfaccia (DDEC-ILS)	Grensesnittmodul (DDEC-ILS)
P1-3	Amperímetro	Amperemätare	Amperometro	Amperemeter
P4	Voltímetro	Spänningsmätare	Voltimetro	Spenningsmåler
P5	Frecuencímetro	Frekvensmätare	Frequenziometro	Frekvensmåler
Q1	Disyuntor cuadripolar	Strömbrytare 4-polig	Interruttore 4 poli	Kretsbryter 4-polet
Q2	Disyuntor 2-polar	Strömbrytare 2-polig	Interruttore 2 poli	Kretsbryter 2-polet
R19	Resistencia reductora de tensión para H19	Droppmotstånd för H19	Resistenza di caduta per H19	Seriemotstand for H19
R20	Resistencia reductora de tensión para H20	Droppmotstånd för H20	Resistenza di caduta per H20	Seriemotstand for H20
S4	Selector de voltímetro	Spänningsmätarens kopplingsväljare	Interruttore di selezione del voltimetro	Valgbryter for spenningsmåler
S13	Interruptor de bloqueo del relé de pérdida a tierra	Avstängningsbrytare för jordfelsrelä	Interruttore chiusura relé guasto di terra	Avstengingsbryter for jordfeilrelé
T1-3	Transformador de corriente	Strömtransformator	Transformatore di corrente	Strøm
T13	Detector de pérdida a tierra	Detektor för jordläckage	Rilevatore corrente di terra	Jordfeilføler
X1	Cuadro de bornas	Anslutningsplint	Morsettiera	Koplingstavle
X2	Casquillo de toma de corriente	Uttag	Presa esterna 3	Uttak
X10	Conector de 15 polos	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X12	Conector bipolar	2-poligt kontaktdon	Connettore a 2 poli	2-polet kontakt
X13	Conector de 12 polos	12-poligt kontaktdon	Connettore a 12 poli	12-polet kontakt

9822 0773 95

9822 0773 95
Applicable for QAS278 Gd PAR



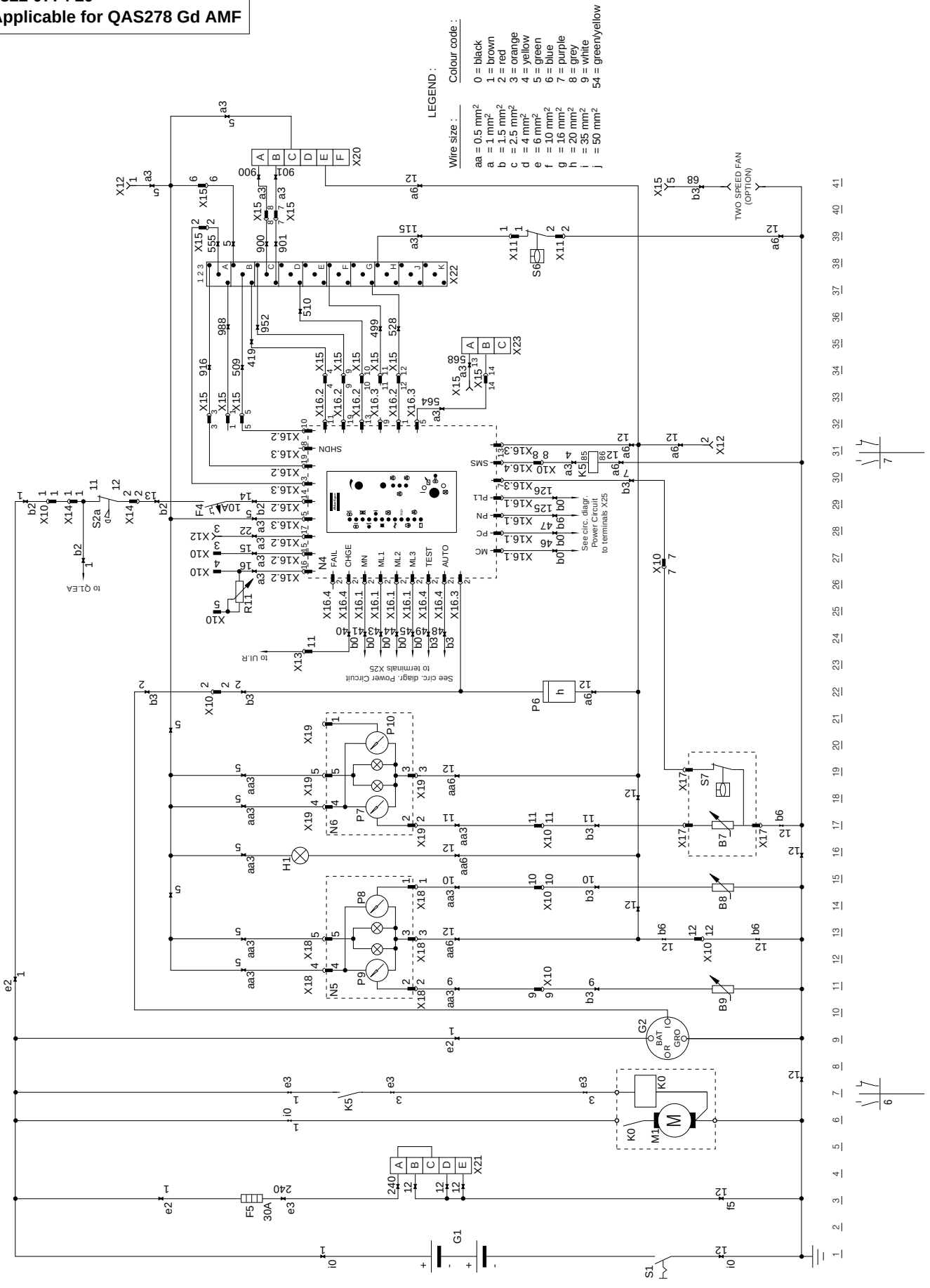
	Wire size X	Wire size Y	Setting Q1	T1/T2/T3 see Note	P1/P2/P3
QAS 168	2x 35mm² PVC	35mm² PVC	216A	300/5A	5A scale 300A
QAS 228	2x 70mm² PVC	70mm² PVC	290A	300/5A	5A scale 300A
QAS 278	2x 95mm² PVC	95mm² PVC	360A	250/5A	5A scale 500A
QAS 338	2x 95mm² STK (*)	95mm² PVC	433A	250/5A	5A scale 500A

* STK = "Soepele trafo-aansluitkabel Drakavinyl mb"
I > has to be set at a value between 3,5 and 4 times Ir.

9822 0773 95

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
F1-3	Sikring 4A	Ασφάλεια 4 Α	Fusível 4A	Varoke 4A
G3	Generator	Γεννήτρια	Gerador	Vaihtovirtageneraattori
H18	Synkroniseringskontrollampe	Λυχνία συγχρονισμού ελέγχου	Lâmpada de controlo da sincronização	Synkronoinnin tarkastus -merkkivalo
H19-20	Synkroniseringslampe	Λυχνία συγχρονισμού	Lâmpada de sincronização	Synkronointimerkkivalo
K15	Hjælperelæ, CSR-omgåelse (indstillet til 2 sek)	Υπερύθμιση βοηθητικού ρελέ CSR (ρυθμισμένη σε 2 δευτ.)	Relé auxiliar CSR de contra-regulação (fixado em 2 seg)	Apureleen CSR ohitus (tehdassaetus 2 s)
K16	Synkroniseringskontrolrelæ	Ρελέ συγχρονισμού ελέγχου	Relé de controlo da sincronização	Synkronoinnin tarkastusrele
N12	Automatisk spændingsregulator	Αυτόματος ρυθμιστής τάσης	Regulador automático da potência	Automaattinen jännitteensäädin
N13	Jordfejlstrømsrelæ	Ρελέ ρεύματος γείωσης	Relé de detecção de falha de terra	Maavuotorele
N14	Isokront belastningsdelingsmodul	Μονάδα καταμερισμού ισόχρονου φορτίου	Módulo de partilha da carga isócrona	Isokroninen kuormanjakomoduuli
N15	Grænsefladem odul (DDEC-ILS)	Μονάδα διασύνδεσης (DDEC-ILS)	Módulo de interface (DDEC-ILS)	Liitäntämoduuli (DDEC-ILS)
P1-3	Amperemeter	Αμπερόμετρο	Amperímetro	Amperimittari
P4	Voltmeter	Βολτόμετρο	Voltímetro	Volttimittari
P5	Frekvensmåler	Μετρητής συχνότητας	Frequencímetro	Taajuusmittari
Q1	Afbryder 4-polig	Διακόπτης κυκλώματος 4πολικός	Disjuntor tetrapolar	Virrankatkaisin 4-napainen
Q2	Afbryder 2-polig	Διακόπτης κυκλώματος 2πολικός	Disjuntor 2-polar	Virrankatkaisin 2-napainen
R19	Formodstand til H19	Αντιστάτης πτώσης τάσης για H19	Resistência de carga para H19	Etuvastus H19:lle
R20	Formodstand til H20	Αντιστάτης πτώσης τάσης για H20	Resistência de carga para H20	Etuvastus H20:lle
S4	Voltmeterets omskifterknap	Διακόπτης επιλογής βολτομέτρου	Comutador selector do voltímetro	Volttimittarin valintakytkin
S13	Afbryderkontakt til jordfejlstrømsrelæ	Διακόπτης αποκλεισμού μετάδοσης λάθους στη γείωση	Interruptor selector do relé de corrente de defeito à terra	Maavuodon tunnistimen sulkukytkin
T1-3	Strømtransformere	Μετασχηματιστής ρεύματος	Transformador de corrente	Virtamuuntaja
T13	Jordfejlstrømsdetektor	Ανιχνευτής ρεύματος γείωσης	Detector de falha de corrente de terra	Maavuodon tunnistin
X1	Klembrædt	Πίνακας ακροδέκτη	Quadro de terminais	Liitäntälevy
X2	Stikkontakt	Ακροδέκτη εξόδου	Tomada de saída	Pistorasia
X10	15-faset kontaktklemme	15πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X12	2-faset kontaktklemme	2πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X13	12-faset kontaktklemme	12πολικός σύνδεσμος	Ligação em 12 polos	12-napainen liitin

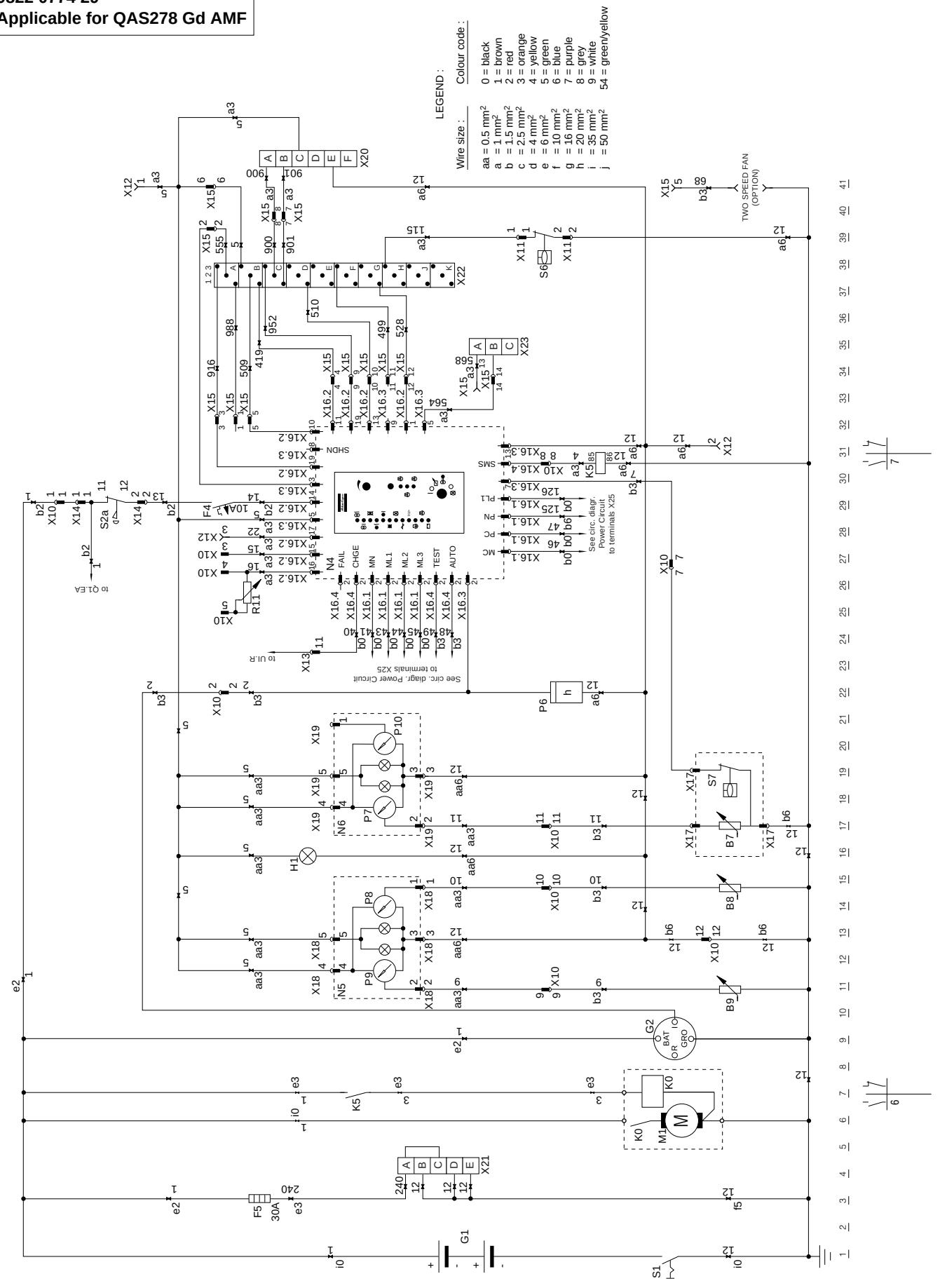
9822 0774 29
Applicable for QAS278 Gd AMF



	ENGLISH	NEDERLANDS	FRANCAIS	DEUTSCH
B7	Fuel level sensor	Sensor, brandstofpeil	Capteur, niveau de carburant	Kraftstoffstandfühler
B8	Coolant temperature sensor	Sensor, koelwatertemperatuur	Capteur, température eau de refroidissement	Kühlwassertemperaturfühler
B9	Oil pressure sensor	Sensor, oliedruk	Capteur, pression d'huile	Öldruckfühler
F4	Fuse 10A	Zekering 10A	Fusible 10A	Sicherung 10A
F5	Fuse 30A	Zekering 30A	Fusible 30A	Sicherung 30A
G1	Battery 24V	Batterij 24V	Batterie 24V	Batterie 24V
G2	Charging generator	Laad alternator	Alternateur, charge	Lademaschine
H1	Panel light	Paneelverlichting	Eclairage panneau	Instrumentenleuchte
K0	Starter solenoid	Startersolenoïde	Solénoide du démarreur	Startermagnet
K5	Starter relay	Starterrelais	Relais de démarreur	Startrelais
M1	Starter motor	Startermotor	Démarreur	Startmotor
N4	Control module	Stuurmodule	Module de commande	Steuermodul
N5, 6	Instrument cluster	Instrumentengeheel	Instrumentation	Instrumentensatz
P6	Hourmeter	Urenteller	Compteur d'heures	Stundenzähler
P7	Fuel level gauge	Brandstofpeilindicator	Indicateur de niveau de carburant	Meßinstrument für Kraftstoffstand
P8	Coolant temperature gauge	Koelwater temperatuurmeter	Indicateur de temp., eau de refroid.	Meßinstrument für Kühlwassertemperatur
P9	Oil pressure gauge	Manometer, oliedruk	Indicateur, pression d'huile	Meßinstrument für Öldruck
P10	Battery voltage gauge	Batterijvoltmeter	Voltmètre de batterie	Batteriespannungsmesser
R11	Voltage adjust potentiometer	Spanningsinstelpotentiometer	Potentiomètre de réglage de tension	Spannungseinstellpotentiometer
S1	Battery switch	Batterijschakelaar	Interrupteur de batterie	Batterieschalter
S2a	Emergency stop button	Noodstopknop	Bouton arrêt d'urgence	Not-Aus-Taste
S6	Low coolant level switch	Schakelaar laag koelwaterpeil	Commutateur de niveau de réfrigérant bas	Schalter für niedrigen Kühlmittelstand
X10	15-pole connector	Konnektor, 15 stiften	Connecteur 15 broches	15-poliger Stecker
X11	Coolant level switch connector	Connector schakelaar koelwaterpeil	Connecteur du commutateur du niveau de réfrigérant	Stecker Kühlmittelstandschalter
X12	3-pole connector	Konnektor, 3 stiften	Connecteur 3 broches	Dreipoliger Stecker
X14	2-pole connector	Konnektor, 2 stiften	Connecteur 2 broches	Zweipoliger Stecker
X15	15-pole connector	Konnektor, 15 stiften	Connecteur 15 broches	15-poliger Stecker
X16	Control module connector	Connector besturingsmodule	Connecteur du module de commande	Stecker Steuermodul
X17	Fuel level unit connector	Konnektor brandstofpeil module	Connecteur du module de niveau d'huile	Stecker für Kraftstoffstandeinheit
X18, 19	Instrument cluster connector	Connector instrumentencluster	Connecteur de groupage d'instrument	Stecker Instrumentengruppe
X20	Diagnostic data socket (DDEC)	Contactdoos diagnosegegevens (DDEC)	Prise pour données de diagnostic (DDEC)	Diagnosedatenbuchse (DDEC)
X21	Power connector (DDEC)	Vermogensconnector (DDEC)	Connecteur de puissance (DDEC)	Starkstromstecker (DDEC)
X22	30-pole connector (DDEC)	30-polige connector (DDEC)	Connecteur 30 broches (DDEC)	30poliger Stecker (DDEC)
X23	Engine sensor harness connector (DDEC)	Connector motorsensor harnas (DDEC)	Connecteur du harnais de capteur de moteur (DDEC)	Stecker Motorsensorkabel (DDEC)

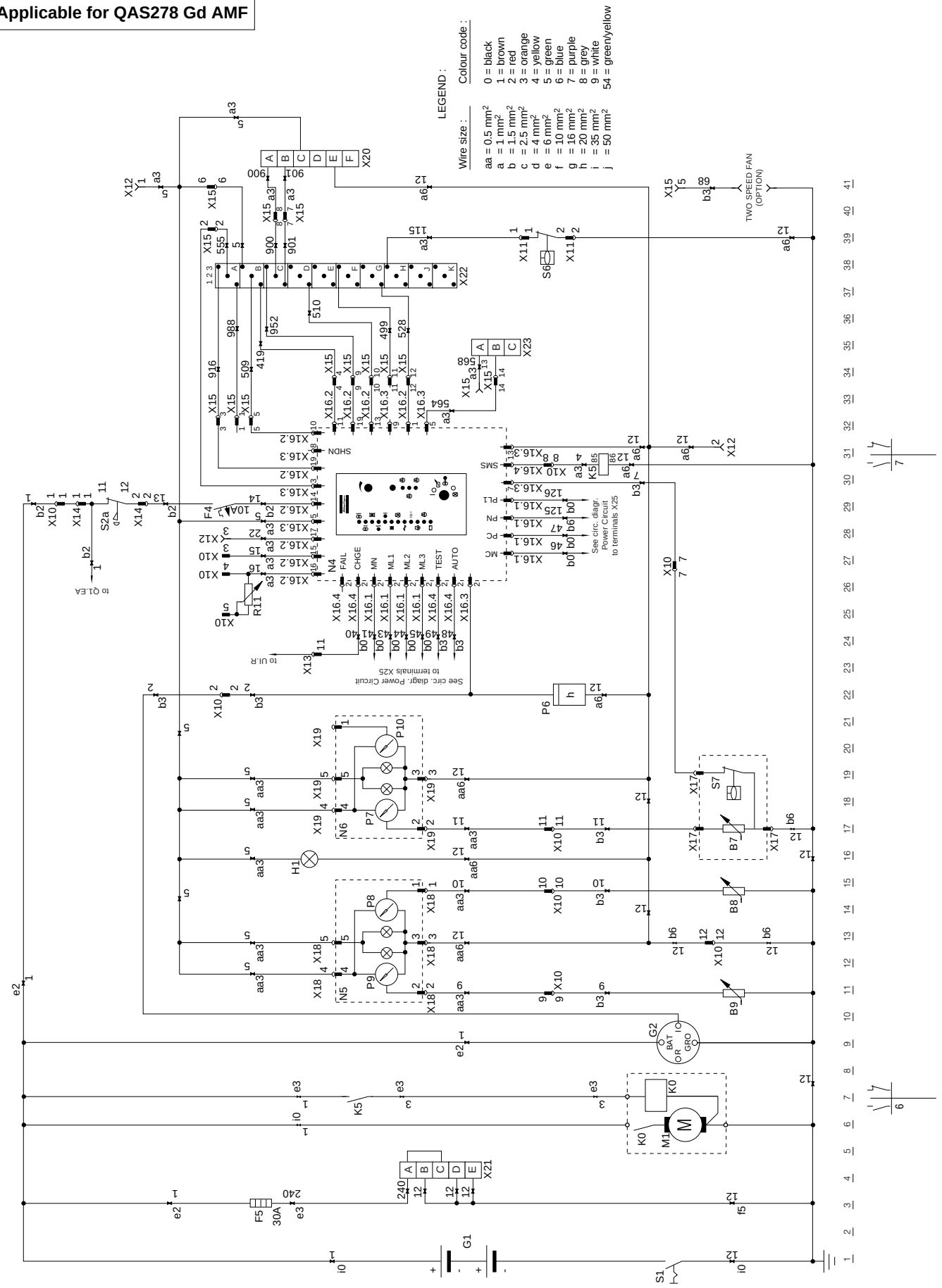
9822 0774 29

9822 0774 29
Applicable for QAS278 Gd AMF



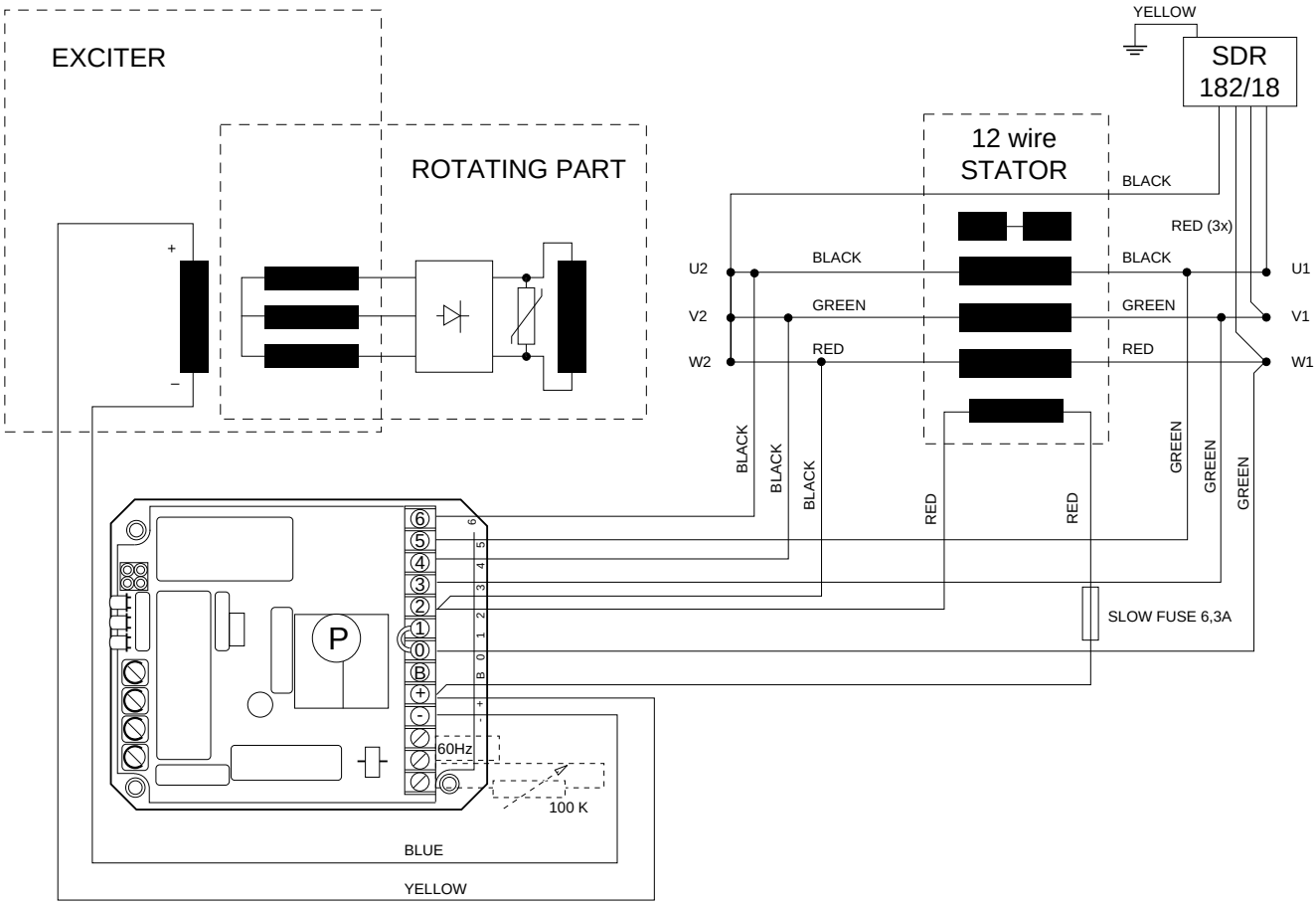
	ESPAÑOL	SVENSKA	ITALIANO	NORSK
B7	Sensor del nivel de combustible	Sensor - bränslenivå	Sensore del livello di combustibile	Føler for drivstoffnivå
B8	Sensor de temperatura del refrigerante	Sensor - kylvätskans temperatur	Sensore della temperatura del refrigerante	Føler for kjølevæsketemperatur
B9	Sensor de presión de aceite	Oljetryckssensor	Sensore della pressionde dell'olio	Oljetrykkføler
F4	Fusible 10A	Säkring 10A	Fusibile 10A	Sikring 10A
F5	Fusible 30A	Säkring 30A	Fusibile 30A	Sikring 30A
G1	Batería de 24V	Batteri 24V	Batteria a 24V	Batteri 24 V
G2	Generador de carga	Laddningsgenerator	Generatore di carica	Ladegenerator
H1	Luz de panel	Panelljus	Luci del pannello	Panellys
K0	Solenoide de arranque	Startsolenoid	Solenoide dell'avviatore	Magnetkontakt for starter
K5	Relé arrancador	Startrelä	Relé di avviamento	Startrelé
M1	Motor de arranque	Startmotor	Motore dell'avviatore	Starter
N4	Módulo de control	Kontrollmodul	Modulo di controllo	Kontrollmodul
N5, 6	Grupo de instrumentos	Instrumentgrupp	Gruppo degli strumenti	Instrumentgruppe
P6	Cuentahoras	Timmätare	Contaore	Timeteller
P7	Indicador del nivel de combustible	Bränslenivåmätare	Indicatore di livello del combustibile	Drivstoffmåler
P8	Indicador de temperatura del refrigerante	Kylvätsketemperaturmätare	Indicatore della temperatura del refrigerante	Måler for kjølevæsketemperatur
P9	Indicador de la presión de aceite	Oljetrycksmätare	Indicatore della pressione dell'olio	Oljetrykkmåler
P10	Medidor de tensión en la batería	Batterispänningsmätare	Indicatore del voltaggio della batteria	Batterispenningsmåler
R11	Potenciómetro de ajuste de voltaje	Potentiometer för spänningsjustering	Potenziometro regolazione voltaggio	Potensiometer for spenningskorrigering
S1	Interruptor de batería	Batteriströmställare	Interruttore della batteria	Batteribryter
S2a	Botón de parada de emergencia	Knapp för nödstopp	Pulsante di arresto di emergenza	Knapp for sikkerhetsstopp
S6	Interruptor de nivel de refrigerante bajo	Brytare för låg kylvätskenivå	Interruttore basso livello del liquido refrigerante	Bryter for lavt kjølevæskenivå
S7	Interruptor bajo nivel de combustible	Brytare för låg bränslenivå	Interruttore di basso livello del combustibile	Bryter for lavt drivstoffnivå
X10	Conector de 15 polos	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X11	Conector del interruptor de nivel de refrigerante	Brytaranslutning för låg kylvätskenivå	Connettore interruttore livello liquido refrigerante	Kontakt for kjølevæskenivåbryter
X12	Conector 3-polar	3-poligt kontaktdon	Connettore a 3 poli	3-polet kontakt
X14	Conector bipolar	2-poligt kontaktdon	Connettore a due poli	2-polet kontakt
X15	Conector 15-polar	15-poligt kontaktdon	Connettore a 15 poli	15-polet kontakt
X16	Conector del módulo de control	Anslutning för kontrollmodul	Connettore modulo di controllo	Kontakt for kontrollmodul
X17	Conector unidad nivel de combustible	Bränslenivåenhetens kontaktdon	Connettore dell'unitá livello del combustibile	Kontakt for drivstoffnivåenhet
X18, 19	Conector del grupo de instrumentos	Anslutning för instrumentgrupp	Connettore quadro strumenti	Kontakt for instrumentgruppe
X20	Casquillo para datos de diagnóstico (DDEC)	Uttag för diagnostikdata (DDEC)	Presa dati diagnostici (DDEC)	Feilsøkingskontakt (DDEC)
X21	Conector de alimentación (DDEC)	Strömanslutning (DDEC)	Connettore di alimentazione (DDEC)	Strømkontakt (DDEC)
X22	Conector con 30 polos (DDEC)	30-polig anslutning (DDEC)	Connettore a 30 poli (DDEC)	30-polet kontakt (DDEC)
X23	Conector de cableado sensor del motor (DDEC)	Anslutning för motorns sensorkabel (DDEC)	Connettore cablaggio sensore motore (DDEC)	Kontakt for maskinføler (DDEC)

9822 0774 29
Applicable for QAS278 Gd AMF



9822 0774 29

	DANSK	Ελληνικά	PORTUGUÊS	SUOMI
B7	Brændstofniveaufører	Αισθητήρας στάθμης καυσίμου	Sensor do nível de combustível	Polttoainemäärän anturi
B8	Kølevandstemperaturfører	Αισθητήρας θερμοκρασίας ψυκτικού	Sensor da temperatura do refrigerante	Jäähdytysnesteen lämpötilan anturi
B9	Olietrykfører	Αισθητήρας πίεσης λαδιού	Sensor da pressão do óleo	Öljynpainearturi
F4	Sikring 10A	Ασφάλεια 10Α	Fusível 10A	Varoke 10A
F5	Sikring 30A	Ασφάλεια 30Α	Fusível 30A	Varoke 30A
G1	Batteri 24V	Μπαταρία 24V	Bateria 24 V	Akku 24 V
G2	Ladegenerator	Φορτιστής γεννήτριας	Gerador de carga	Latausgeneraattori
H1	Lampe	Λυχνία πίνακα	Luz do painel	Kojetaulun valo
K0	Startmagnet	Σωληνοειδές εκκίνησης	Solenóide do motor de arranque	Käynnistyssolenoidi
K5	Startrelæ	Αναμεταδοση Μίζας	Relé do motor de arranque	Käynnistysrele
M1	Startermotor	Μίζα	Motor de arranque	Käynnistysmoottori
N4	Kontrolmodul	Στοιχειο ελέγχου	Módulo de controlo	Ohjainmoduli
N5, 6	Instrumentgruppe	Σύμπλεγμα οργάνων	Grupo de instrumentos	Kojeisto
P6	Timetæller	Ωρομετρητής	Contador de horas	Käyttöuntimittari
P7	Brændstofniveaumeter	Οργανο μέτρησης στάθμης καυσίμου	Indicador do nível de combustível	Polttoainemittari
P8	Kølevandstermometer	Οργανο μέτρησης θερμοκρασίας ψυκτικού	Indicador da temperatura do refrigerante	Jäähdytysnesteen lämpömittari
P9	Manometer, olietryk	Οργανο μέτρησης πίεσης λαδιού	Indicador da pressão do óleo	Öljynpainemittari
P10	Måler for batteriets spænding	Οργανο μέτρησης της τάσης της μπαταρίας	Voltímetro da bateria	Akkujännitemittari
R11	Potentiometer til justering af spændingen	Μετρητής δυνατότητας προσαρμογής τάσης	Potenciómetro de ajustamento da voltagem	Jäähdytysnesteen lämmitysvastus
S1	Batterikontakt	Διακόπτης μπαταρίας	Comutador da bateria	Akkukytkin
S2a	Nødstopknap	Μπουτόν σβησιματος έκτακτης ανάγκης	Botão de paragem de emergência	Hätäpysäytyskytkin
S6	Kontakt for lavt kølevæskeniveau	Διακόπτης χαμηλής στάθμης ψυκτικού	Interruptor do nível baixo do líquido de arrefecimento	Alhaisen jäähdytysnestemäärän kytkin
S7	Brændstofniveaukontakt	Διακόπτης χαμηλής στάθμης καυσίμου	Comutador do nível baixo de combustível	Alhaisen polttoainemäärän merkkivalon kytkin
X10	15 -faset kontaktklemme	15-πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X11	Kontakkonnektor for kølevæskeniveau	Συνδεσμος διακόπτη στάθμης ψυκτικού	Dispositivo de ligação do interruptor do nível do líquido de arrefecimento	Jäähdytysnestemäärän kytkin
X12	3 -faset kontaktklemme	3-πολικός σύνδεσμος	Ligação em 3 polos	3-napainen liitin
X14	2 -faset kontaktklemme	2-πολικός σύνδεσμος	Ligação em 2 polos	2-napainen liitin
X15	15 -faset kontaktklemme	15-πολικός σύνδεσμος	Ligação em 15 polos	15-napainen liitin
X16	Kontrolmodulkonnektor	Συνδεσμος ελέγχου καταξύνσης	Dispositivo de ligação do módulo de controlo	Ohjausliitteen liitin
X17	Kontakklemme for brændstofniveau	Σύνδεσμος μονάδος στάθμης καυσίμου	Ligação da unidade do nível de combustível	Polttoainemäärän ilmaisimen liitin
X18, 19	Gruppeinstrumentkonnektor	Συνδεσμος συστάδας οργάνου	Dispositivo de ligação do grupo de instrumentos	Kojeiston liitin
X20	Fejlfindingsstikkontakt (DDEC)	Υποδοχή διαγνωστικών πληροφοριών (DDEC)	Ficha de dados de diagnóstico (DDEC)	Diagnoosipistorasia (DDEC)
X21	Strømkonnektor (DDEC)	Συνδεσμος ενέργειας (DDEC)	Ligação da corrente (DDEC)	Virtaliitin (DDEC)
X22	30-pols konnektor	Συνδεσμος 30 πόλων (DDEC)	Dispositivo de ligação de 30 pinos (DDEC)	30-napainen liitin
X23	Følekonnektor ved motorens ledningsnet	Συνδεσμος αισθητήρα στηρξης μηχανής (DDEC)	Dispositivo de ligação da instalação eléctrica do sensor do motor (DDEC)	Moottorintunnistinjohtosarjan liitin (DDEC)


EXCITER
ROTATING PART
+
–
YELLOW
SDR
182/18
12 wire
STATOR
BLACK
RED (3x)
U2
V2
W2
BLACK
GREEN
RED
BLACK
GREEN
RED
U1
V1
W1
BLACK
BLACK
BLACK
RED
RED
GREEN
GREEN
GREEN
SLOW FUSE 6,3A
P
6
5
4
3
2
1
0
B
+
-
60Hz
100 K
BLUE
YELLOW