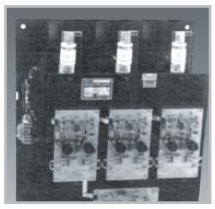
Ultra Quick industry application

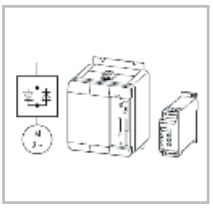
Typical applications, with Ultra Quick fuse-links

DC drives



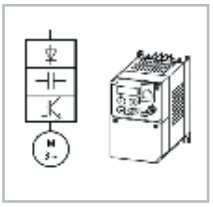
Power controls

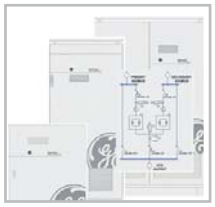
Soft- starters



AC servo regulators-brushless

Frequency inverters





Thyristor switches

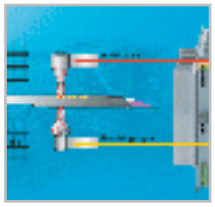
UPS

Variable power regulators

Power rectifires

Voltage regulators

SSR- semiconductor relays



Welding inverters

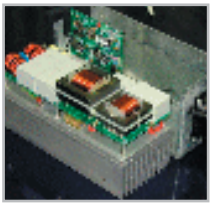
Solbrakes

Temperature controlers

Batery chargers

Solar power

Traction batery chargers



Wind power

DC drives

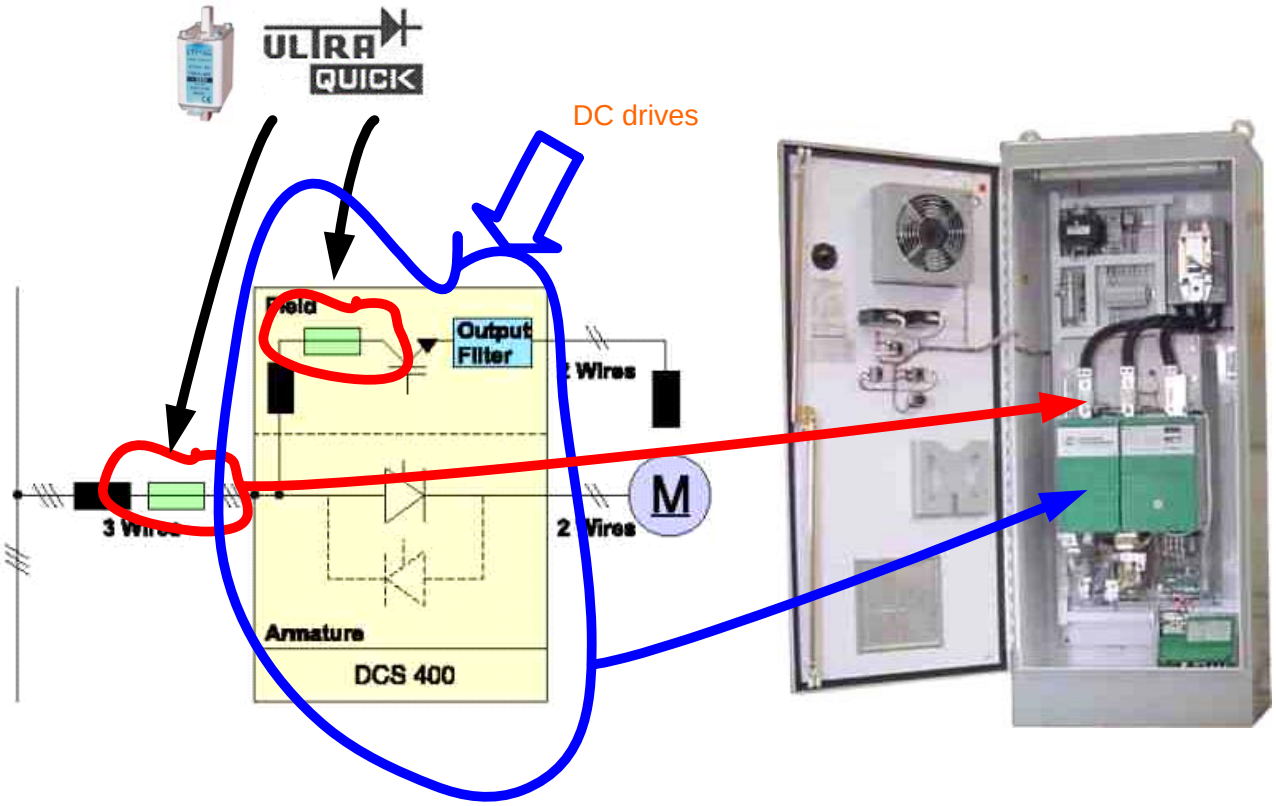
Description:

DC drives, because of their simplicity, ease of application, reliability and favorable cost have long been a backbone of industrial applications. A typical adjustable speed drive using a silicon controller rectifier (SCR) power conversion' section, common for this type unit. The SCR, (also termed a thyristor) converts the fixed voltage alternating current (AC) of the power source to an adjustable voltage, controlled direct current (DC) output which is applied to the armature of a DC motor.

SCR's provide a controllable power output by "phase angle control", so called because the firing angle (a point in time where the SCR is triggered into conduction) is synchronized with the phase rotation of the AC power source. If the device is triggered early in half cycle, maximum power is delivered to the motor; late triggering in the half cycle provides minimum power. The effect is similar to a very high speed switch, capable of being turned on and "conducted" off at an infinite number of points within each half cycle. This occurs at a rate of 60 times a second on a 60 Hz line, to deliver a precise amount of power to the motor. The efficiency of this form of power control is extremely high since a very small amount of triggering energy can enable the SCR (Silicon Controlled Rectifier) to control a great deal of output power.

Electrical circuit:

-up to 630A (1000A)- external fuses
-over the 630A (1000A)- internal fuses

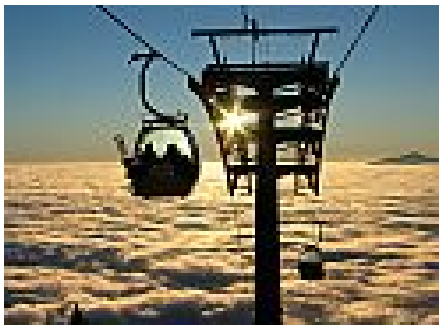


Application:

- Batery charger
- DC driver for DC motor

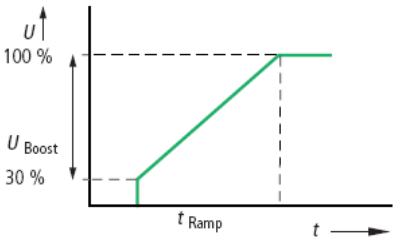
Industry:

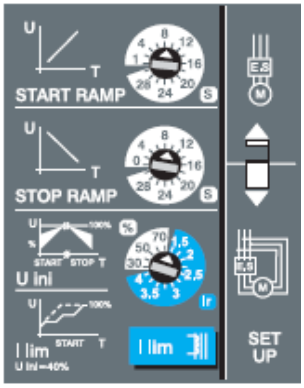
- Metals, Pulp & paper, material handling, test rings,
- Food & beverage, printing, plastic and rubber, vessels, ski lifts, magnets, mining, electrolysis

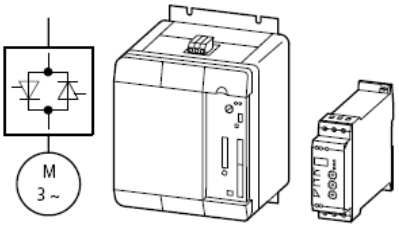


Soft-starter

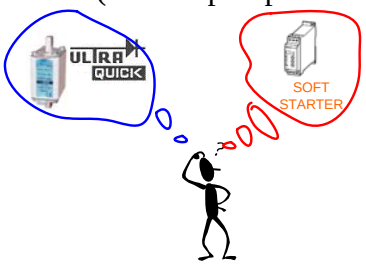
Description:

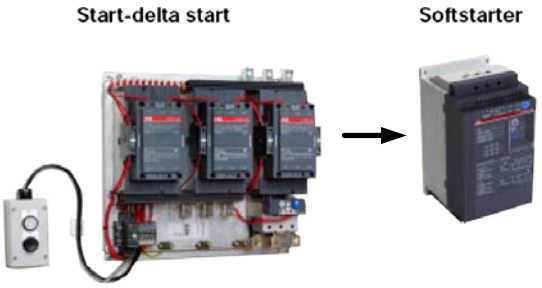




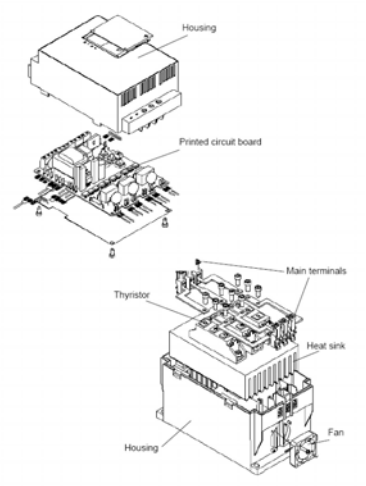


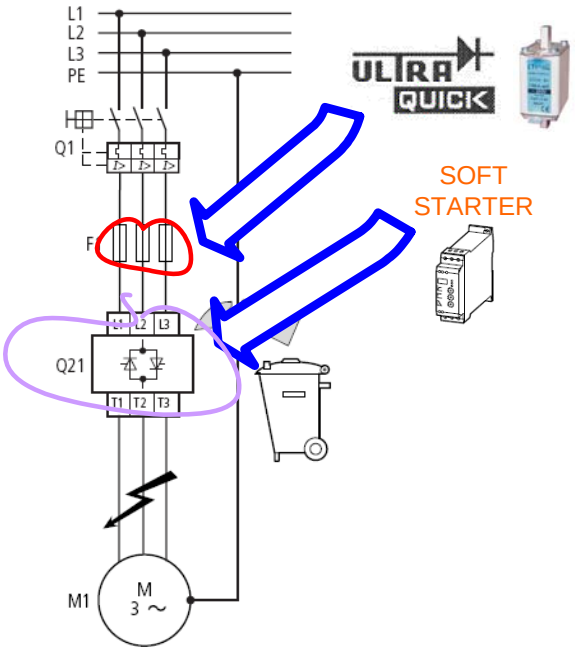
Soft starters ramp the voltage fed to the motor up to mains voltage, so that the motor starts almost jolt-free. The voltage reduction leads to a square-law torque reduction in relation to the motor's normal starting torque. Soft starter are therefore especially well suited to starting loads with a square-law speed or torque characteristic (such as pumps or fans).





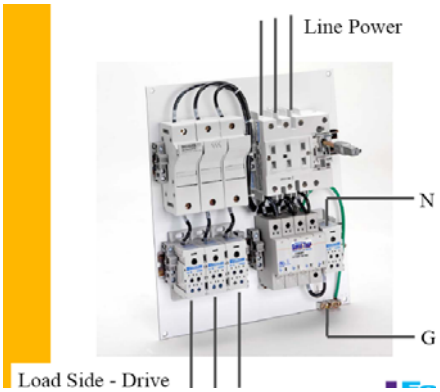
Electrical circuit:





Application:

- Pumps, fans, compressors,elevators, lifts
- Hydraulic systems, conveyor belts, bow thrusters,
- Mills, crushers, centrifuges, mixers, centrifugal fans blowpipes, lifting engine, lifting crane



Controlled Starting and Stopping
Eliminates the Damaging Effects of Pressure Surges

Application with a centrifugal fan

Application with a compressor

Application with a conveyor belt

Industry:

- Ironworks, mine, chemical industry, petrol industry, waterworks, ports, building, pharmacy, automotive, cunsomers, electronics, life sciences, manufacturing, marine, metals, paper industry, turbochargers and utility industries…






Semiconductor fuse:

-cross-reference (http://uq.eti.si/)

For Softstarter	Recommended ABB Overload protec protection		Max power loss at	Max fuse rating main circuit [1]) Bussman fuses			Ferraz fuses circuit			Ultra Quick ETI fuses
Size	Type	Current range A	rated /e W	A	Type	Holder	A	Type	W	
PSS03	**TA 25 DU**	2.2-3.1	-	**16**	170M1359	170H10072			2	004371105
PSS12	**TA 25 DU**	10-14	-	40	170M1363	170H10072			2	004371110
PSS25	**TA 25 DU**	18-25	-	50	170M1364	170H10075			5	004371111
PSS18/30	**TA 25 DU**	6-18	**65**	50	170M1364	170H1007	**63**	6.6 URB 000 D08 V 0063	9	004371111
PSS30/52	**TA 25 DU**	10-30	100	80	170M1366	170H1007	100	6.6 URB 000 D08 V 0100	9	004371113
PSS37/64	**TA 42 DU**	22-37	120	125	170M1368	170H1007	160	6.6 URB 000 D08 V 0160	9	004371115
PSS44/76	**TA 75 DU**	29-44	142	160	170M1369	170H1007	200	6.6URD30D08 A 0200	9	004371116
PSS50/85	**TA 75 DU**	29-50	160	160	170M1369	170H1007	200	6.6 URD 30 D08 A 0200	1	004371116
PSS60/105	**TA 75 DU**	29-60	190	25010	170M1370	170H1007	250	6.6 URD 30 D08 A 0250	1	004371117
PSS72/124	**TA 75 DU**	45-72	226	250	170M1371	170H1007	31	6.6 URD 30 D08 A 0315	1	004371119
PSS85/147	**TA 110 DU**	65-85	291	315	170M1372	170H1007	400	6.6 URD 30 D08 A 0400	3	004371121
PSS105/181	**TA 110 DU**	65-105	351	400	170M3019	170H3004	400	6.6 URD 30 D08 A 0400	3	004383123
PSS142/245	**TA 200 DU**	100-142	462	450	170M3020	170H3004	500	6.6 URD 30 D08 A 0500	3	004383125
PSS1 75/300	**TA 200 DU**	100-175	590	50	170M3021	170H3004	**M3**	6.6 URD 30 D08 A 0550	6	004383126
PSS250/430	**TA 450 DU**	130-250	815	700	170M5013	170H3004	630	6.6 URD 31 D08 A 0630	6	004384129
PSS300/515	**TA 450 DU**	130-300	965	900	170M5015	170H3004	900	6.6 URD 32 D11 A 0900	6	004744731

Soft starters save costs for mechanical engineers

Statistics show that about 90% of the motors in industrial use have no form of control, other than simple electromechanical switching. This results in huge industry costs in maintenance and equipment replacement. Fitting soft starters could reduce these costs dramatically.

But where should the initiative come from: the electrical engineer or the mechanical engineer. If this seems a strange question, consider for a moment where the main benefits of fitting soft starters accrue.

The electrical engineer benefits in two ways.

1. by avoiding the dips in mains voltages that occur due to current peaks inherent in "Across the Line Starting".

2. by avoiding the considerable stresses on the motor windings, and the iron cores of the stator and rotor, which result in reduced motor life, especially important in larger horsepower motors.

Although these benefits are considerable, the benefits to the mechanical engineer are greater still. This is because the sudden impact at startup of uncontrolled starting, followed by the rapid acceleration to full speed, causes problems across a wider range of equipment types.

Sudden torque stresses cause excessive wear on belts, pulleys, gears, chains, couplings and bearings, and also cavitation in pumps, which reduces their efficiency and life. Similarly, shock waves can be generated and transmitted along hydraulic pipework, weakening joints in pumping systems. In conveyor systems, too, loads may be displaced or damaged on startup, and products may become contaminated.

Clearly then, mechanical engineers have more reasons to press for the fitting of soft starts in fixed speed motor applications. Especially so, as the cost savings resulting from reduced downtime and from not having to replace bearings, gears, pulleys and bearings so frequently, will ensure quick payback on any soft starter unit.

A further argument for the mechanical engineer in fitting soft starts is that equipment previously left running, due to concerns about it restarting - and concerns, also, regarding belts braking, shafts shearing and bearings failing - can now be switched off, enabling real savings in energy to be achieved.

Similar savings can also result if there is a breakdown situation. Taking the example of a blockage in a mill. Historically all other motors have been left running when this situation occurred, even though the time required to remove the blockage was considerable. Today, this cost can be avoided simply by employing soft starters on the motors, enabling them to be switched off with no negative consequences for restarting. The above example deals with a breakdown situation.

Prevention, however, is always better than cure. Modern manufacturing processes employ large numbers of pumps to convey everything from water to hazardous fluids. In many applications these pumps are driven by motors, which have no form of control during their starting and stopping.

As a result, pressure surges and water hammer occur, which can damage pipework and equipment. Soft starters such as Fairford's QFE unit provide a solution to this problem with a feature known as "ramp down". Intended for use where heavy dynamic loads are encountered, ramp down is particularly useful in pumping applications where it ensures that pump motors stop progressively, thus minimising fluid shocks.

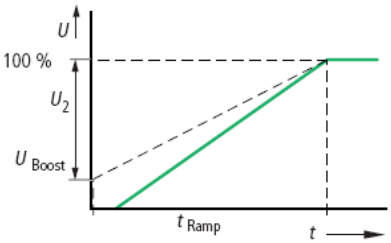
Another soft starter feature especially relevant to mechanical engineers is the "electronic shear pin". Included as standard on Fairford's QFE controller, the electronic shear pin enables the soft starter to cater for situations where loads are likely to jam suddenly, such as in wood sawing, rock crushing etc. The traditional method of achieving this protection was via a mechanical shear pin that consisted of a pin of a deliberately weak material inserted into two concentric shafts at a convenient point in the drive train to the load. If the load became jammed, the sudden rise in torque would cause the pin to shear so that the two shafts could then rotate independently, thereby disconnecting the motor from its load. Before the load could be restarted, the old pin would need to be removed and a new one inserted - an obviously inconvenient and time-consuming process. The QFE's electronic shear pin facility eliminates the need for a mechanical shear pin entirely because the speed and extent of a sudden and rapid rise in motor torque is immediately detected by the QFE which will then decide on a course of actions ranging from instantaneous shutdown to monitoring for recurrences if the blockage is released rapidly.

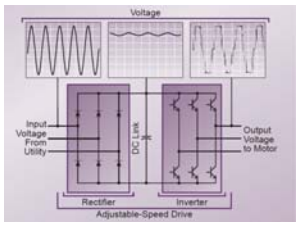
Soft starters provide an electronic solution to mechanical problems at relatively low cost. They can extend the life of belts, chains, gearboxes, shafts, bearings and machine mountings.

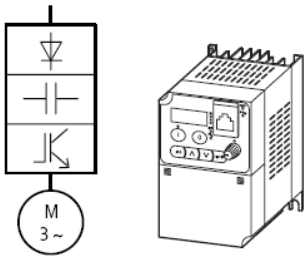
In addition, soft starters can achieve real savings in energy for users by providing the facility to switch motors off, without fears for their restarting. Added to these factors, traditional fit and forget reliability ensures security of operation even in the most critical of tasks.

Frequency inverter

Description:





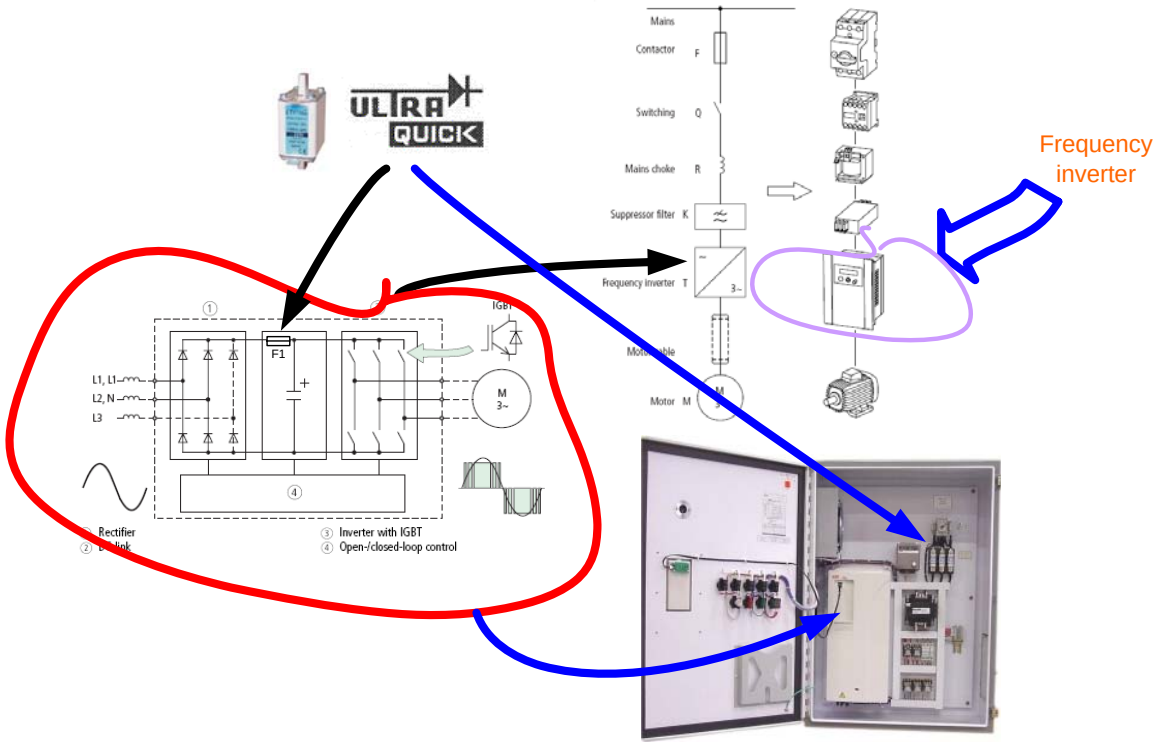


Frequency inverters convert the AC or three-phase system with its constant voltage and frequency into a new, three-phase system with variable voltage and frequency. This voltage/frequency control enables stepless speed control of three-phase motors. The controled drive can be operated at rated-load torque even at low speeds.

Adjustable frequency AC motor drive controllers frequently termed inverters are typically more complex than DC controllers since they must perform two power section functions, that of conversion of the AC line power source to DC and finally an inverter change from the DC to a coordinated adjustable frequency and voltage output to the AC motor. The appeal of the adjustable frequency drive is based upon the simplicity and reliability of the AC drive motor, which has no brushes, commutator or other parts that require routine maintenance, which more than compensates for the complexity of the AC controller. The robust construction, and low cost of the AC motor makes it very desirable for a wide range of uses. Also, the ability to make an existing standard constant speed AC motor an adjustable speed device simply by the addition of an adjustable frequency controller creates a very strong incentive for this type of drive.

Electrical circuit:

A number of different types of AC motor controllers are currently in common use as general purpose drives: Pulse Width Modulated (PWM), Current Source Input (CSI), and the Load Commutated Inverter (LCI). Each type offers specific benefits and characteristics but the PWM type has been selected by the best combination of simplicity, performance and economy for general purpose applications.



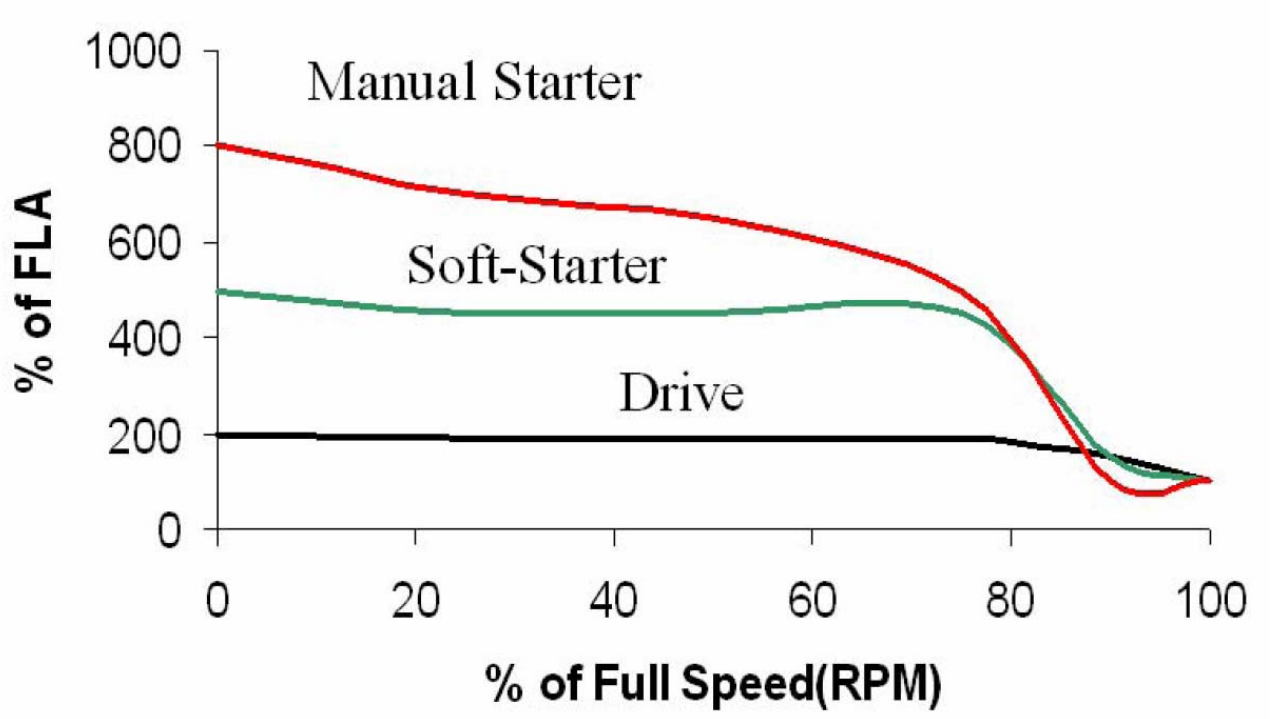


Table 3-3 460VAC Controls (3 Phase) Wire Size and Protection Devices

Control Rating		Input Breaker (Amps)	Input Fuse (Amps)		Wire Gauge	
Amps	HP		Fast Acting	Time Delay	AWG	mm²
2	0.75		2	2	14	2.5
2	1		3	2.5	14	2.5
4	2		6	5	14	2.5
5	3		8	7	14	2.5
8	5		12	10	14	2.5
11	7.5		20	15	14	2.5
14	10		25	20	12	3.31
21	15	30	30	25	10	5.26
27	20	40	40	35	10	5.26
34	25	50	50	45	8	8.37
40	30	50	60	50	8	8.37
52	40	70	80	70	6	13.3
65	50	90	100	90	4	21.2
77	60	100	125	100	3	26.7
96	75	125	150	125	2	33.6
124	100	175	200	175	1/0	53.5
156	125	200	250	200	2/0	67.4
180	150	225	300	250	3/0	85.0
240	200	300	350	300	(2) 2/0	(2) 67.4
302	250	400	450	400	(2) 4/0	(2) 107.0
361	300	450	600	450	(3) 2/0	(3) 67.4
414	350	500	650	500	(3) 3/0	(3) 85.0
477	400	600	750	600	(3) 4/0	(3) 107.0
515	450	650	800	700	(3) 250MCM	(3) 127.0
590	500	750	900	800	(3) 300MCM	(3) 152.0

Line fuse where and when???

Frequency converter

Model	I (A) (Input)	I (A) (Output)	Line Fuse	
			I (A)*1	I (A)*2
V2500-0220TFW1	49	45	175	50
V2500-0300TGW1	60	60	225	63
V2500-0370TGW1	63	73	250	80
V2500-0450TGW1	90	91	350	100
V2500-0550THW1	130	110	400	125
V2500-0750THW1	160	150	600	150

Note:

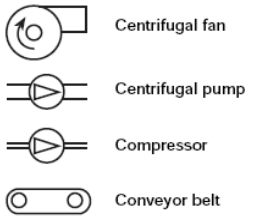
***1) Use "ultra rapid fuses" when working according to uL and CuL standards**

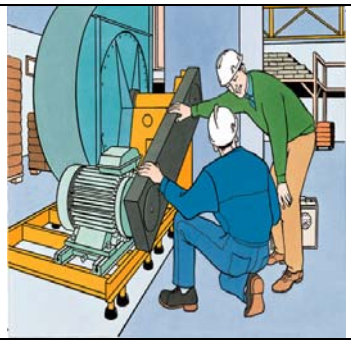
***2) Fuse characteristics - "gL" for European standard environment**

PWM Controllers - The PWM controller converts the AC power source to a fixed DC voltage by a full-wave rectifier. The resultant DC voltage is smoothed by a filter network and applied to a pulse width modulated inverter using high power transistors. The speed reference command is directed to the microprocessor which simultaneously optimizes the carrier (chopping) frequency and inverter output frequency to maintain a proper volts/Hz ratio and high efficiency throughout the normal speed range.
The voltage applied to the motor is a pulsed approximation of a true sinusoidal waveform.. This is commonly called a PWM waveform because both the carrier frequency and pulse width is changed (modulated) to change the effective voltage amplitude and frequency. The current waveform very closely follows the shape of a sine wave and therefore provides improved low speed motor performance, efficiency, and minimal motor heating.

Application:

- Pumps, fans, compressors, printing presse, stamping presse,
- Hydraulic systems, conveyor belts
- Mills, ore crushers, centrifuges, blowpipes, lifting engine, lifting crane,





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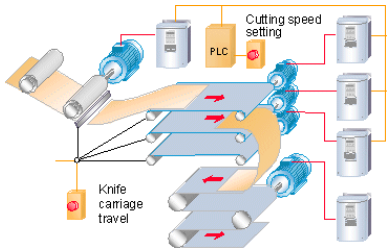
<td> 
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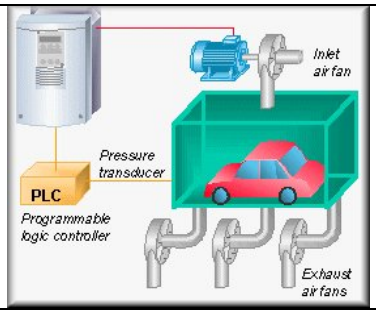
<td> 
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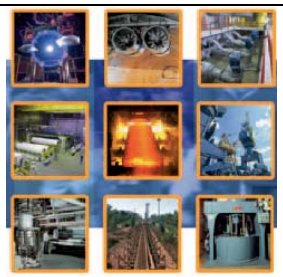
<td>  </td>
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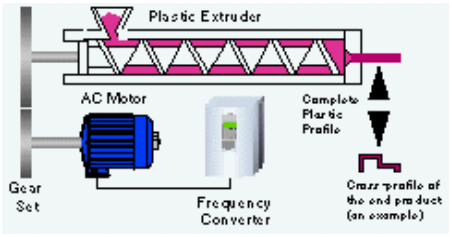
<td> 
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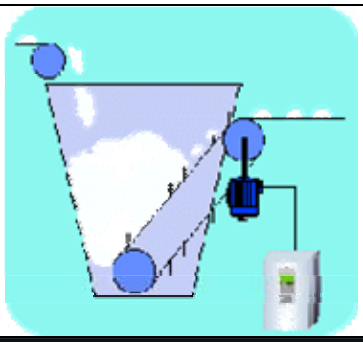
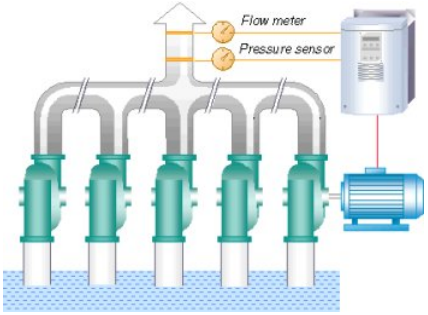
<td>  </td>
<td> 
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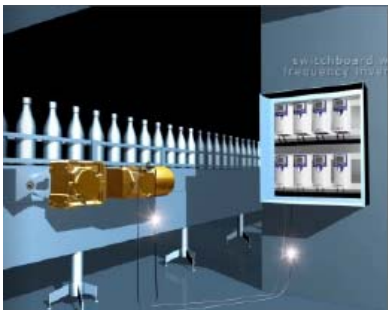
<td>  </td>
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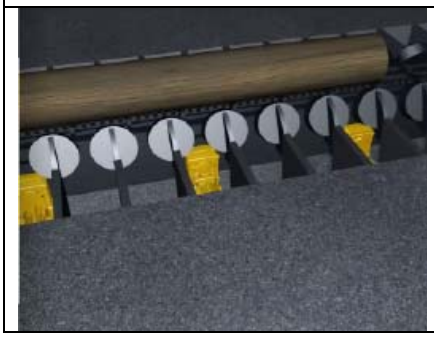
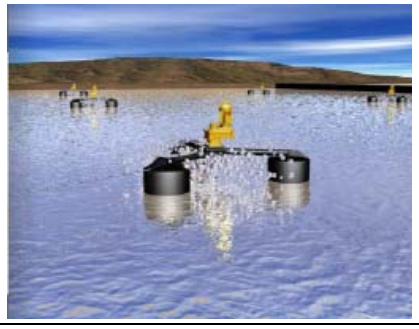
<td>  </td>
<td>  </td>
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</tr>
</table>

- MARINES (Cable and pipe layers, Chemical and product tankers, Cruise vessels, Double-acting tankers, Dredgers Drill ships and semi-sub, RoRo and RoPax ferries mersible rigs, FPSO tankers, Icebreakers, Offshore support vessels, Research and survey vessels, Shuttle tankers)

Industry:

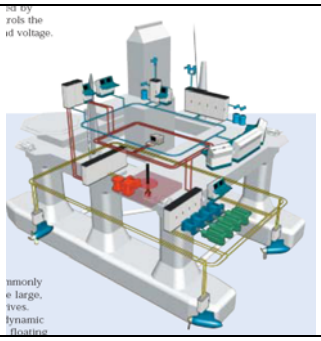
- Cement, Mining and Minerals
- Marine
- Textile
- Sugar production
- Snowmaking
- Sewage Treatment plants
- Food processing
- Pharmaceutical
- Metals
- Chemical, Oil and Gas
- Power Generation
- Pulp and Paper
- Cable and wire industry
- Water and Waste Water
- Airport (400Hz mains frequency)





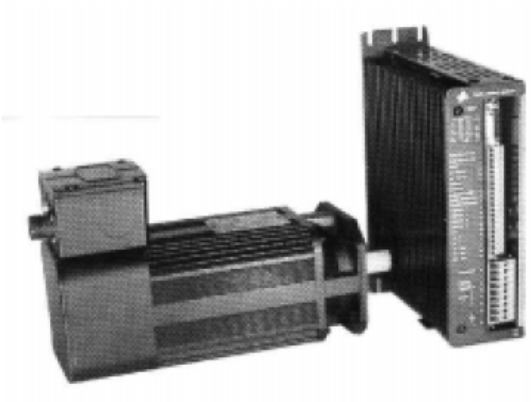






Thialf, Crane Ship
6 x 5.5 MW Thruster Drives (ACS 6000)

3-phase regulator for brushless servo motor

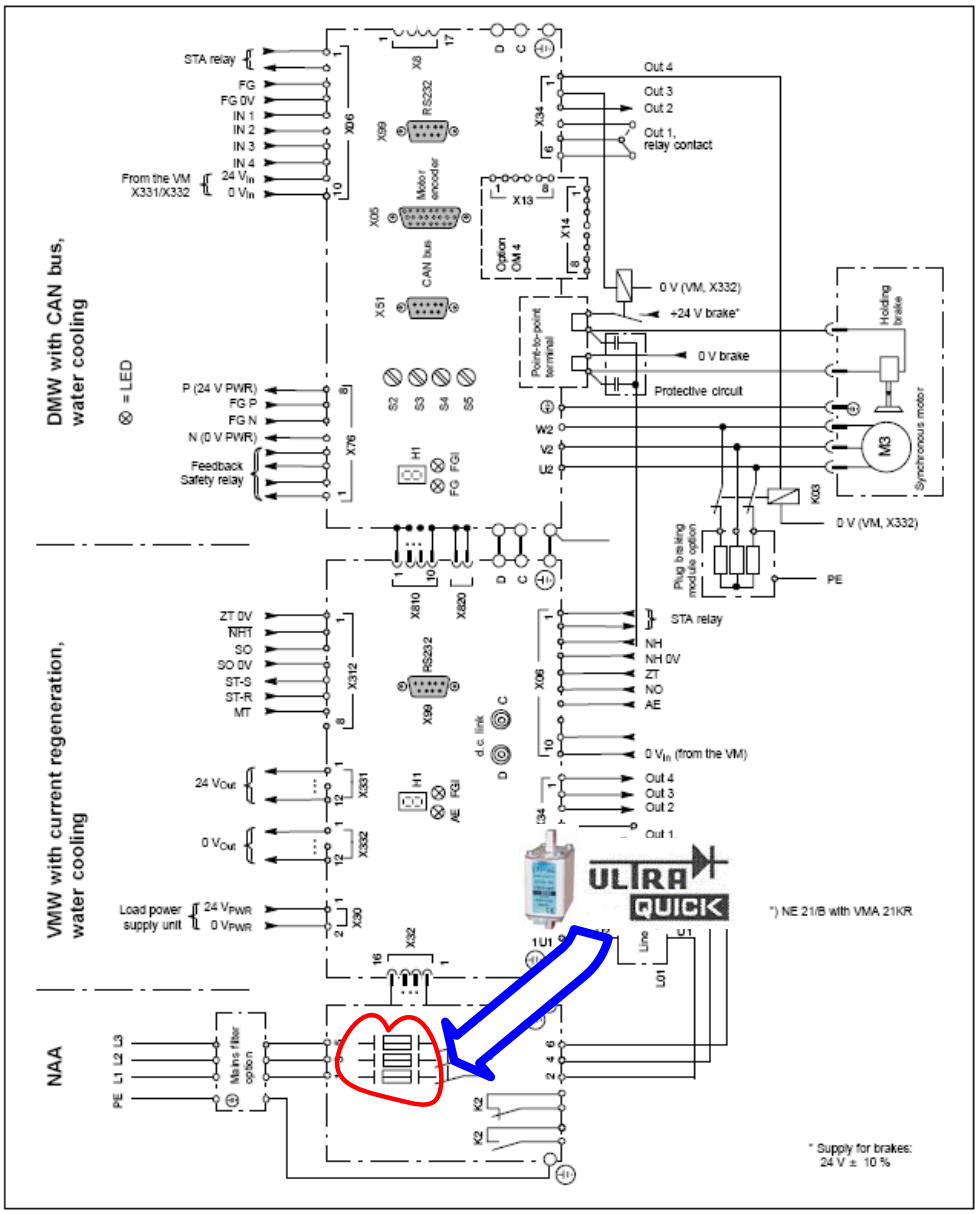


Description:

3- phase regulator for brushless servo motor is used forregulation and positioning brushless servo motor. Regulator is protected against short circuit by fuse for semiconductor protection. Fuses are located on line power supply.

Electrical circuit:

Rexroth Bosch Group *Servodyn-D* **Connectivity Manual**



Bosch Rexroth servo drive type *Servodyn-D* has Jean Muller ultra flink fuse link inside.
Ultra flink (JM ™) is the same products like Ultra Quick (ETI ™).

Modultyp	Einheit	NAA 21	NAA 35	NAA 70	NAA 90	NAA 180
für Versorgungsmodul		VMA 21KR	VMA 35B	VMA 70C	VMA 90D	VMW 180F
Anschlussspannung	VAC	3 x 400...460 ± 10%				
Bemessungsspannung	VAC	400				
Netzfrequenz	Hz	48...62				
Bemessungsleistung bei ϑ_U = 45° C	kVA	16	24	47	62	124
Sicherung	Typ	FERRAZ Kap-selsicherung, überflink	Jean Müller M00üf1, superflink			Jean Müller M1üf1, super-flink
		50 A/690 V	63 A/660 V	100 A/660 V	125 A/660 V	250 A/660 V
	Bestell-nummer	3 x 1070 921 621	3 x 1070 917 648	3 x 1070 917 649	3 x 1070 918 481	3 x 1070 919 804

Application:

- **Axis drive at CNC numeric control** (Siemens type **INDEX** CNC machine…)
- Industrial robots
- Positionning drives
- Transfer
- Cutters, winding machine
- Pick and place machine (PCB board assembling)
- Working lines at high dynamics





Industry:

- automotive, cunsumers, electronics, manufacturing, metals,

High current rectifires

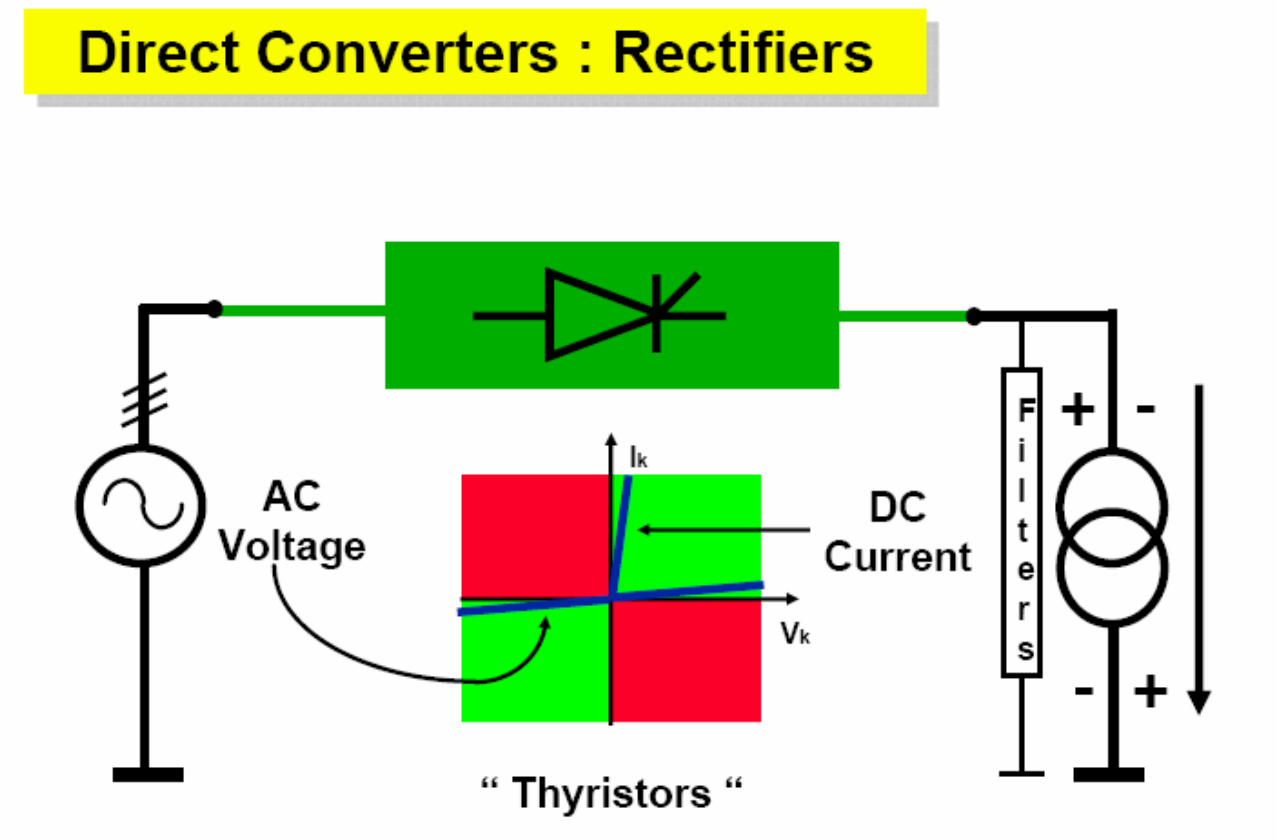
Description:

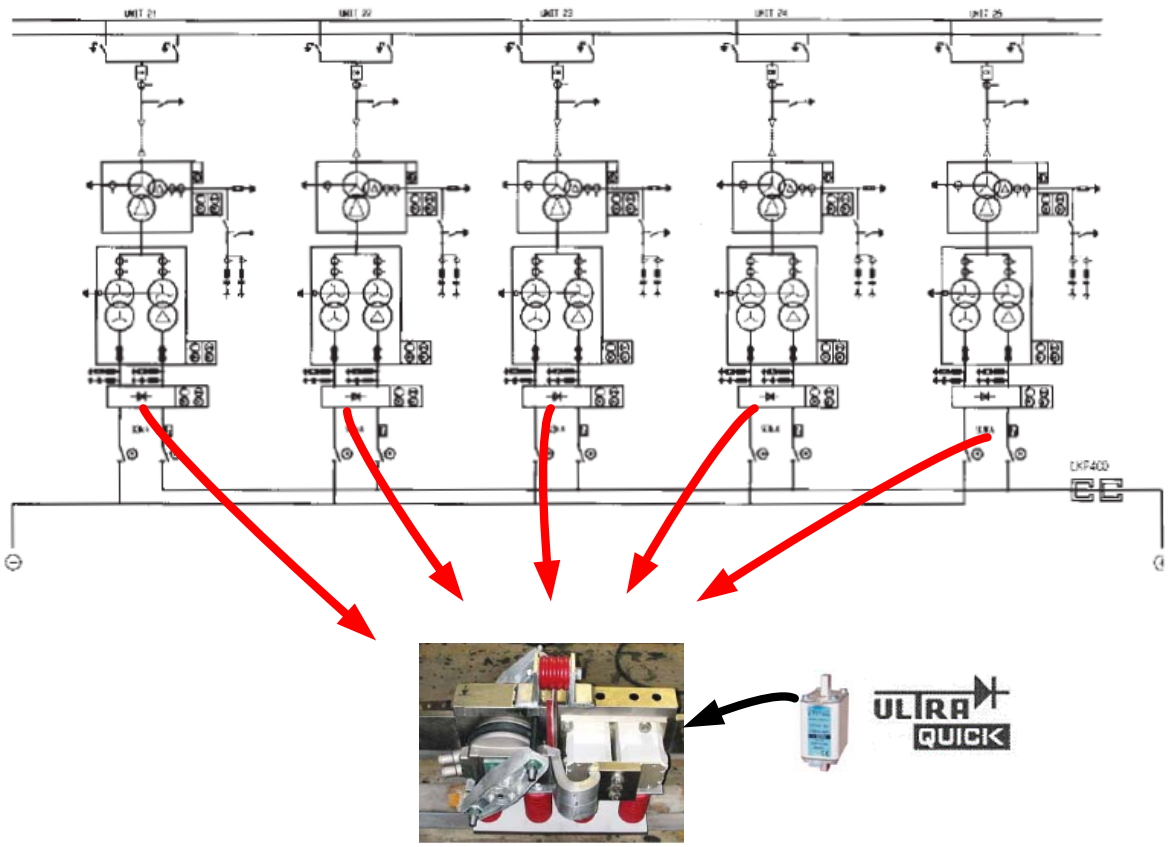
Primary aluminium is produced in an electrolytic process using DC electrical power of up to 600 MW per potline. AC-to-DC power conversion units (rectifiers) use diode or thyristor semiconductors to produce the DC current required for the process. Smelter projects requiring up to 550 kA pot current may soon be built. With increased potline currents, the single conversion units also need an increased rating to remain highly efficient. With these increased ratings, the plant can operate close to or at full production in an N-2 operation mode (N-2 means that only three out of five installed units are in operation).

The semiconductor, diode or thyristor, and its fuse are the key elements in a high-current rectifier. To get maximum current out of a semiconductor and fuse, an efficient cooling design is important. So double-side cooling is standard for semiconductors, and is becoming standard for fuses in rectifiers rated for 100 kA or more. Nevertheless, for high voltage, e.g. 1600 V, which seems to be the preferred rating for new potlines, the bottleneck today is the fuse. New developments will open this bottleneck in the near future.

Another aspect that becomes more important is how to coordinate the semiconductor and fuse. In case of a semiconductor fault, the fuse must clear and open the circuit before the semiconductor housing ruptures. The coordination is designed via a calculation and then proven with tests in a high-current laboratory.

Electrical circuit:





Application:

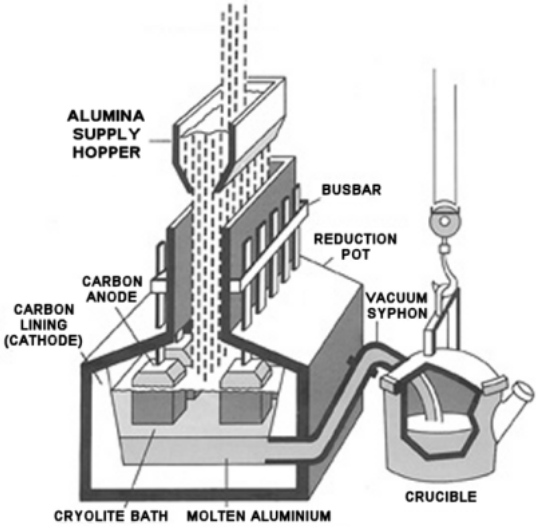
- Power rectifires

Industry:

- Aluminium smelters,Chemical electrolysis, Magnesium smelters, Electrolytic winning of cadmium, copper, nickel, cobalt and non-ferrous metals, Zinc plants and similar processes, Graphite Electrode plants, DC Arc Furnace

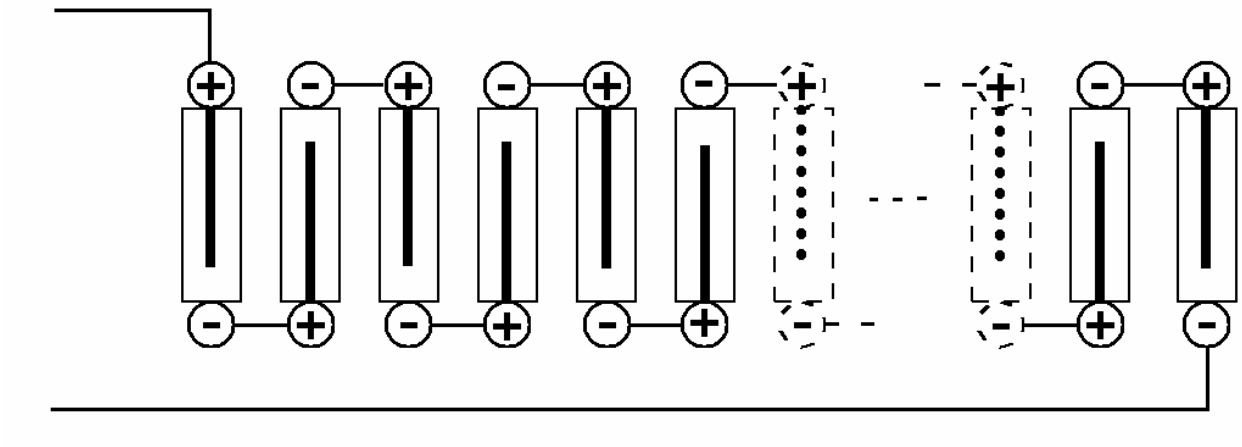
Al - industry:

Smelting Aluminium – the pot
$2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2$
(Aluminium Reduction Process)



- The anode is a pre-baked mixture of coke and pitch
- The cathode is a large rectangular steel box lined with carbon made by a mixture of metallurgical coke and pitch
- The hot molten mixture (cryolite) is electrolyzed at a low voltage of 4-5 volts, but a high current of 50,000-500,000 amperes. This process reduces the aluminium ions to produce molten aluminium metal at the cathode, oxygen is produced at the graphite anode and reacts with the carbon to produce carbon dioxide.

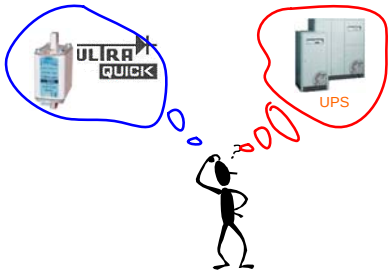
- An electric current is passed through the electrolyte at low voltage (4-5 Volts) , but very high current, typically 150,000 amperes up to 500.000 amperes.



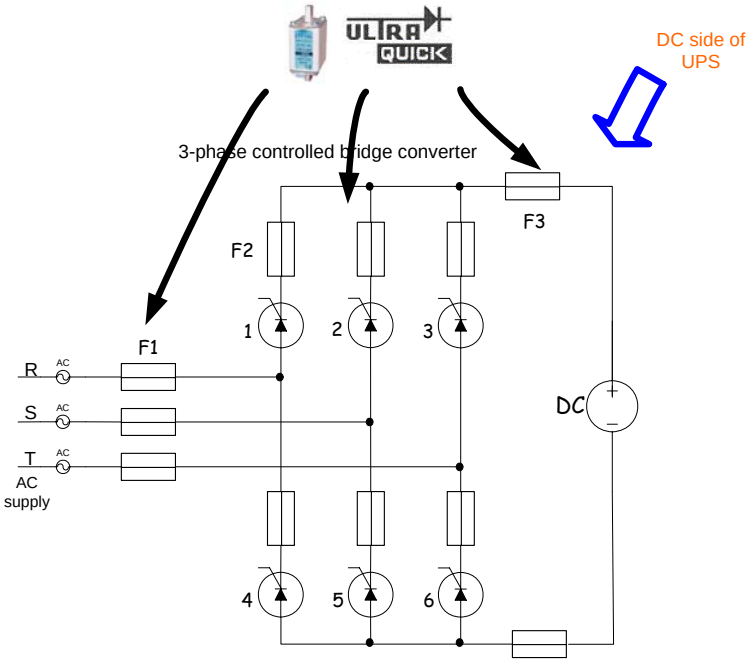
Uninterruptible Power supplies (UPS)

Description:

Depending on required transitory period to overcome a network failure and consumers loads the UPS configuration and size differs. Main components of an UPS-system are: rectifier/ battery charger, battery (lead-acid or NiCd), inverter and static bypass and maintenance (thyristor) switches. During standard operation, rectifier feeds loads through inverter and charges the battery. In case of network system fault, the connected battery automatically supplies power to consumers through inverter. Depending on consumers loads and if longer system failure period are to be considered an additional emergency diesel generator should be planned.



Electrical circuit:



Application:

- power stations
- data center
- proceesses
- oil platforms
- sea transport
- air transport
- railway
- underground alarm and security systems
- industrial processes hospitals.

Industry:

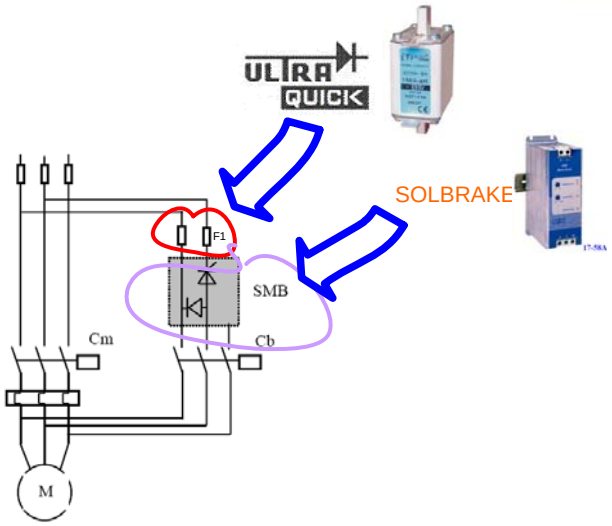
- Telecom, airports, oil, railway, industry, IT…, hospital, Emergency equipment, Controlled power shut down

Solbrake (SMB)

Description:

It is used for soft brakeing 3 phase AC motor without using mechanical brake. Somethimes brake could be a part of frequency converter for AC motors.

Electrical circuit:



Application:

- CNC machines
- Circular saw
- Quick stopping of load with high persistence

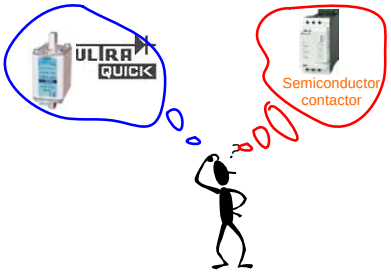
Industry:

- Wood industry
- Mechanical industry

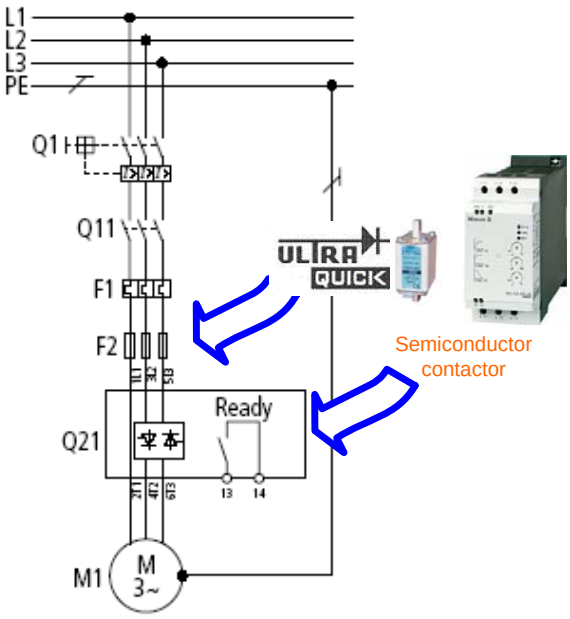
Semiconductor contactor, relay

Description:

Semiconductor contactor allow fast, silent swithing of three-phase motors and resistive loads. Switching takes place automatically at the ideal point in time and suppreeees inwanted current and voltage peaks.



Electrical circuit:



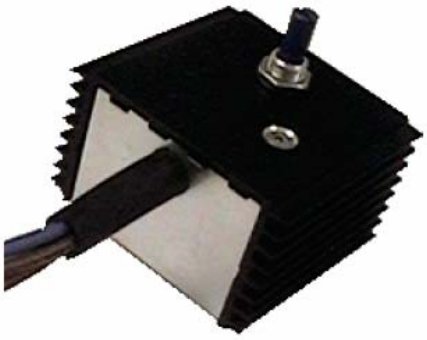
Application:

- Single-phase resistive loads
- Temperature regulation via two-step controllers
- Control of high switching frequency in packaging machines
- Actuation of valves in mechanical handling
- Noiseless switching of lights and heating in buildings
- Control of signalling and traffic light installations
- Solid-state switching in the extreme environments of steel works

Industry:

- Wood industry
- Mechanical industry
- Electrical industry…

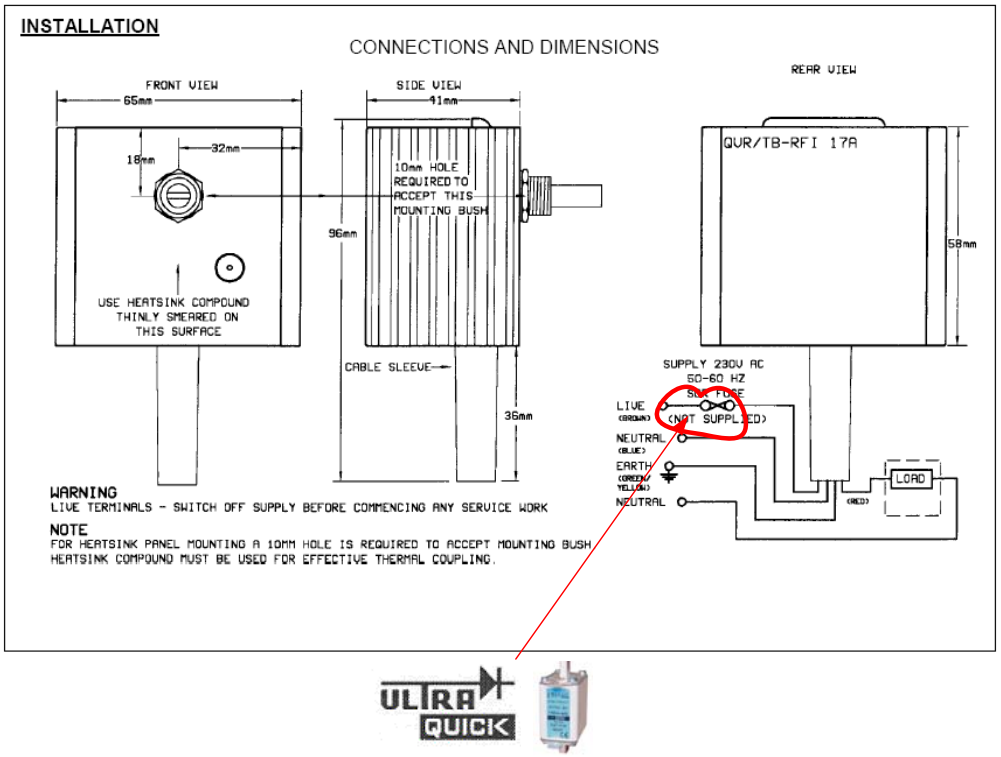
Variable AC regulator



Description:

These variable phase angle power regulators are robust and compact units, which are ideal for controling single phase mains driven loads. They give fully adjustable voltage outputs from 0-98% and the large triac enables the unit to handle high inrush currents with ample safety margin on industrial installations.

Electrical circuit:



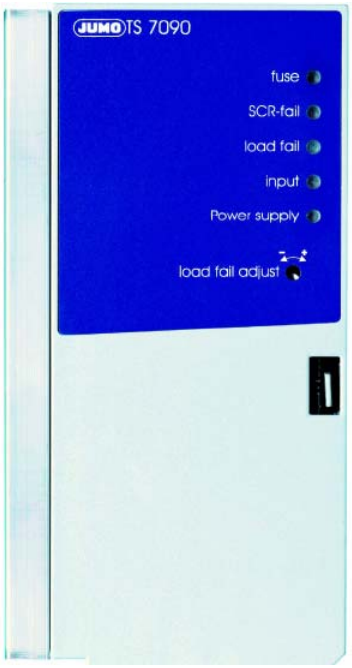
Application:

- Suitable for quartz lamps
- Conventional resistive heating elements
- Ovens
- Moulders
- Dryers
- Inductive loads (transformer, motor)

Industry:

- General

Thyristor power switch



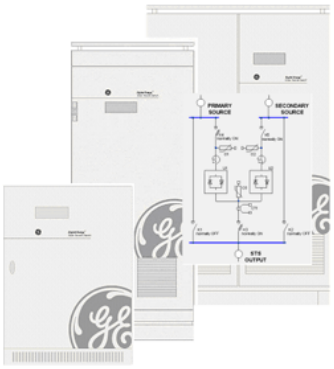
Description:

The power section operates as a zero-voltage switch on the full-wave switching principle, i.e. basically, the voltage is switched as it passes through zero, independently of the time and the control pulse.

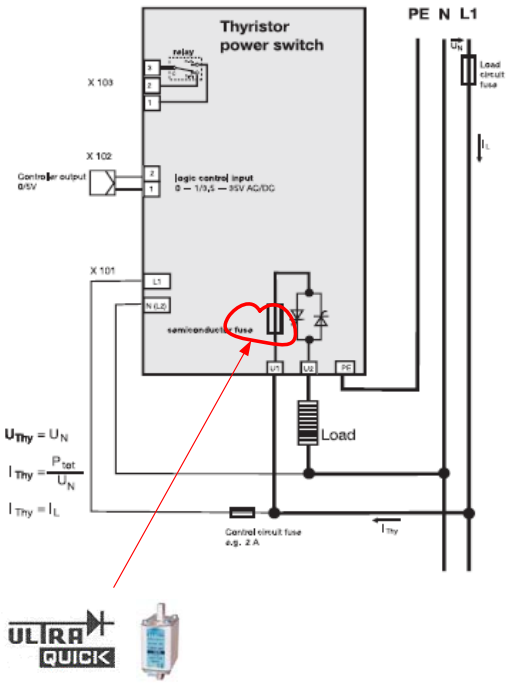
The power section consists of two antiparallel connected thyristors, the insulated heat sink and the control electronics. The TS 7090 for load currents up to 50A can either be snapped onto a 35 mm DIN rail or wall mounted, using a mounting plate.

The TS 7090 power switches comply with EN 50 178 (VDE 0160). The earthing arrangements must be made in accordance with the regulations of the responsible electricity supply company.

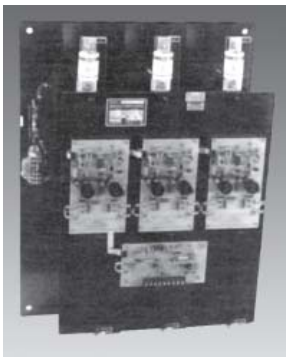
Depending on the length of the control signal at the logic control input, the output is increased through the number of complete cycles switched through per control period.
This mode of operation is used for resistive-inductive loads, where the resistance when cold is roughly the same as the resistance when hot. Because switching always occurs at a voltage-zero, the unit causes very little radio frequency interference during operation.



Electrical circuit:



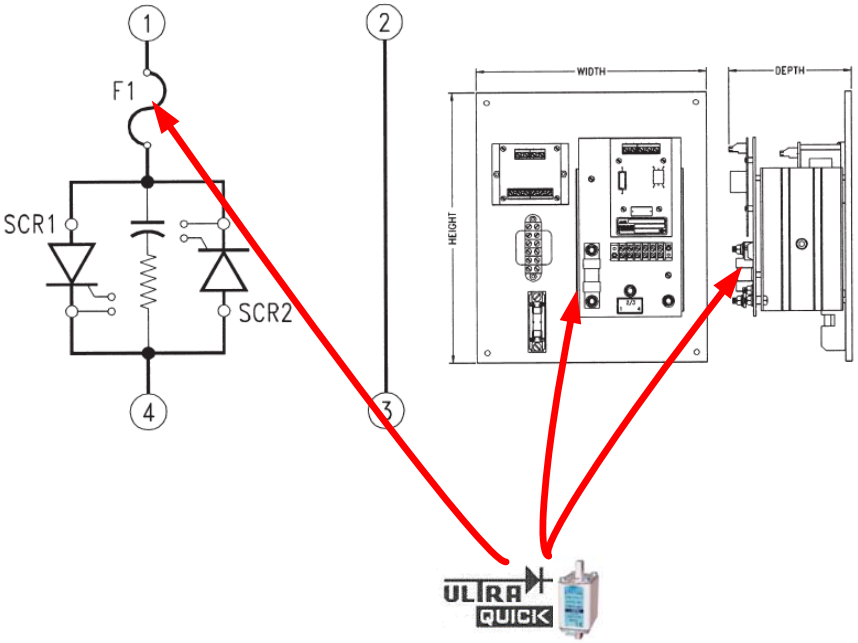
SCR Power controls



Description:

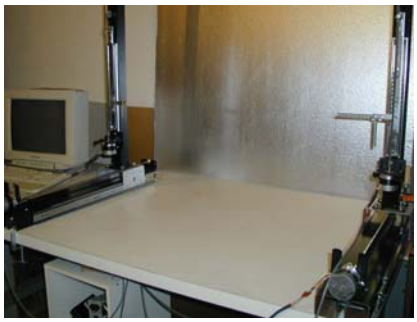
Controls utilize phase-angle firing to provide infinitely variable control of single-phase and three phase a.c. voltage to inductive loads. This unit are solid state replacement for variable transformer, saturable core reactors, electromechanical contactors and mercury relays. Power SCR replace contacts and brushes to switch electric power withouth moving parts and when operated within stated ratings for current, voltage and temperature.

Electrical circuit:



Application:

- Transformer-coupled Loads
- Inductive heating
- Silicon-Carbide elements
- Foam Cutting
- Other inductive loads



Industry:

- Metal, other industries

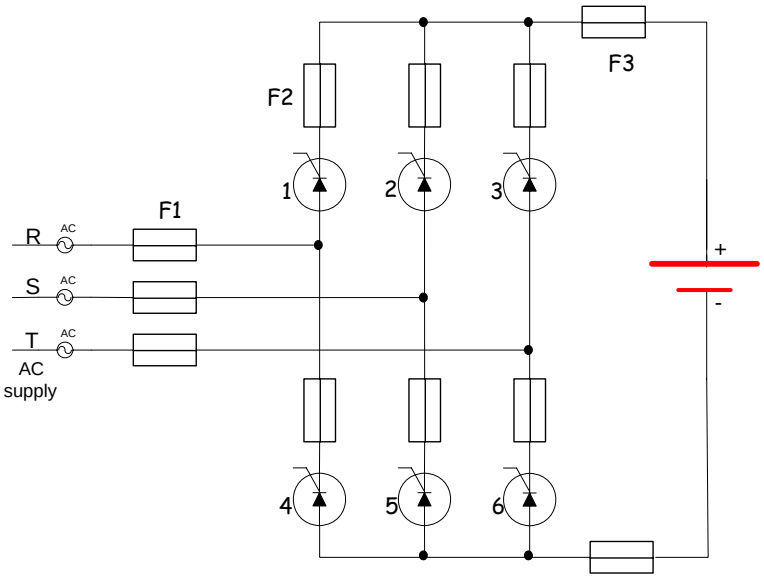
Battery charger

Description:

Conversion of three-phase AC power to DC power to for battery charging and current supply to DC loads.

Electrical circuit:

F1, F2, F3 fuse for semiconductor protection (Ultra Quick) (for protection of thyristors).



Application:

- Automatic battery charger for auxiliary DC supply in power system sub – stations and communications systems. Power supply for telephone equipment High current DC voltage power supply…

Industry:

- Sub-station, electrical, electronics, telecomunications…

Voltage regulator for generator

Description:

The voltage regulator's primary task is to keep the voltage of the power system constant. It is also to maintain the stability of the power system in steady-state conditions and when there are transient disturbances in the network. The voltage regulator covers all control functions needed for excitation systems. The calculating capacity makes it possible to realize accurate control functions, and the digital technique also provides good long-term stability. The basic function may easily be supplemented. By adding software and, in certain cases, hardware, different limiters and overriding control functions can be implemented, see Figure 2.

Hardware

The voltage regulator is based on a programmable micro-computer system, PLC. The PLC has an interface to the surroundings comprising digital and analogue inputs/outputs and communication units. The equipment is normally mounted in a cubicle together with power supply units, transducers and interface relays.

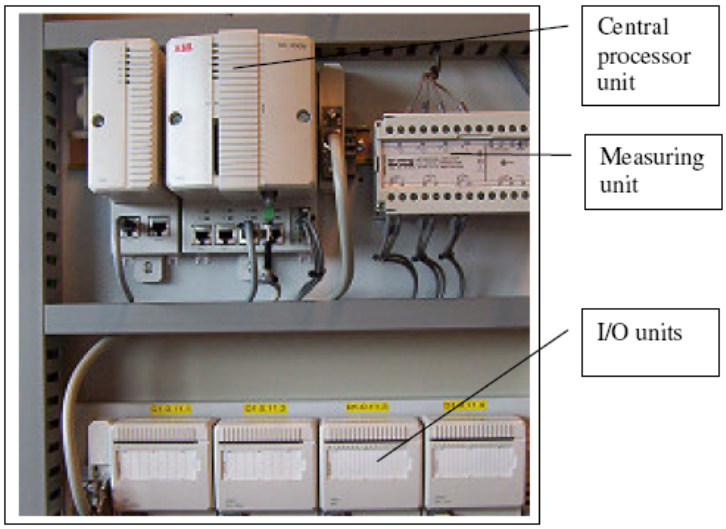
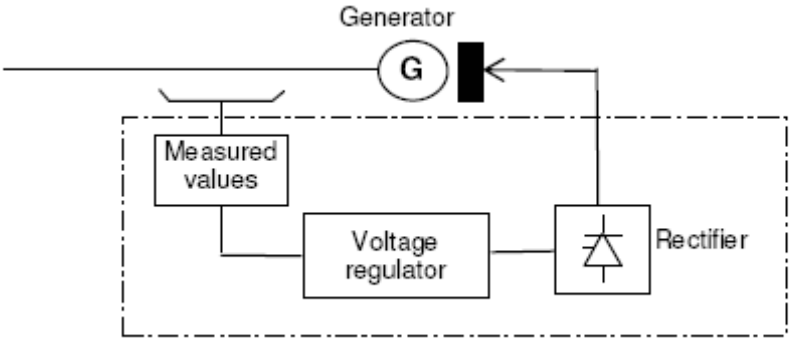
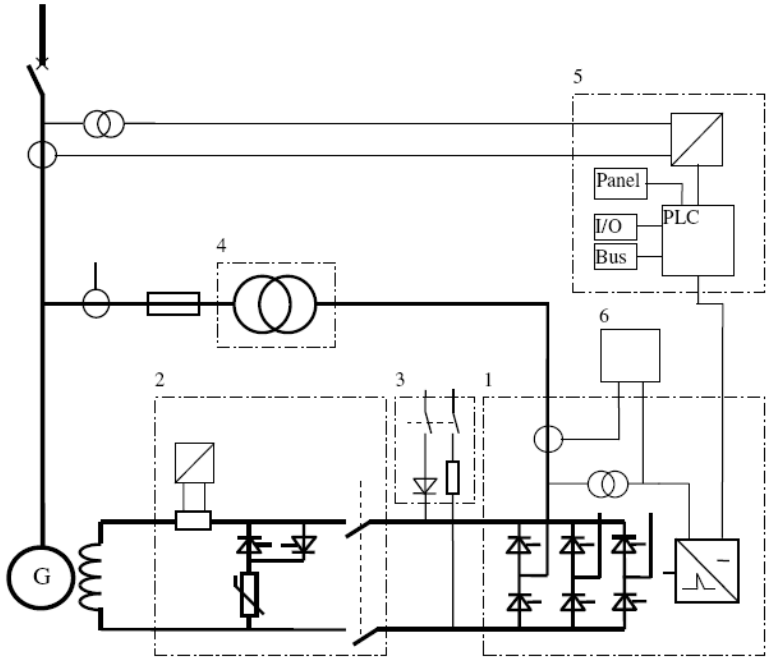


Figure 6 **Typical installation of voltage regulator**

Electrical circuit:

The thyristors are protected against short circuits by means of a quick-acting fuse in each branch or phase. Protection against voltage transients is achieved by RC circuits (snubbers). For efficient cooling, the thyristors are clamped into heat sinks, that can be natural or forced air cooled.





Application:

- Power generators

Industry:

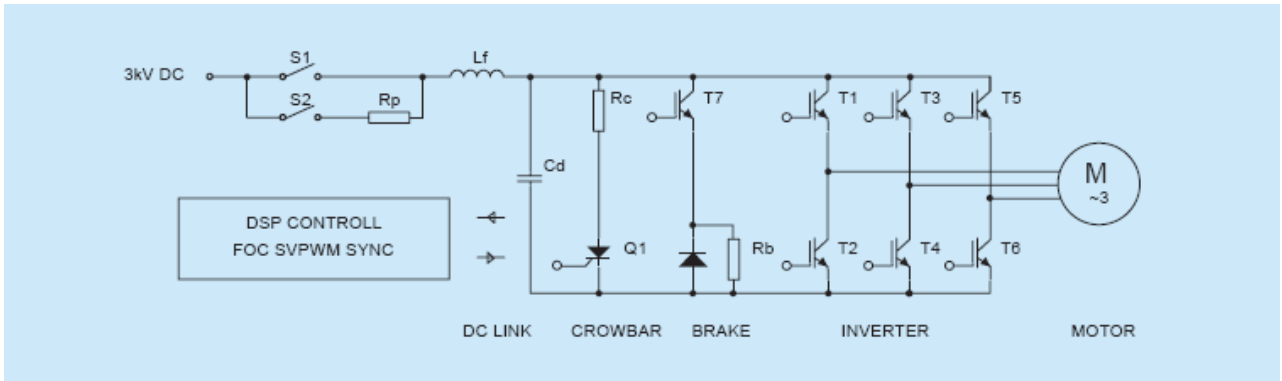
- Power plants

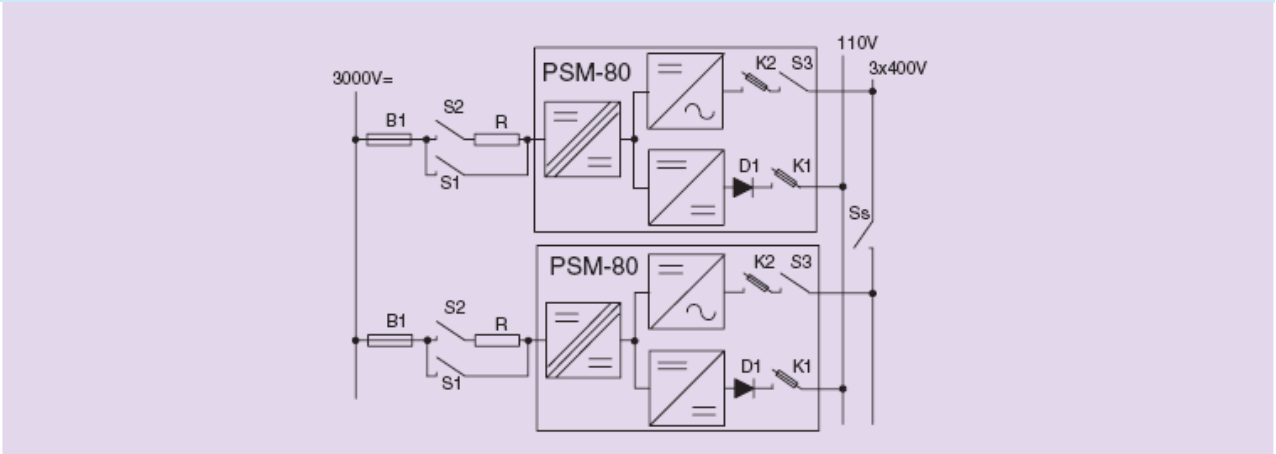
Traction inverter

Description:

Traction inverter is a modern chopperless system of the direct three-phase inverter based on HV IGBT 6,5kV technology. The control of the converter is performed in DSP technology with the application of FOC SVPWM (field oriented space vector pulse width modulation) Within the range of high speeds, the system co-operates with a synchronised Bus Clamping Pulse width modulation, which causes redustion of the losses and noise. The control system ensures acceleration with a constant torque and low power losses. The drive may operate with rheostatic or regenerative braking. The inverter system guaranties very good traction parameters and a perfect stabilisation of the driveing torque. The control system is equiped with an event recorder with a nonvolatile memory. It is also equiped with an antislip system for the drive and braking. Applied braking resistors made of stainless steel guarantee a long service lifetime and low noise level. The applied system of bussbar combined with a perfect IGBT driver guarantee a failure-free behaviour at short circuits. It also cancels the possibility of secondary damages in case of the transistors failure. The applied polypropylene capacitors ensure long service lifetime and resistance of the system against changes of voltage in the traction network. The inverter system is also protected with a thyristor crowbar.

Electrical circuit:





Rated input voltage	3000 VDC +30% -30%
Auxiliary voltage	24 VDC +10% -40%
Rated current	200 Arms
Maximum output current	250 Arms
Rated power	500 kW
Frequency	0÷160 Hz
PWM frequency	460÷1100 Hz
Insulation strength	12 kV
Cooling	Forced, air
Weight (without output chokes)	450 kg
Dimensions	652×2494×2236 mm

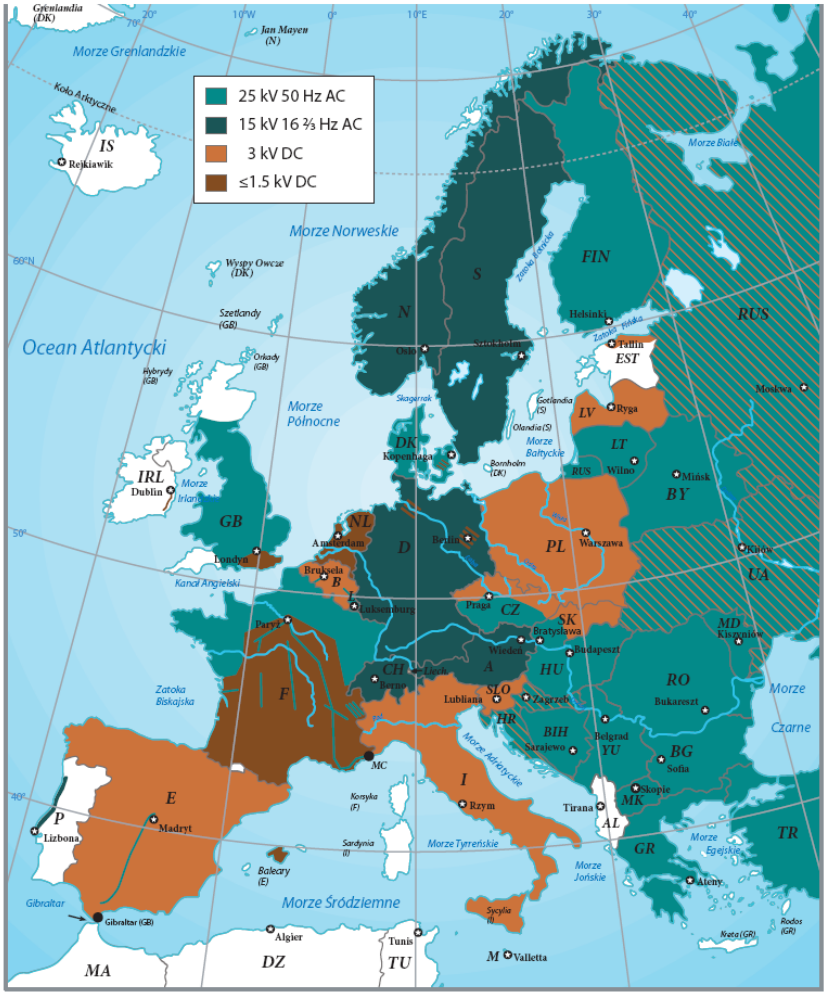
Application:

- Trolley-bus, Tramway, Passenger coach, Rail-bus, Locomotive…

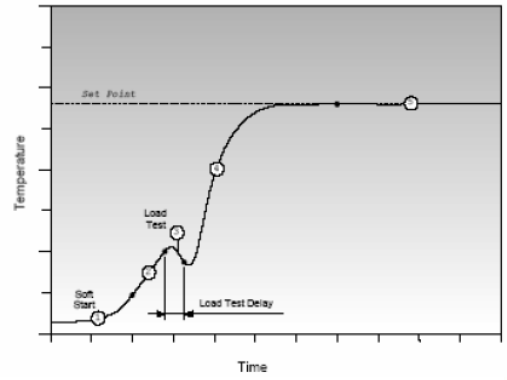
Industry:

- Railway

MAP OF TRACTION VOLTAGES IN EUROPE



DMS Hot Runner temp. controls



Description:

DMS Hot Runner temp. controllers ared esigned for use in the plastic injection moulding industry as temp. controls for third party hot runner system as commonly used in mould tools.

Electrical circuit:

Specification

The following are general specifications. The actual controller/console supplied may have contractual variations and differ in some specified options.

Supply Voltage: HRS	Single phase with 13A or 16A connector Plug
Supply Voltage: HRS4HP	415v 3 phase 50/60Hz with neutral, others available 240/480v Star/Delta
Supply Voltage Tolerance:	± 20% supply voltage swing.
Supply Protection:	Miniature Circuit Breaker
Overload Protection:	High Speed Semiconductor Fuse Links
Mains Voltage Output:	Burst fired, zero crossover.
Output Current: HRS	10 A max
Output Current: HRS4HP	15 A max
Control range:	0 - 472 Centigrade (Celsius).
Temperature scale:	Centigrade (Celsius).
Control Method:	Open or closed loop with HR software.
Thermocouple input:	Iron Constantan Fe/Con type 'J',
Front panel LED Indicators	Normal running, high and low temperature Alarm
T/C & Heater Tool connector	Harting type Han A or equivalent.
Keypad	7 pad, tactile switch
Display	4 x 20 characters, LCD
Case: HRS	Metal case 44w x 10h x 20d cm
Case: HRS4HP	Metal case 36w x 16h x 34d cm

Application:

- Temp. control

Industry:

- Moulding industry

Welding inverters

Description:

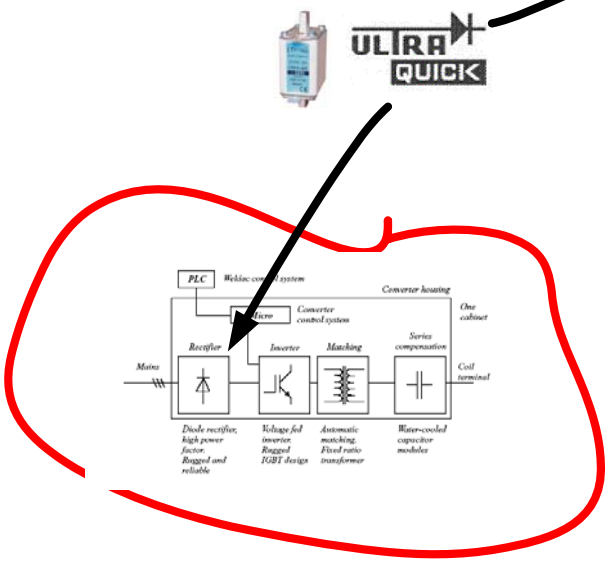
General description

This description covers the Weldac G2, the new solid-state IGBT welder. The converter is based on IGBT transistor inverters. The welder utilizes EFD Induction's patented IGBT driver technology, allowing IGBT transistors to operate at frequencies of up to 350 kHz. The use of IGBTs increases the durability of the equipment and enhances reliability. The new welder has a compact design and is contained in a single cabinet.

The Weldac G2 system consists of the frequency converter, a busbar and an external control system. The converter includes a diode rectifier, up to six individual IGBT inverter modules, a matching transformer and compensation capacitors. The new welder is exceptionally small because the rectifier is built into the cabinet of the converter, making the DC-cable redundant.

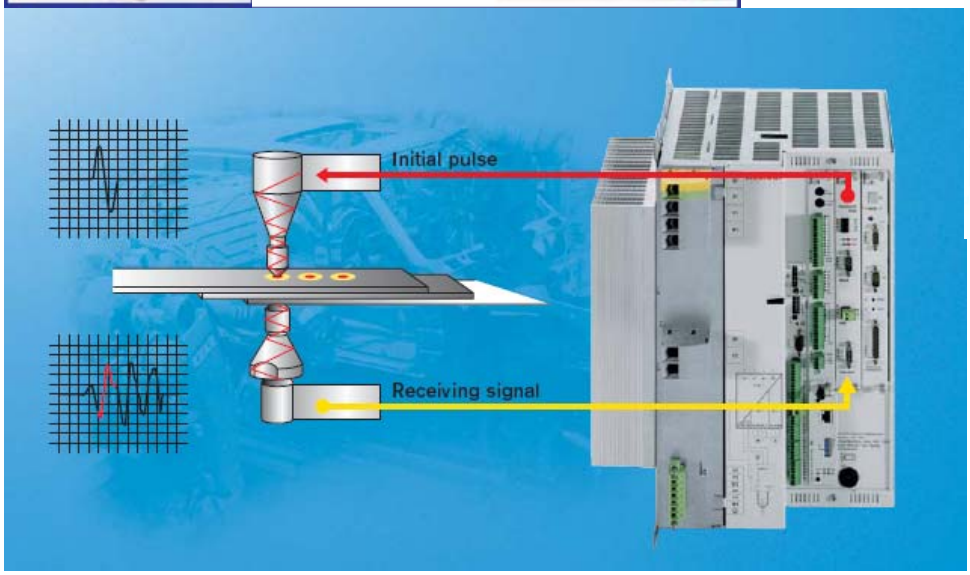
Electrical circuit:

All the inverter modules are connected to the DC-bus via individual high speed fuse links. The output from the inverters is connected to the matching transformer in a way that ensures equal current in all inverters. This lowers the risk of failure in the inverter modules and enhances the reliability of the welder.



Application:

- Manual Welders, Industrial Welders



Industry:

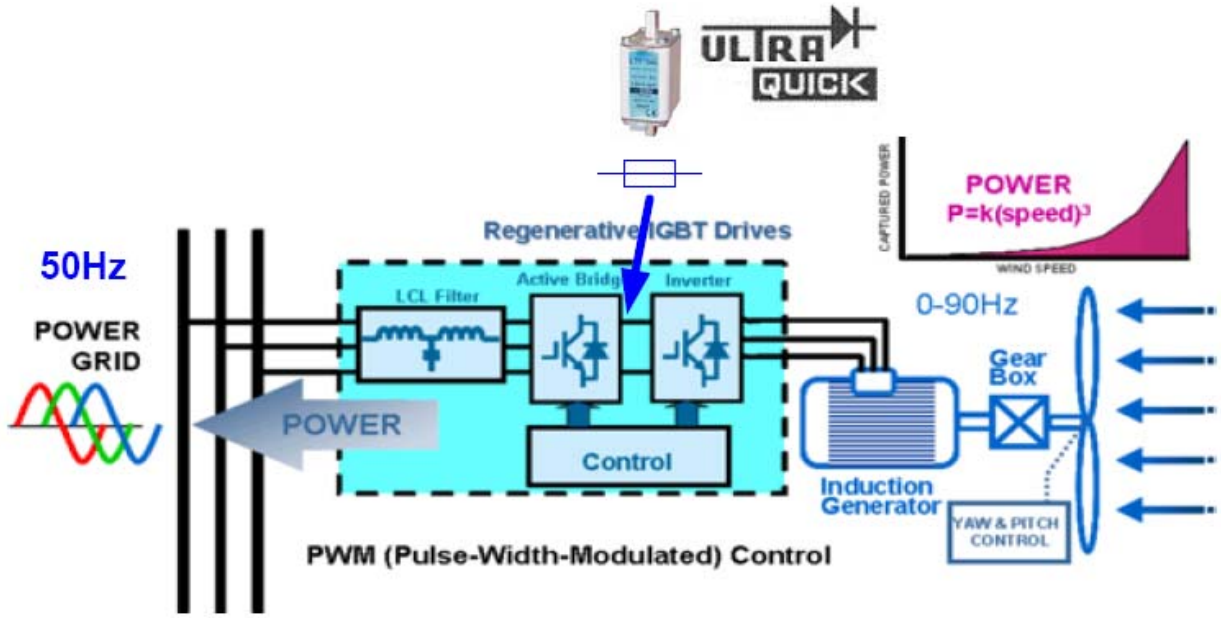
- Automotive industry

Wind power-alternative energy

Description:

In a typical wind turbine application, a propeller rotates an induction motor - (in this case “induction generator”) at a speed that varies with wind velocity. The slight sub-synchronous frequency of the inverter guarantees the motor functions as a generator at all times.
Affinity laws of fan operation define the power produced to increase as a cube of wind speed. Regenerative IGBT Drives smoothly distribute this newly generated power onto the power grid at a constant 50Hz, regardless of speed.

Electrical circuit:



Application:

- Inverter for wind power

Industry:

- Wind power

Solar power-alternative energy

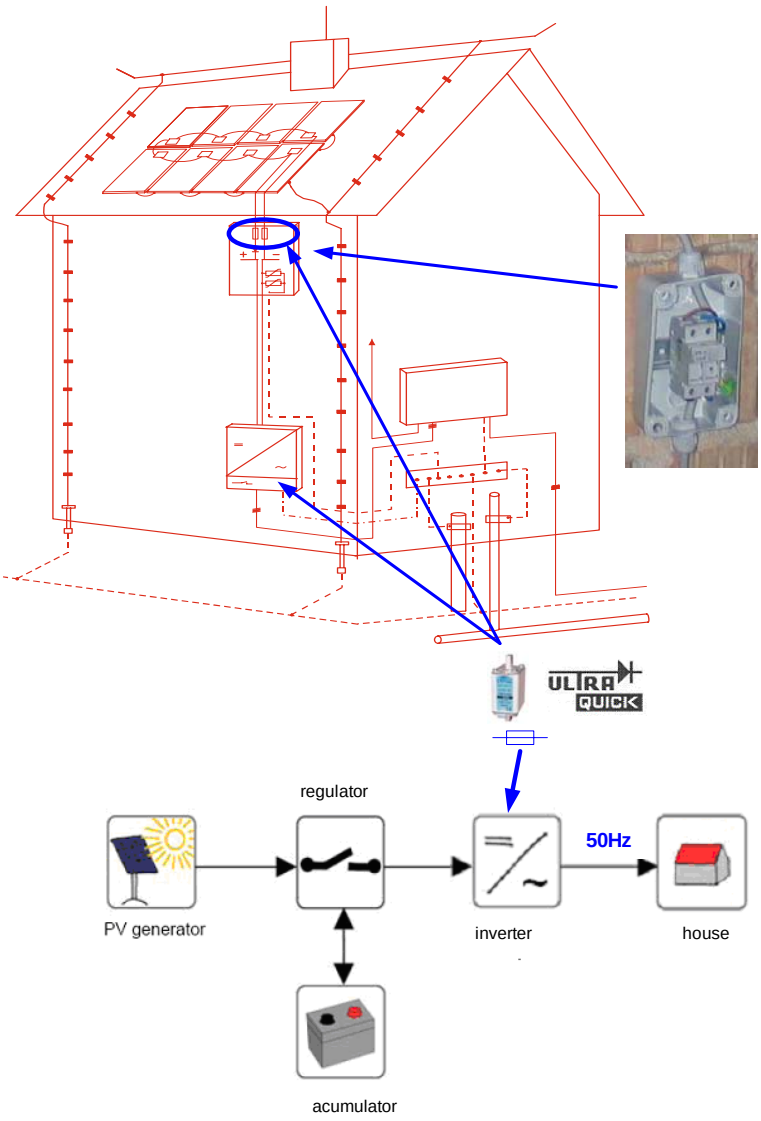
Description:

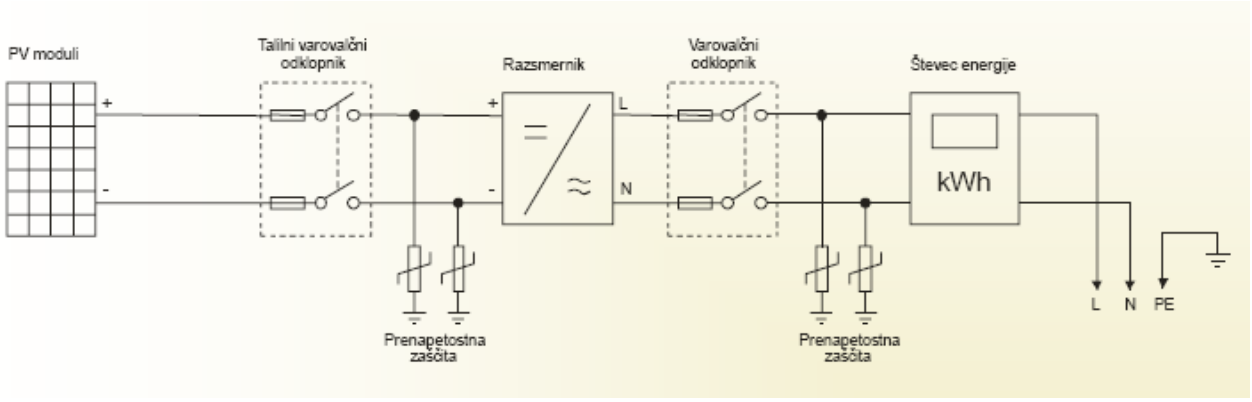
Concern about the environment together with diminishing reserves of fossil fuels are driving the price of energy upwards and forcing the society to consider alternative sources of energy. One of the options of tapping into a renewable source of power is the energy of the Sun.

For direct conversion, photovoltaic systems are used either as stand-alone units in remote areas where commonly used sources of energy are not readily available (country houses, mountain cottages …), or as grid-connected systems.

Electrical circuit:

Case: CH 10x38mm , 1000V AC/DC





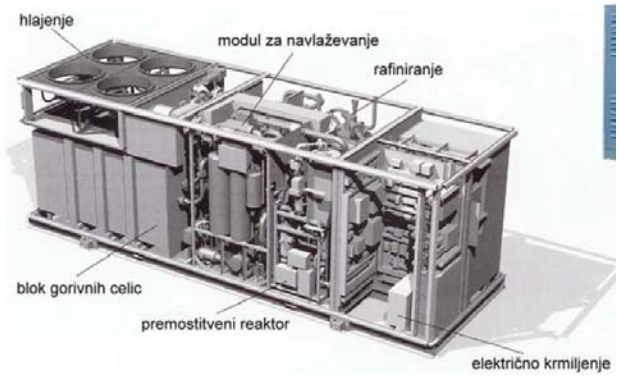
Application:

- Inverter for solar power
- For protection of solar cell

Industry:

- Solar power plant

Fuel cell-alternative energy



Description:

Fuel cell is used for production of DC electrical energy.

Application:

- Protection of fuel cell

Industry:

- Fuel cell power plant (small, medium, big)

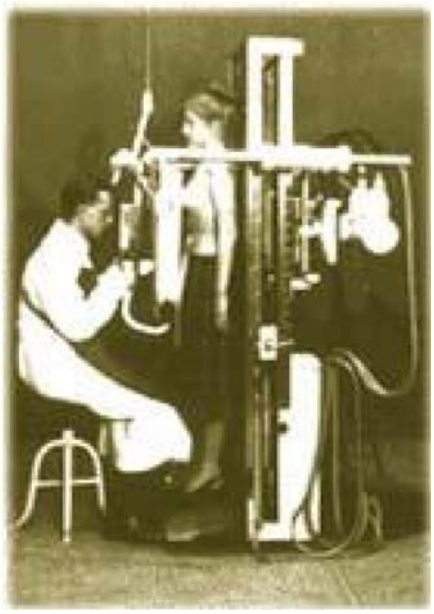
Rontgen machine, magnetic resonance -medicine

Description:

Ultra Quick fuses are used for protection diode-thyristor in high voltage (225kV) power supply for rontgen and magnetic resonance machine.

Application:

- Rontgen, magnetic resonance machine



Industry:

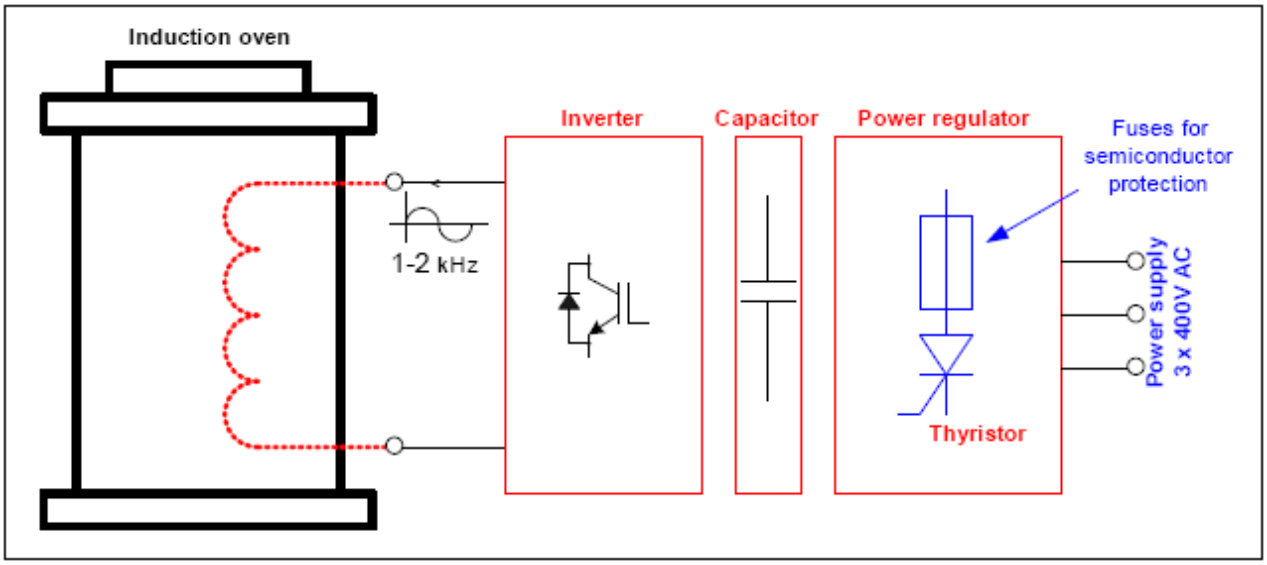
- Hospital

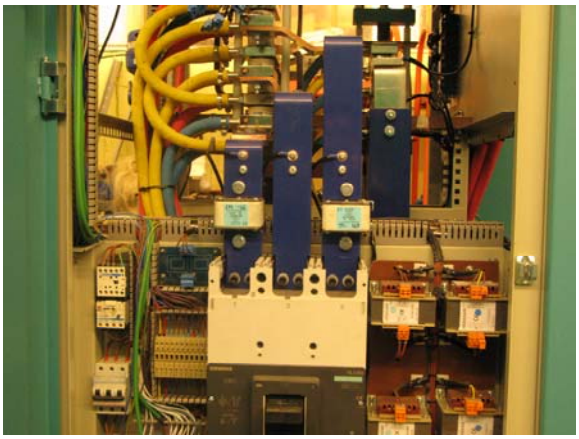
Inverter for frequency induction oven

Description:

Frequency induction oven is controled by thyristor or IGBT inverter. Resonant frequency is abouth 2kHz.

Electrical circuit:





Application:

- Moulding and casting of iron, Al, Copper (Thyristor regulation of power)-smelting plant

Industry:

- Metal, smelting plant, other industries

Printing machine

Description:

For protection transistor switch on power bulb.

Application:

- Printing machine

Industry:

- Printing industry

VAR compensator

Description:

Is a device for compensation VAR energy in in the electro system. It make active compensation by measuring cos factor and switching compensation capacitors.

Application:

- Protection of triac in VAR compensator.

Industry:

- Industrial plants