LEROY SOMER

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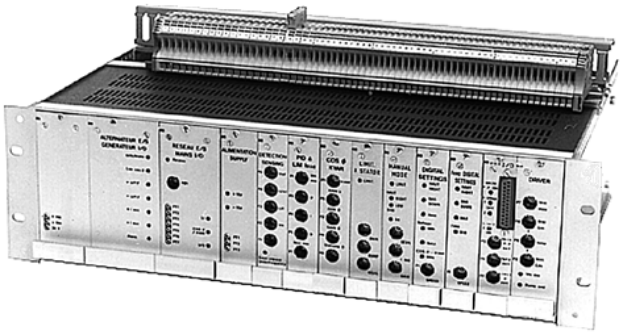
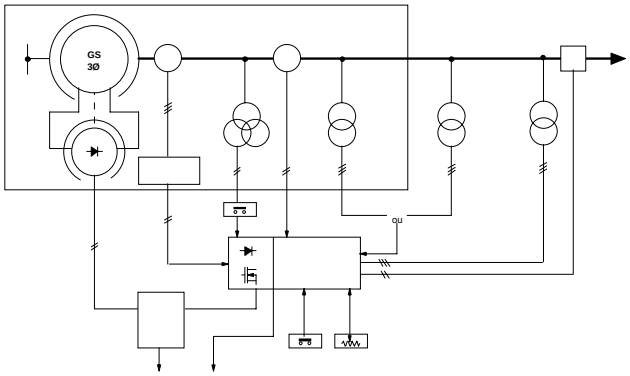
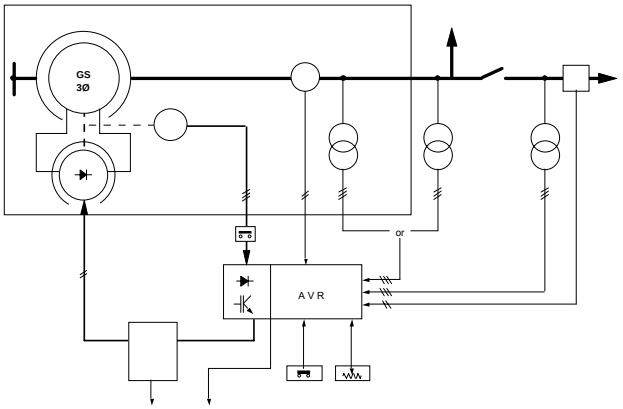
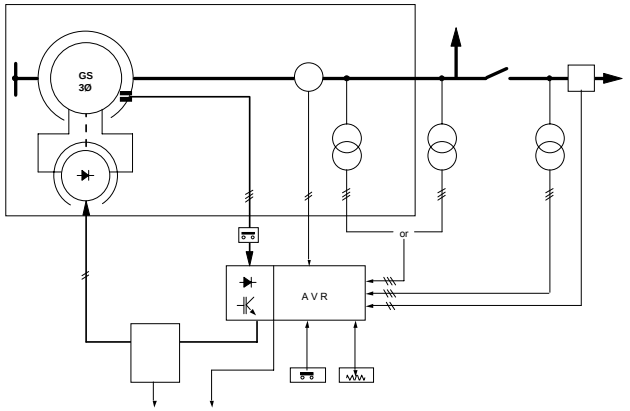




SHUNT + booster



PMG



AREP

AUTOMATIC VOLTAGE REGULATOR R630

Instruction manual

AVR MODEL R630

NOTE

THE ELECTRICAL CONNECTION DIAGRAM ARE ONLY GIVEN AS AN INDICATION. PLEASE REFER TO THE SPECIFIC DIAGRAMS OF YOUR ALTERNATOR

WARNING

TO PREVENT PERSONNAL INJURY OR EQUIPMENT DAMAGE, ONLY QUALIFIED TECHNICIANS/OPERATORS SHOULD INSTALL AND OPERATE THIS DEVICE

CAUTION

MEGGERS AND HIGH POTENTIAL TEST EQUIPMENT MUST NOT BE USED. INCORRECT USED OF SUCH EQUIPMENT COULD DAMAGE THE SEMICONDUCTORS CONTAINED IN THE AVR

TABLE OF CONTENT

CARDS REFERENCE

DESIGNATION	N° printed Circuit board	N° Card	REMARKS
Wired empty rack		C51950267	AREP
Wired empty rack		C51950250	Shunt + Booster
Wired empty rack		C51950251	PMG
Generator I/O board		C51950200	100 / 120V - 50 / 60Hz
Generator I/O board		C51950202	400 / 450V - 50 / 60Hz
3F Mains I/O board		C51950220	Alt:110V; réseau:110V
3F Mains I/O board		C51950222	Alt:400V; réseau:400V
2F Mains I/O board		C51950210	
1F Mains I/O board		C51950215	
Rack supply	CP1950040	C51950041	
Sensing	CP1950050	C51950051	
PID, limitation	CP1950060	C51950061	
Driver	CP1950070	C51950071	
Digital U / PF potentiometer	CP1950110	C51950111	
CosØ, KVAR	CP1950080	C51950081	
Manual mode	CP1950100	C51950101	
Digital Ifield pot & follower	CP1950110	C51950141	
Mains PF regulation	CP1950120	C51950121	
Limit I stator	CP1950090	C51950091	

= Basic
= Optional

NOTE :
- 1F = Solo or parallel operation between machines (Voltage regulation + reactive load sharing (droop))
- 2F = 1F + parallel operation with the mains (P.F or KVAR regulation)
- 3F = 2F + automatic voltage matching between the generator and the mains. (For synchronizing)

IMPORTANT : The informations given on this sheet will be used to order spare parts. Take care of it.

GENERAL DESCRIPTION

1) APPLICATION

- The AVR model R600 can be used with brushless self-excited type generators, "SHUNT", "SHUNT with BOOSTER" or "PMG" or “AREP” excitation. In case of "SHUNT with BOOSTER” the booster current is totally monitored by the AVR.
- The AVR is able to ensure, depending of its constitution, solo operation, parallel operation between equivalent generators or parallel operation with the mains with cosØ or KVAR regulation.

2) DESCRIPTION

- The AVR model R630 is composed of electronic cards which are included in a rack 19" .
- Except the necessary “Generator I/O”, the optional “mains I/O” located on the left of the rack and the “driver” card located on the right, all the other cards can be plugged anywhere in the rack. Future optional cards could be added without any internal wiring modification.
- The rear flat cable (BUS 64 points) is given more long as it can be connected to an optional interface terminal block which gives all the internal test points or in the future the possibility to connect another rack if the cards number will become too important.

3) INTERCONNECTIONS

- External interconnections are located on the top of the rack in form of two terminal blocks:
- A power / voltage terminal block (19 terminals, two with fuses)
- A command / control terminal block (41 terminals)
- A conventional wiring connect this terminal blocks to the power block fitted on a heat sink and also to the "generator I/O" and "mains I/O" to give an interface with the flat cable BUS 64 points.
- In the same manner a 8 points connector connects directly the driver card to the power block.

4) OPTIONAL CARDS

- Basically the AVR allows voltage regulation with reactive sharing when paralleling with other machines.
The following cards can be plugged into the AVR without internal wiring modification :
- CosØ / KVAR regulation (2F) (// with the mains)
- Voltage equalisation with the mains (3F) (Synchro)
- Voltage and P.F digital potentiometers
- Manual operation
- I stator limitation
- Mains P.F or KVAR regulation from 4-20mA converter.

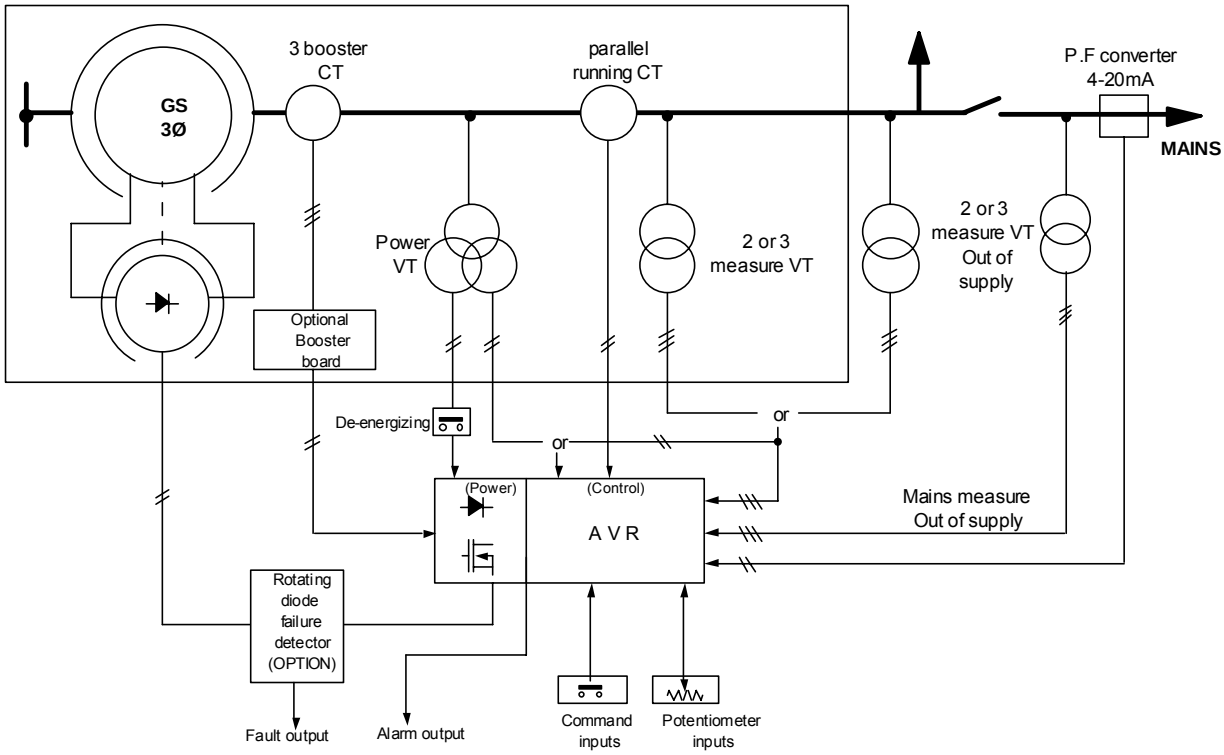
5) SPECIFICATIONS :

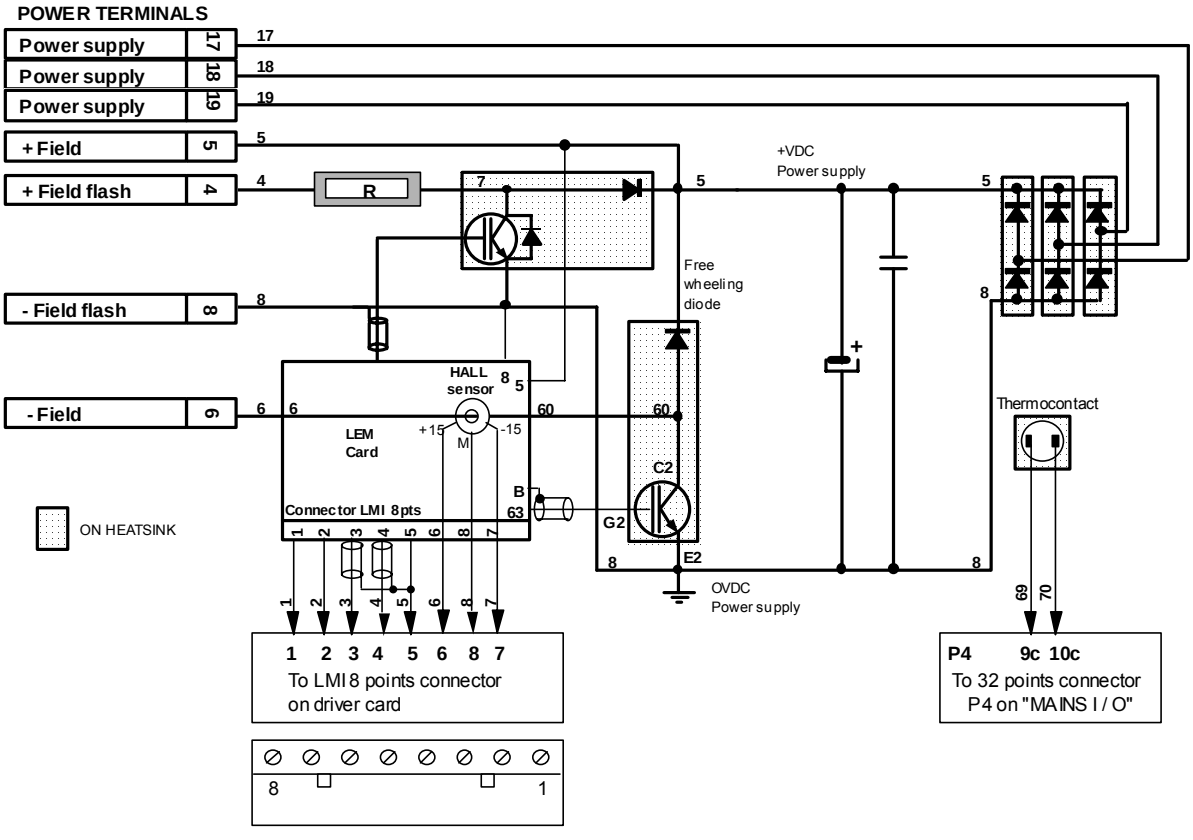
- Sensing voltage
  : 100/110Vac 50Hz
  : 120/130Vac 60Hz
  : 380/420Vac 50Hz
  : 430/450Vac 60Hz
- Power supply
  (maximum 180Vac 50/60Hz)
  Shunt+Booster = power transformers
  AREP = auxiliary windings
  PMG = external generator
- Field output
  : 12 Amperes nominal, 24Amp maximum during 10s on 6Ω minimum
- Accuracy
  : +/-0,5% of the means of the three phases on linear load and without droop
- Voltage setting range
  : +/-10% of the nominal voltage by means of external optional potentiometer, according to alternator capability.
- Droop setting range
  : - 7% of the nominal voltage at cosØ =0
- Under-frequency protection
  : Adjustable threshold and slope from V/Hz to 2V/Hz
- Field ceiling
  : 110% of If nominal permanently, unlocked in case of voltage decrease
- Protection
  : Heat sink overheating, exciter short-circuit
- Alarm output
  : Heat sink overheating, too much ceiling unlocked time
- Environment
  : Maximum ambient temperature -10°C to +50°C
  : Fitting in control panel without excessive vibrations

6) SCHEMATICS AND DRAWINGS

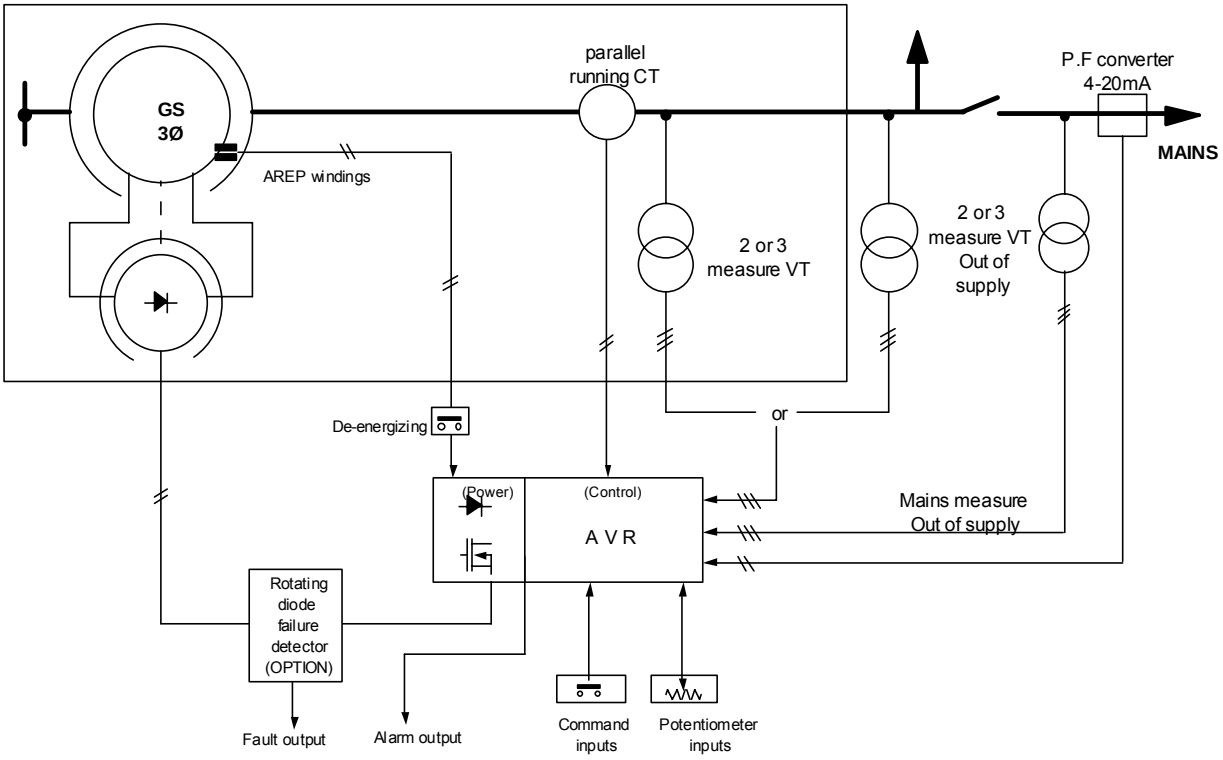
- Following schematics give all the usual information on the interconnections between the terminal block, the I/O connectors and the power block.

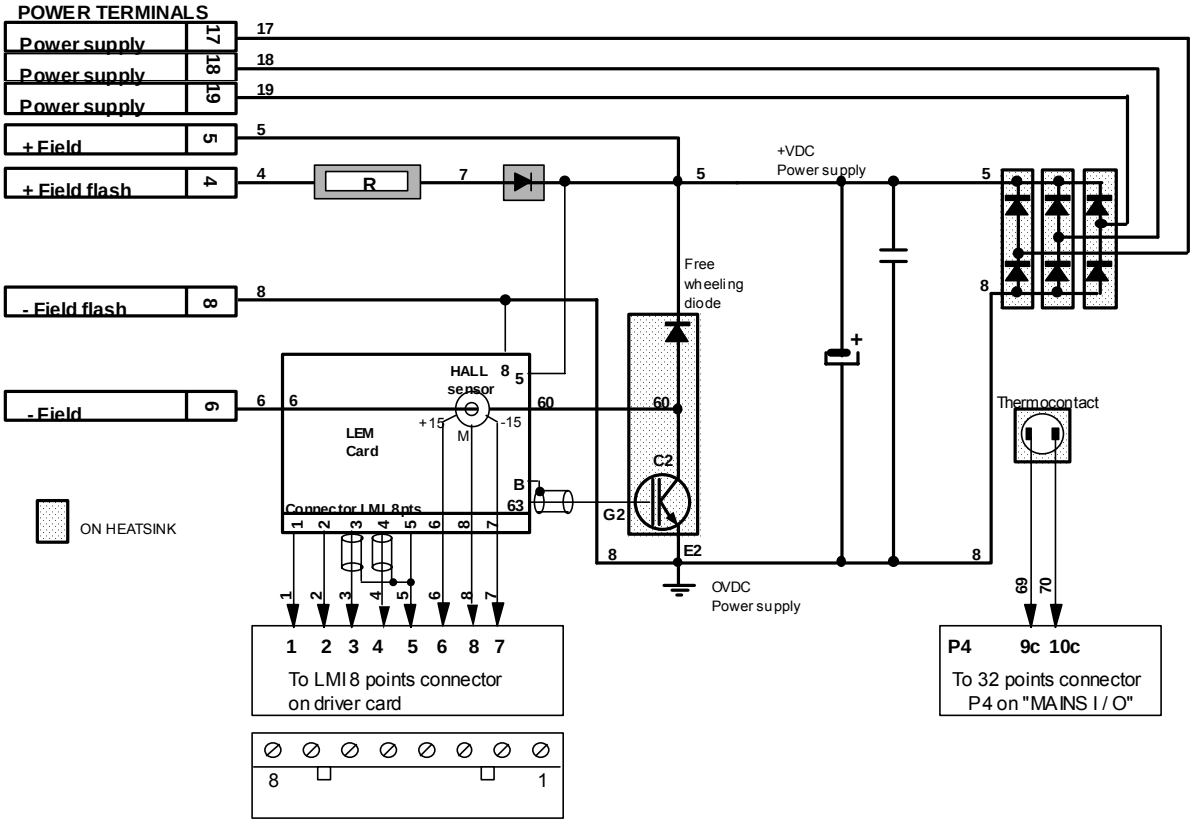
MIMIC DIAGRAM EXCITATION – REGULATION – Shunt + Booster



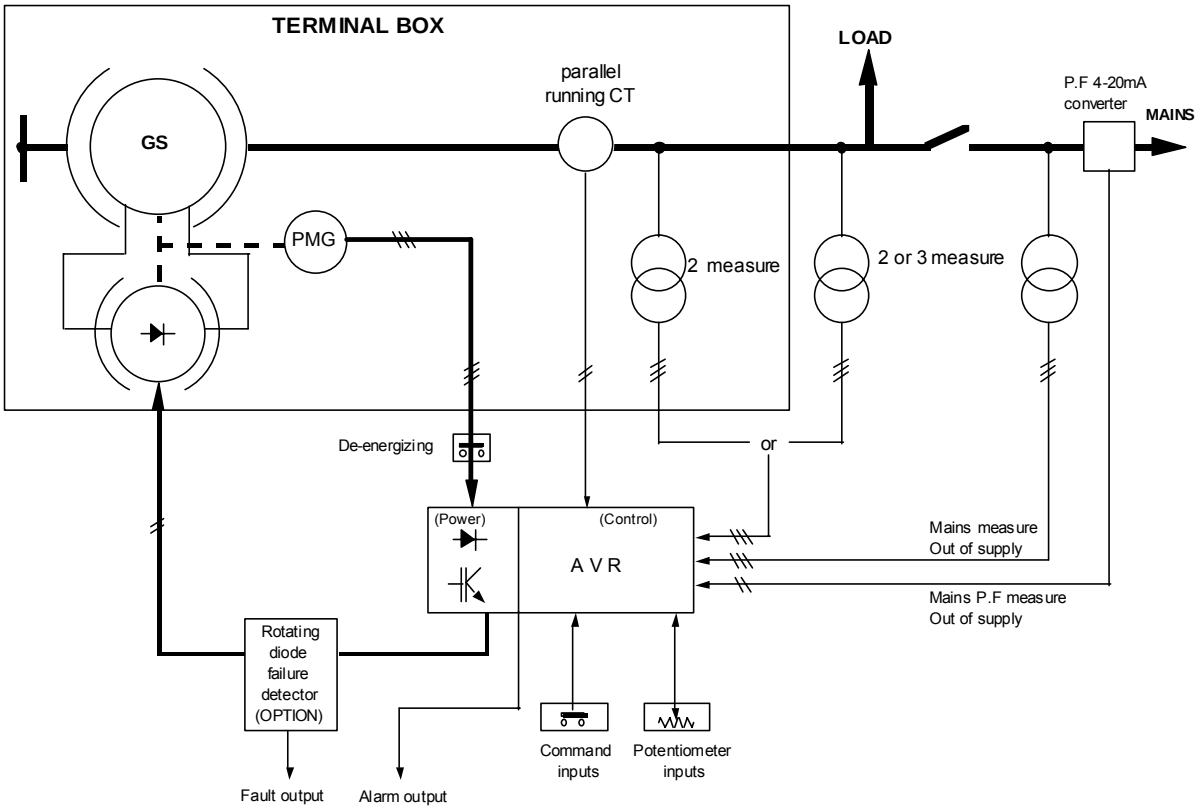


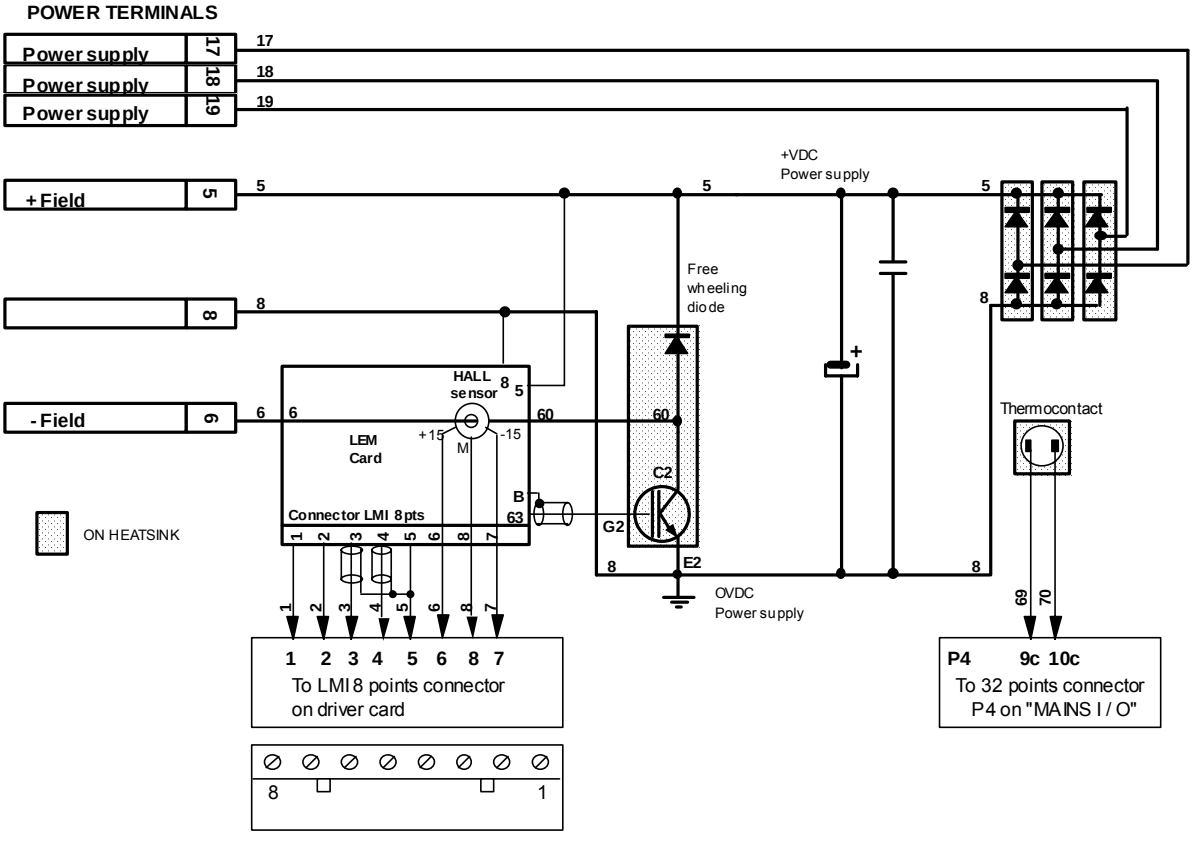
MIMIC DIAGRAM EXCITATION – REGULATION – AREP





MIMIC DIAGRAM EXCITATION – REGULATION – PMG





AVR MODEL R630

CONNECTICS

CONNECTICS

TERM N°	VOLTAGE / POWER TERMINAL BLOCK	0F	1F	2F	3F
1	Phase 1 (U) machine (measure)	N	N	N	N
2	Phase 2 (V) machine (measure)	N	N	N	N
3	Phase 3 (W) machine (measure)	N	N	N	N
4	+ field flashing or pre-excitation input (optional)	O	O	O	O
5	+ field output	N	N	N	N
6	- field output	N	N	N	N
7	+ booster input (nothing if AREP or PMG)	O	O	O	O
8	– booster input (nothing if AREP or PMG)	O	O	O	O
9	Paralleling CT phase 2 (V) S1		N	N	N
10	Paralleling CT phase 2 (V) S2		N	N	N
11	Not connected				N
12	Phase 1 (U) mains (measure)				N
13	Phase 2 (V) mains (measure)				N
14	Phase 3 (W) mains (measure)	N	N	N	N
15	Nothing in Shunt or auxiliary supply in AREP & PMG	N	N	N	N
16	auxiliary supply	N	N	N	N
17	auxiliary supply in Shunt or power supply in AREP&PMG				
18	Power supply (CB in AREP and PMG)				
19	Power supply (fuse in Shunt or CD in AREP and PMG)				
	COMMAND / CONTROL TERMINAL BLOCK				
20,20,20	Potentiometer shield (3 terminals)	O	O	O	O
21	External voltage potentiometer maximum CW)	O	O	O	O
22	External voltage potentiometer (10KΩ-2W) (cursor)	O	O	O	O
23	External voltage potentiometer (minimum CCW)	O	O	O	O
24	External voltage input (10Vdc, 0V to terminal 20)	O	O	O	O
25	Field current measurement output (+Vdc)	O	O	O	O
26	Field current measurement output (0V)	O	O	O	O
27	External cosØ potentiometer (CW maximum)			O	O
28	External cosØ potentiometer (10KΩ-2W) (cursor)			O	O
29	External cosØ potentiometer (CCW minimum)			O	O
30	External KVAR potentiometer (CW maximum)			O	O
31	External KVAR potentiometer (10KΩ-2W) (cursor)			O	O
32	External KVAR potentiometer (CCW minimum)			O	O
33	cosØ regulation command input			N	N
34	cosØ regulation command input			N	N
35	Voltage equalization command input				N
36	Voltage equalization command input				N
37	Overheating or ceiling unlocked time alarm (common)	O	O	O	O
38	Overheating or ceiling unlocked time alarm output (NC)	O	O	O	O
39	Overheating or ceiling unlocked time alarm ouput (NO)	O	O	O	O
40	External +24Vdc supply input (relay locking)	O	O	O	O
41	External 24Vdc supply input (relay locking) common	O	O	O	O
42	Upper command voltage and PF	O	O	O	O
43	Lower command voltage and PF	O	O	O	O
44	Common	O	O	O	O
45	Upper command I field (manu)	O	O	O	O
46	Lower command I field (manu)	O	O	O	O
47	"AUTO / MANU" command input (Open = "AUTO")	O	O	O	O
48	"AUTO / MANU" command input (Open = "AUTO")	O	O	O	O
49	"AUTO / MANU" image output	O	O	O	O
50	"AUTO / MANU" image output	O	O	O	O
51	I field direct manual setting potentiometer	O	O	O	O
52	Manual mode 1 card I field setting potentiometer (10kΩ)				
53	"CosØ / KVAR" selection command input (°/ terminal 48) (open = "CosØ")				

1F	= // running between machines	O	= Optional
2F	= 1F + // running with the mains	N	= Necessary
3F	= 2F + voltage matching before coupling	Nothing	= Not Appliable

AVR MODEL R630

CONNECTICS

- The following tables give interconnections between each card and the 64 points flat cable.
- Grey cases give signals origine .
- Other cases where they go.
- On the left we have two numbers :
    - First the connector numering
    - Second test block terminal number.
- On the right we have a recapitulative of all the informations wich can be found on the test terminal block.

PIN	PIN	Gen/Mains I/O	Supply	Sensing	PID, limit	CosØ,KVAR	Pot digital U	Manu mode	Driver	test output
1c	1	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc
1a	2	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc	+Vcc
2c	3	+Vdc alim	+Vdc alim							+Vdc alim
2a	4	+Vdc alim	+Vdc alim							+Vdc alim
3c	5	-Vdc alim	-Vdc alim							-Vdc alim
3a	6	-Vdc alim	-Vdc alim							-Vdc alim
4c	7	Vac puiss 1						Vac puiss 1	Vac puiss 1	Vac puiss 1
4a	8	Vac puiss 2							Vac puiss 2	Vac puiss 2
5c	9	GND	GND	GND	GND	GND	GND	GND	GND	GND
5a	10	Vac-dr1								Vac-dr1
6c	11	Vac-dr2								Vac-dr2
6a	12	Vac-dr3								Vac-dr3
7c	13	GND	GND	GND	GND	GND	GND	GND	GND	GND
7a	14	Vac-dm1		Vac-dm1						Vac-dm1
8c	15	Vac-dm2		Vac-dm2		Vac-dm2				Vac-dm2
8a	16	Vac-dm3		Vac-dm3						Vac-dm3
9c	17				V-10%			V-10%	V-10%	V-10%
9a	18	TI//		TI//		TI//				TI//
10c	19					Déphasage				Déphasage
10a	20	Ures			Ures					Ures
11c	21			Um	Um					Um
11a	22			Uref	Uref					Uref
12c	23				Correct PID			Correct PID		Correct PID
12a	24					IsinØ				IsinØ
13c	25				Uregl		Uregl			Uregl
13a	26				Statisme D	Statisme D				Statisme D
14c	27				cosØ, KVAR	cosØ, KVAR				cosØ,KVAR
14a	28				IcosØ	IcosØ				IcosØ
15c	29				Sauto		Sauto	Sauto	Sauto	Sauto
15a	30							Smanu	Smanu	Smanu
16c	31						cde Iexc	cde Iexc	cde Iexc	cde Iexc
16a	32	GND	GND	GND	GND	GND	GND	GND	GND	GND

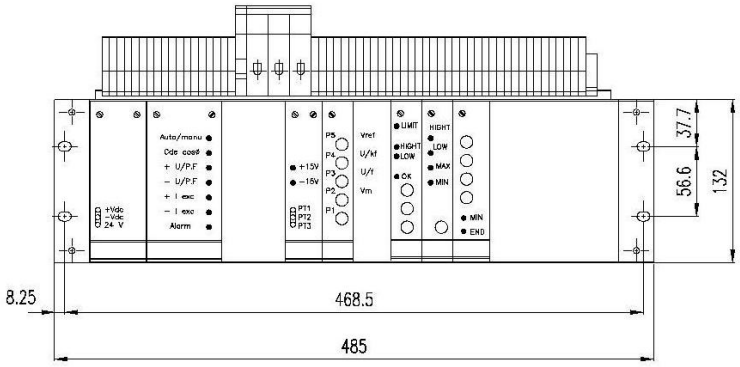
AVR MODEL R630

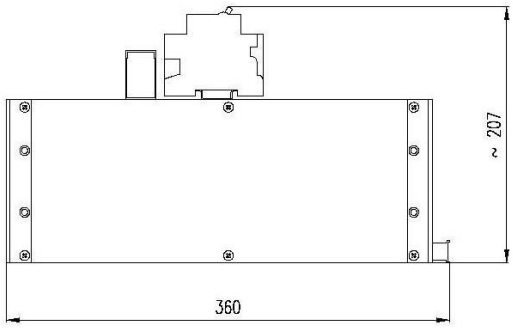
CONNECTICS

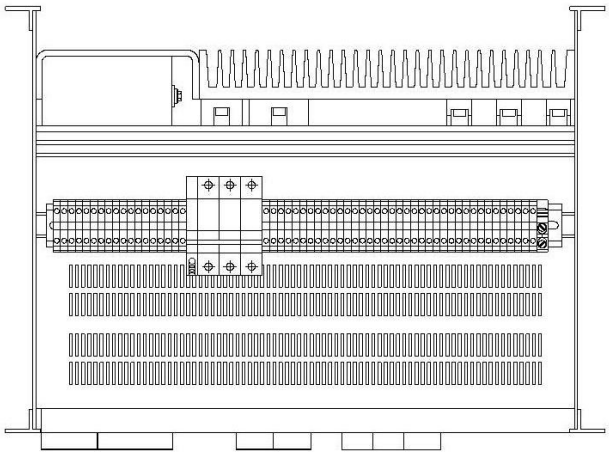
PIN	PIN	Gen/Mains I/O	Supply	Sensing	PID, limit	CosØ, KVAR	Pot dig U	Manu mode	Driver puiss	test output
17c	33	GND	GND	GND	GND	GND	GND	GND	GND	GND
17a	34	Mes Iexc							Mes Iexc	Mes Iexc
18c	35	synchro							Perte synchro	Perte synchro
18a	36	I limit							I limit	I limit
19c	37	GND	GND	GND	GND	GND	GND	GND	GND	GND
19a	38	Fin rampe			Fin rampe				Fin rampe	Fin rampe
20c	39	U cosØ				U cosØ	U cosØ			U cosØ
20a	40	P.F/KVAR				P.F/KVAR	P.F/KVAR			P.F/KVAR
21c	41	U KVAR				U KVAR	U KVAR			U KVAR
21a	42	Pot tension			Pot tension					Pot tension
22c	43	U tension			U tension					U tension
22a	44	+Iexc								+Iexc
23c	45	-Iexc								-Iexc
23a	46	+Uauto					+Uauto			+Uauto
24c	47	-Uauto					-Uauto			-Uauto
24a	48	Cde reg cosØ			Cde reg cosØ					Cde reg cosØ
25c	49	Cde U=U			Cde U=U					Cde U=U
25a	50	cde auto/manu						cde auto/manu	cde auto/manu	cde auto/manu
26c	51	Défaut T°C							Défaut T°C	Défaut T°C
26a	52									reserve
27c	53							Cde U		Cde U
27a	54									reserve
28c	55									reserve
28a	56									reserve
29c	57									reserve
29a	58									reserve
30c	59									Max pot Iexc
30a	60						Max pot			Max pot U/P.F
31c	61									reserve
31a	62	Alarm							Alarm	Alarm
32c	63	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc
32a	64	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc	-Vcc

AVR MODEL R630

OUTLINE







GENERATOR / MAINS I/O (1F / 2F)

1) FUNCTIONAL

- This unit is mainly an interface between external signals and low power electronics.

- It is composed by :

- The adaptation three phases transformer between generator input voltages (1F,2F) and measurement circuits. **For 2F a P.F / KVAR card must be fitted in the AVR**

- The burden resistor of parallel CT.
- The adaptation transformer between input voltage and low power electronic supplies.
- The interface input relays between command / control terminals and internal circuits.
- The interface between 64pts BUS and the analogic input / output terminals

2) ADJUSTMENTS

- None

3) INPUT / OUTPUT

- See following table

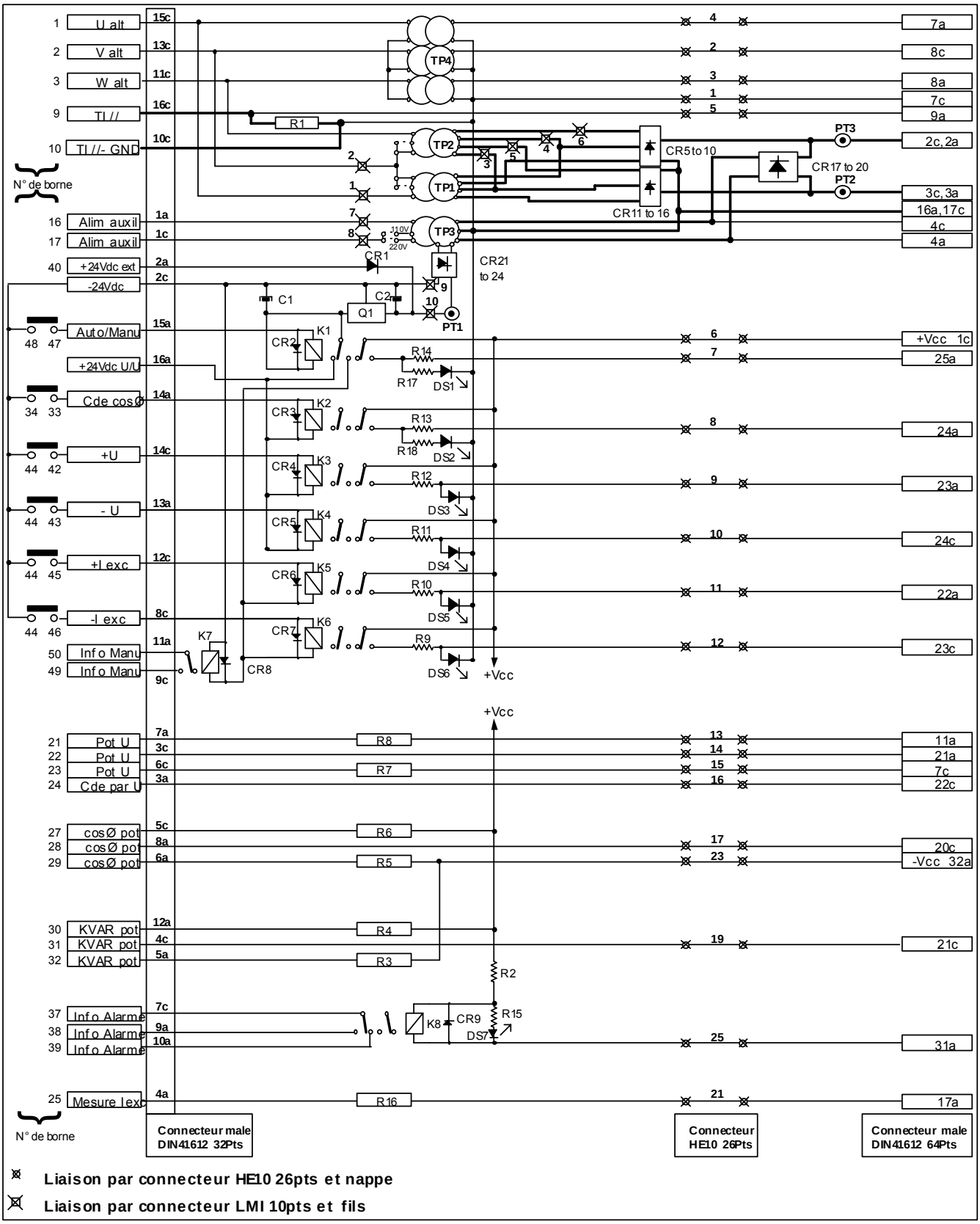
INPUT TERMINAL	Connector 32 PTS	Type I / O	Interface	Connector 26 PTS	Connector BUS 64 PTS
1	15c	measure	transfo tri TP4	4	7a
1	15c	alim	transfo TP2		
2	13c	measure	transfo tri TP4	2	8c
2	13c	alim	transfo TP1/2		
3	11c	measure	transfo tri TP4	3	8a
3	11c	alim	transfo TP1		
9	16c	measure	resistance RTI	5	9a
10	10c	measure	ground	1	7c
16	1a	alim	transfo TP3		4c
17	1c	alim	transfo TP3		4a
20	10c	Shield	ground	1	7c
21	7a	signal	resistance	13	11a
22	3c	signal	direct	14	21a
23	6c	signal	resistance	15	7c
24	3a	signal	direct	16	22c
25	4a	signal	direct	21	17a
26	10c	signal	ground	1	7c
27	5c	signal	resistance	6	1c
28	8a	signal	direct	17	20c
29	6a	signal	resistance	23	32a
30	12a	signal	resistance	6	1c
31	4c	signal	direct	19	21c
32	5a	signal	resistance	23	32a
33	14a	Cmd Input	relay	8	24a
34	2c	Cmd Input	relay		
37	7c	Cmd Output	relay	25	31a
38	9a	Cmd Output	relay	25	31a
39	10a	Cmd Output	relay	25	31a
40	2a	ext alim	relay		
41	2c	ext alim	relay		
42	14c	Cmd Input	relay	9	23a
43	13a	Cmd Input	relay	10	24c
44	2c	common	relay		
45	12c	Cmd Input	relay	11	22a
46	8c	Cmd Input	relay	12	23c
47	15a	Cmd Input	relay	7	25a
48	2c	Cmd Input	relay		
49	9c	Cmd Output	relay	12	23c
50	11a	Cmd Output	relay	12	23c

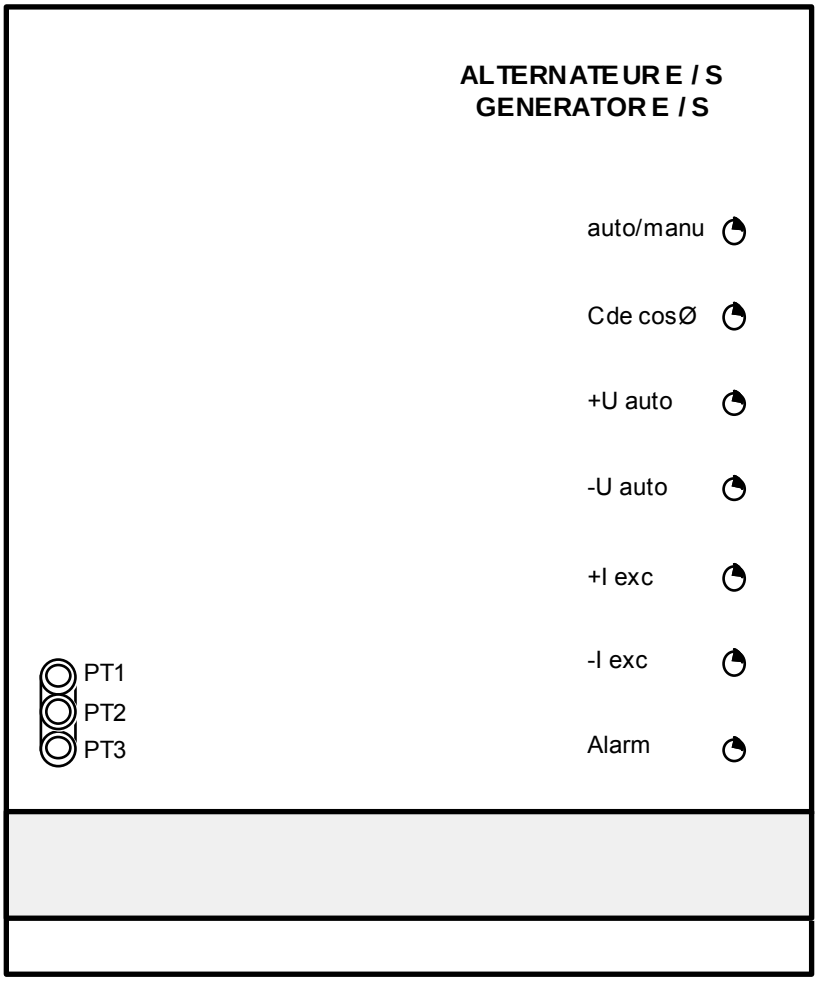
VOLTAGE INPUTS :

Reference	Generator sensing voltage
C5 195 0200	100V - 120V 50/60Hz
C5 195 0202	400V - 450V 50/60Hz

AVR MODEL R630

GENERATOR I/O





R610 potentiometers position. For adjustments, refer to specific card technical manual

SUPPLY CARD

1) FUNCTIONAL

- This card, from not regulated symetrical voltage, generates +15Vdc and -15Vdc voltages with 0V common to both named +Vcc for +15V and Vdd for -15V in the following.

- The non régulated voltages are first filtered (C01, C02), pre-régulated to 20dc with ballast stages Q01 et Q02 and finally decreased to15V by means of RG01 et RG02 régulators.

- Its permanent current capability is 0,5 Amp on both polarity.

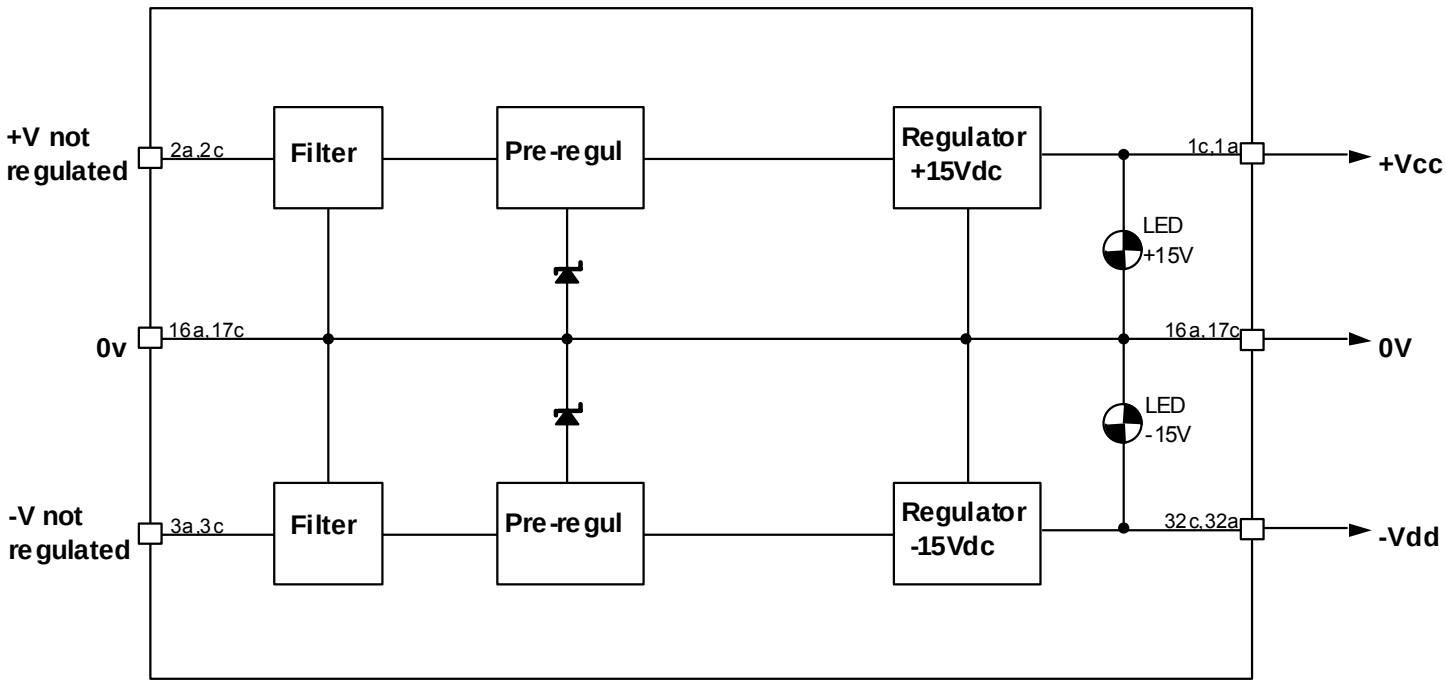
2) ADJUSTMENTS

- None

3) INPUTS / OUTPUTS

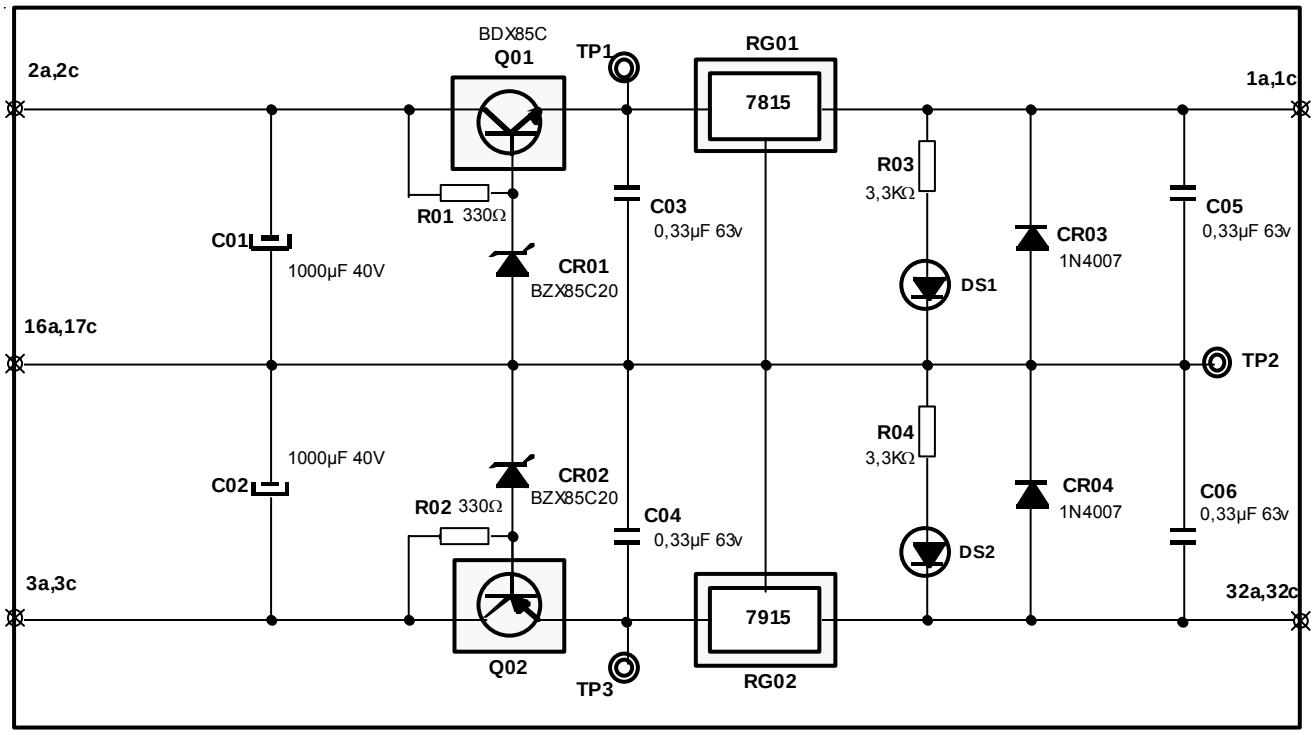
- 2a, 2c : Input +30Vdc not regulated
- 3a,3c : Input -30Vdc not regulated
- 1a,1c : Output +15Vdc regulated (Vcc)
- 32a,32c : Output -15Vdc regulated (Vdd)
- 16a,17c : Common electronic ground

MIMIC DIAGRAM OF ELECTRONIC SUPPLY CARD

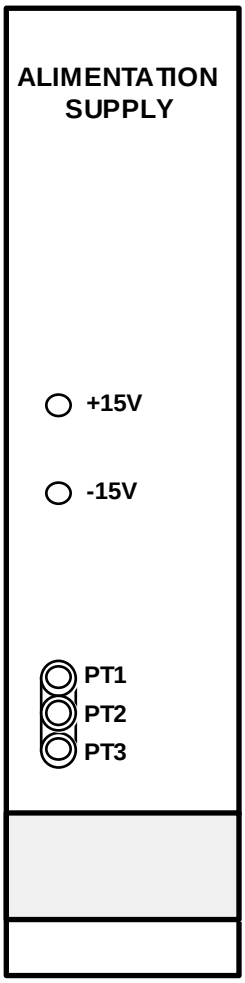


AVR MODEL R630

SUPPLY CARD



FRONT VIEW
SUPPLY CARD

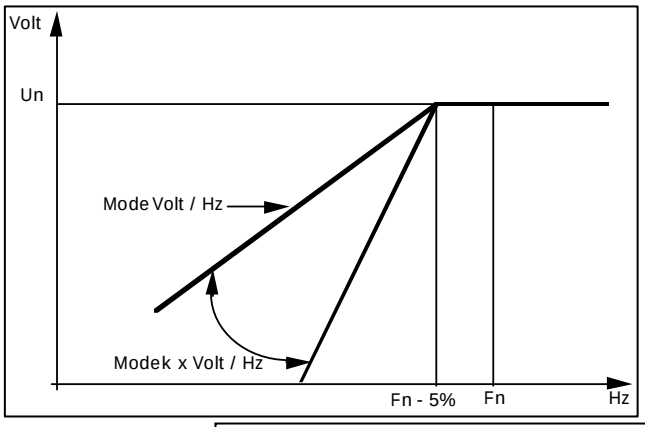


SENSING CARD

1) FUNCTIONAL

- This card elaborates from the three phases voltage image of the generator given by the "ALTERNATOR I/O" :
-A rectified, calibrated, filtered voltage Vm proportional to the stator voltage of the generator. Vm could be affected by droop depending of adjustment.
- A voltage function of the generator frequency, a part of which gives the reference set point named Vref.

- Vref is a constant above the underfrequency threshold set point (signaled by LED) and decreases below this threshold following a function depending of the position of the strap CV1:
  - In fixed V/Hz mode
  -In adjustable kVolt / Hz (see curve below)



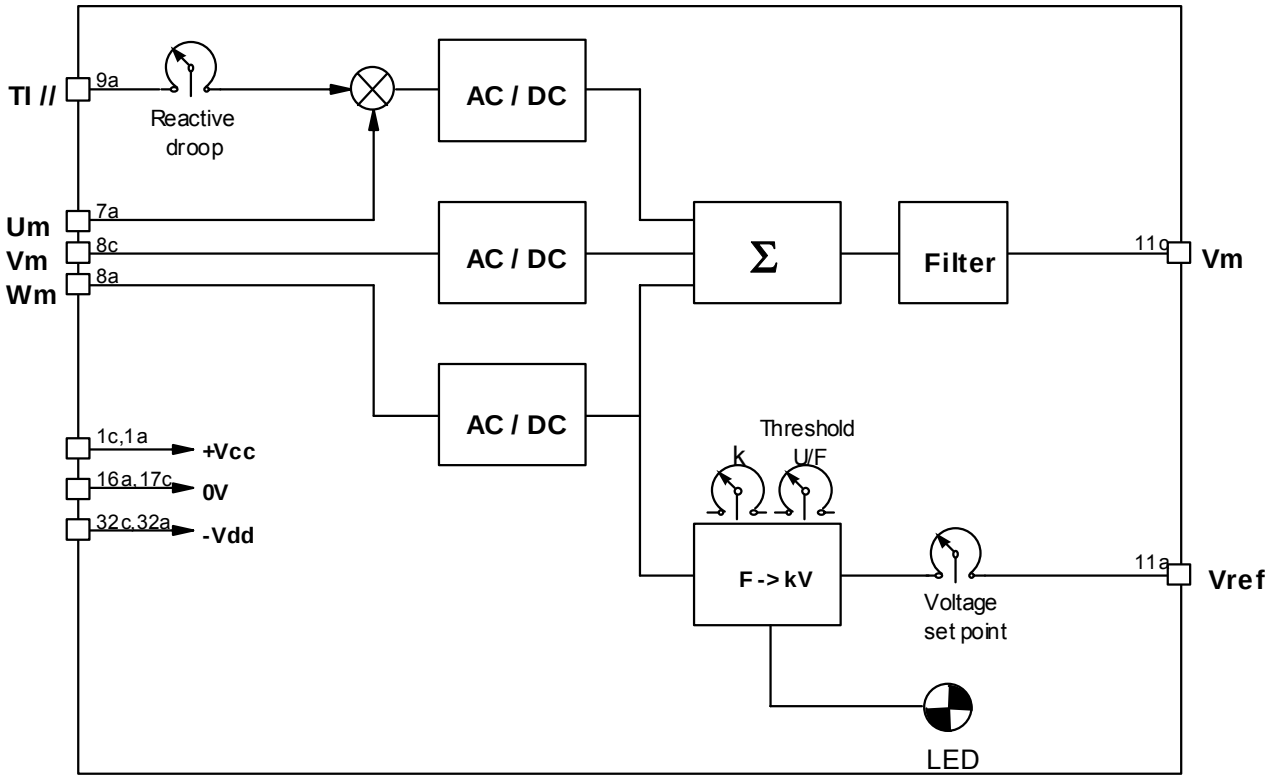
2) ADJUSTMENTS

- P1 : Reactive droop adjust for parallel operation between equivalent machine.
- P2 : Vm adjust for nominal voltage. (9Vdc at Un)
- P3 : Underfrequency threshold adjust (normally Fn - 5%) signaled by LED.
- P4 : Underfrequency slope adjust (k) in kVolt / Hz mode
- P5 : Voltage set point Vref for the nominal voltage (9Vdc at Un and Fn)

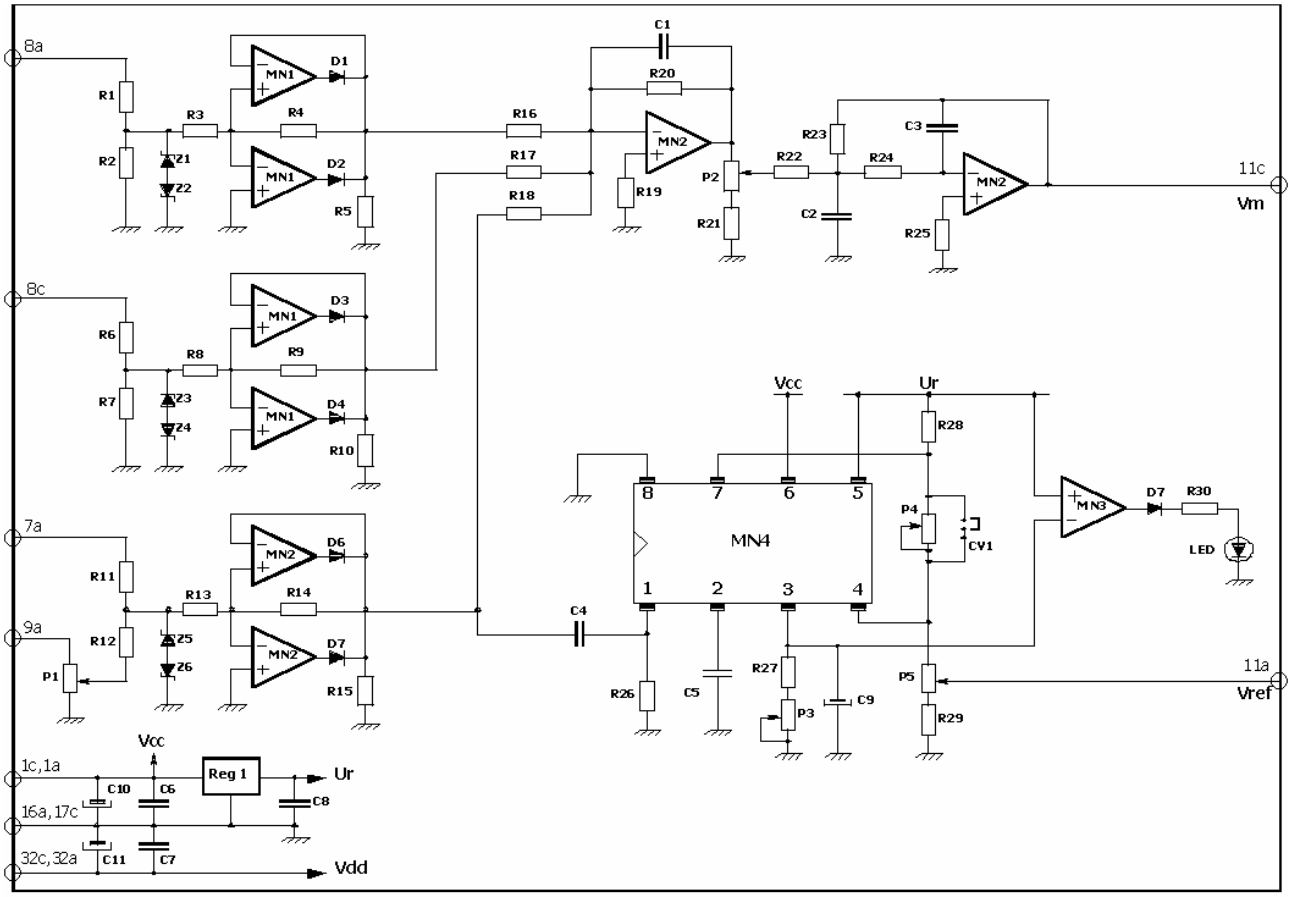
3) INPUTS / OUTPUTS

- 7a, 8a, 8c : Voltage inputs image of the generator (3 x 21Vac between each and the GND)
- 9a : Current input image of the generator stator current (1Vac pour In)
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common ground (GND or 0V)
- 11c : Voltage output image of the generator (Vm) 9Vdc at Un
- 11a : Voltage set point output (Vref) 9Vdc at Un and Fn

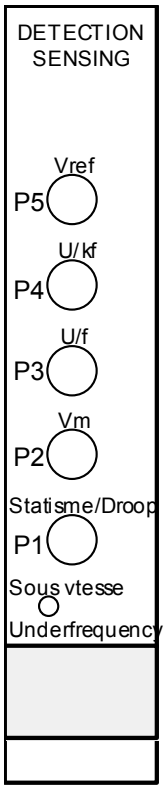
MIMIC DIAGRAM OF SENSING CARD



Principle diagram SENSING card



FRONT VIEW SENSING CARD



PID, LIMIT CARD

1) FUNCTIONAL

- This card, from Vm (machine voltage image), Vref (voltage set point) and complementary informations given in the following, elaborates the voltage command of the power driver card, which is the field current set point.

- Three operating modes are possible, depending of external informations :

- Solo operation or parallel operation between equivalent machines (1 Fonction)
(This is the normal mode)

- Parallel operation with the mains with power factor (COSØ) or KVAR regulation (2 Fonction)
(Only if COSØ / KVAR card is fitted)

- Operation in voltage equalization mode between machine and mains before coupling (3 Fonction)
(Only if "MAINS I / O" card is fitted)

1F : Machine image Vmis compared with the sum of Vref, Pext, etc voltages depending of used options and the resultant voltage (error voltage) feeds the PID.

2F : When cosØ cmd input is activated (+Vcc), the machine voltage Vm is compared to the voltage given from the cosØ/KVAR card and the result (error voltage) feeds the PID.

3F : When U/U cmd input is activated (+Vcc), the machine voltage Vm is compared to the voltage given from the "MAINS I / O" card and the result (error voltage) feeds the PID.

A compensation external input, given for specific applications is added to the error voltage and the resultant voltage is the real PID input. Each branch (P, I, D) of the PID, independently adjustable from the others, set the time constants of the AVR in regard to the generator. The integrator branch can be short-circuited, for example when starting-up.

These three outputs are added, limited to 10Vdc and then give the field current set voltage of the "automatic channel" which is the driver card input.
The minimum value of this signal can be limitated to avoid total loss of excitation of the generator. In case of parallel operation with the mains (cosØ/KVAR card), this limitation is a function of the active power supply by the generator, this information is given by the COSØ / KVAR card.

A separate stage detect if the generator voltage is below an adjustable value to unlock the normal field ceiling voltage from 110% of nominal to 160% (adjustable).

2) ADJUSTMENTS

- P1 : Ceiling unlocked voltage threshold adjust (normally 90% Un).
- P2 : Proportionnal branch gain adjust (large signal)
- P3 : Proportionnal branch gain adjust
- P4 : Integrative branch time constant adjust
- P5 : Derivative branch gain adjust
- P6 : Derivative branch time constant adjust
- P7 : Minimum field limitation adjust
- P8 : Minimum field limitation, active power correction adjust

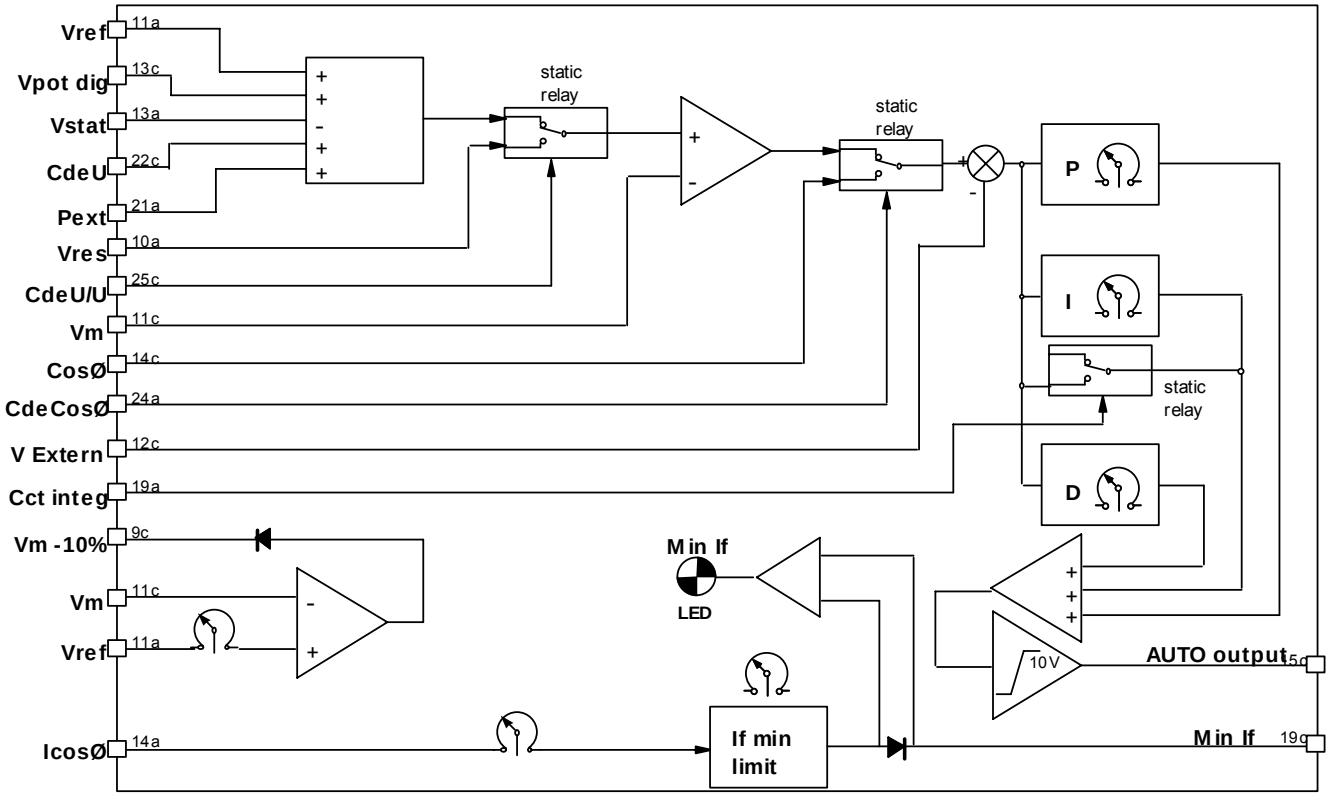
3) INPUTS / OUTPUTS

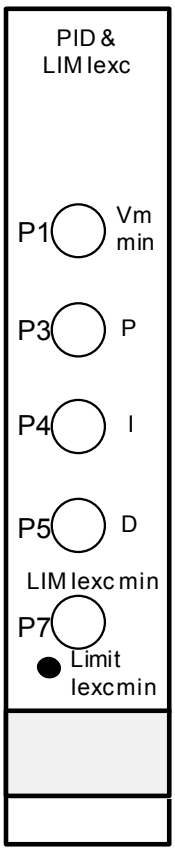
- 11a : Voltage reference set point input. Vref
- 13c : Added signal to voltage reference set point input (option)
- 22c : Added signal to voltage reference set point input (external voltage option)
- 21a : Added signal to voltage reference set point input (external potentiometer option)
- 13a : Added signal to voltage reference set point input (differential droop option; with cosØ/KVAR card)
- 19a : Integrator short-circuit command input
- 10a : Mains image voltage input (3F) (with "MAINS I / O" card only)
- 14c : CosØ error voltage input (2F) (with cosØ/KVAR card)
- 25c : Voltage equalization command input (3F) (with "MAINS I / O" card only)
- 24a : CosØ regulation command input (2F) (with cosØ/KVAR card)
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common electronic ground
- 14a : Minimum field limitation, active power correction input
- 15c : Field current voltage control output "AUTO" channel

AVR MODEL R630

PID, LIMIT CARD

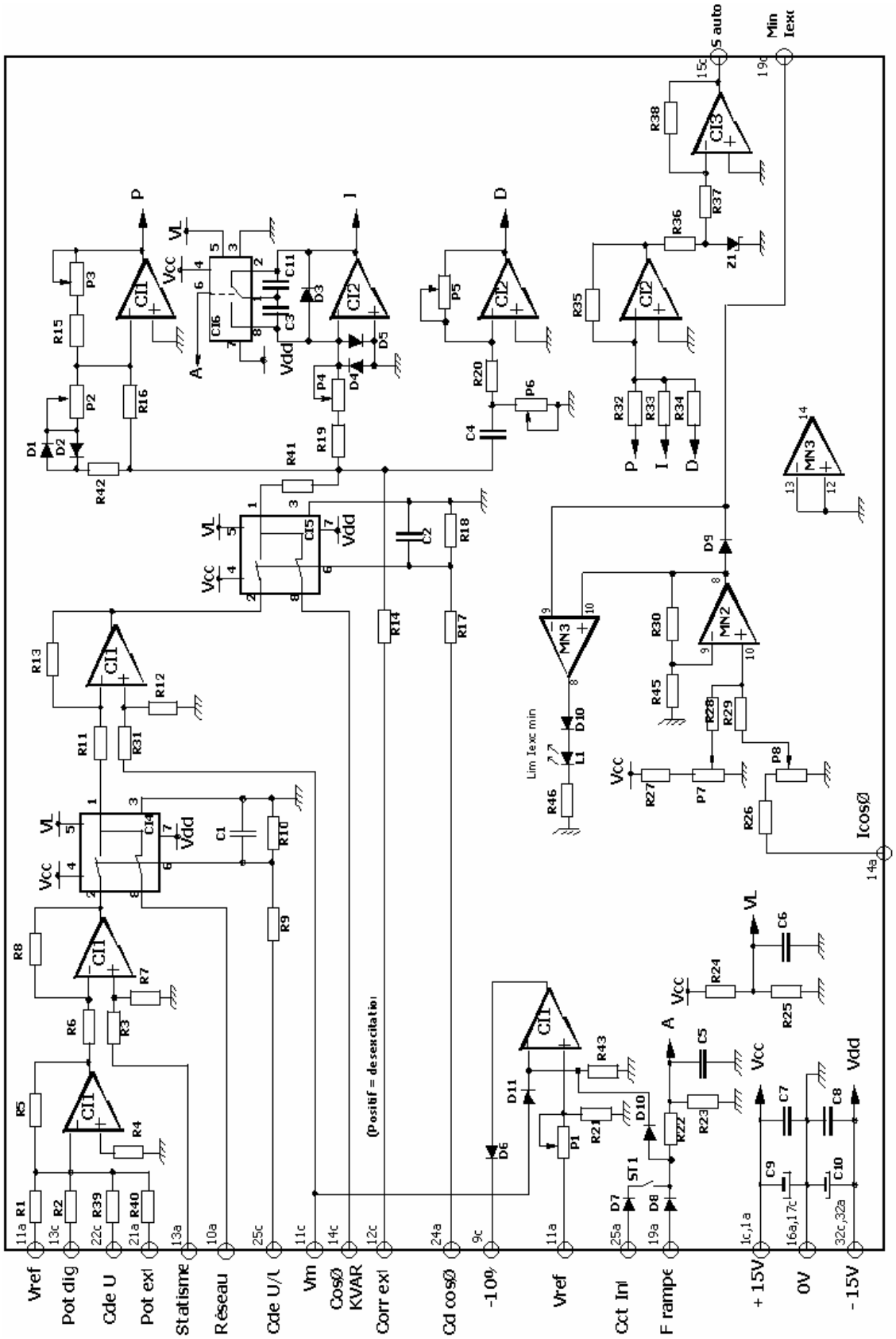
MIMIC DIAGRAM PID, LIMIT CARD





FRONT VIEW
PID CARD

Principle diagram PID, limit card



DRIVER CARD

1) FUNCTIONAL

This card controls from "AUTO" and "MANU" voltage reference and some additional informations detailed in the following, the exciter field current supply by the regulator and the booster (if used).

- Three operating mode are possible, depending of external informations :
  - Normal mode with 110% ceiling of If nominal.
  - Ceiling unlocked mode (160% minimum Ifield nominal) depending of the command input from the PID card with limited delay and alarm output in case of sustained undervoltage.
  - Maximum ceiling mode if the synchronisation voltage desappears (machine short-circuit) with limited (adjustable) field current.
  - The "AUTO" or "MANU" reference voltage depending of the associated command input and also of the active limitations, is compared to the field current measurement and gives the error voltage which is after integration, compared to a sawtooth feed by the synchronisation voltage. The output of this stage is a variable duty cycle signal which controls the power transistors throught isolating optocouplors.

- This card can be supplied in three manners :

- From the general supply of the rack in normal operation
- Throught an isolated supply taken from the field voltage during start-up or generator short-circuit. (Rack supply not present)
- Directly from the field voltage for power transistor command.

The permanent limitation (110% de Iexc nominal) can be modified by the following conditions:

- Field ceiling unlocking on machine undervoltage condition. It inccreases from 110% (normal operation) to a minimum of 160% of the nominal field current during an adjustable time delay and then go back to 110%. An alarm is activated if this undervoltage is sustained afterward.
- Field ceiling unlocking on synchronisation voltage abcence. It increases to the maximum given by the setting of P7.
- Field ceiling limitation caused by power heatsink overheating. On thermocontact action the ceiling is reduced to a value given by the setting of P8.

A separate circuit monitors the instantaneous current of the power transistor and reduces immediatly the command signal if its value increases above a fixed value. (Exciter or wiring short-circuit protection).

2) ADJUSTMENTS

- P1 : Integrator time constant adjust.
- P2 : Unlocked ceiling time delay adjust. (generally 5s)
- P3 : Alarm time delay adjust after ceiling unlock.
- P4 : Permanent ceiling value adjust (generally 1,1If nominal)
- P5 : HALL sensor range adjust.
- P6 : Initial ramp-up adjust
- P7 : Maximum field current adjust (machine short-circuit)
- P8 : Maximum fieeld current in case of heatsink overheating.

3) INPUTS / OUTPUTS

Flat cable (BUS 64points)

- 15c : If reference set point input "AUTO" channel
- 15a : If reference set point input "MANU" channel
- 25a : "AUTO / MANU" command input (0V = "AUTO")
- 9c : Unlocking ceiling command input
- 4a, 4c : Synchronisation voltage input
- 26c : Heatsink thermocontact input
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common ground (GND or 0V)
- 17a : Field current measure output
- 19a : End of ramp-up output signal
- 31a : Alarm output

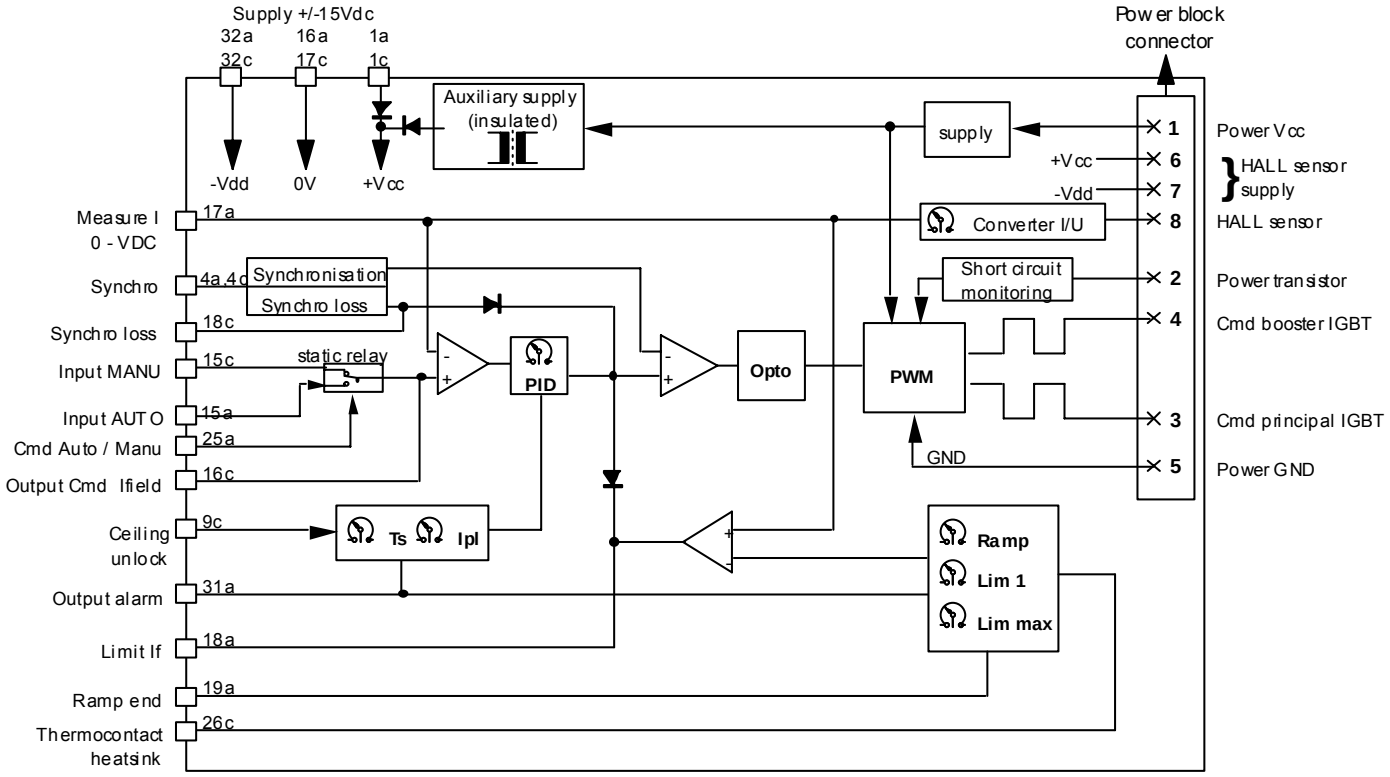
Card connector (8 points)

- 1 : Field voltage
- 2 : Main transistor drain
- 3 : Main transistor gate
- 4 : Booster transistor gate
- 5 : Power ground
- 6 : +Vcc HALL sensor
- 7 : -Vcc HALL sensor
- 8 : HALL sensor measure output

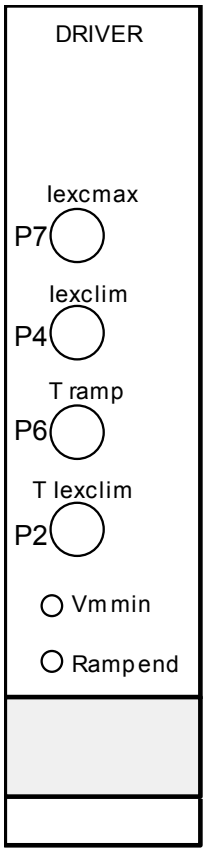
AVR MODEL R630

DRIVER CARD

MIMIC DIAGRAM DRIVER CARD



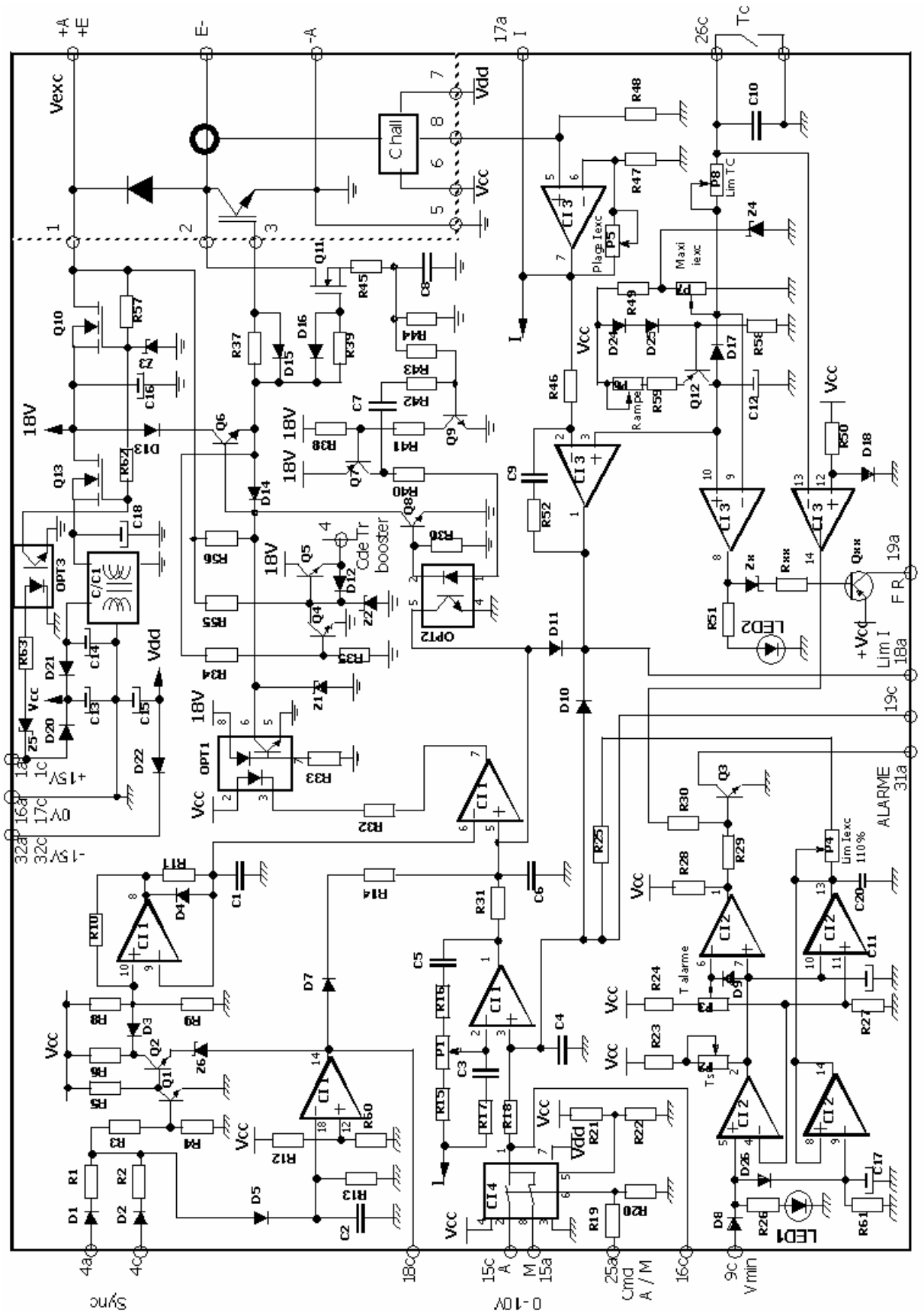
FRONT VIEW DRIVER CARD



AVR MODEL R630

DRIVER CARD

Principle diagram DRIVER card



COSØ – KVAR OPTIONAL CARD

1) FUNCTIONAL

This option allows the parallel operation coupling with the mains with P.F or KVAR regulation (also called 2F)

This card elaborates from generator current and voltage informations, the following signals:

- An image of the reactive current of the generator named (KVAR) used for KVAR regulation.
- An image of the phase shift between the voltage and the current of the generator named (Ø) used for cosØ (PF) regulation.
- An image of the active current of the generator named (KW) used for compensate the minimum Ifield limit of the PID card.

- The principle of measurement is to sample and hold the instantaneous value of the current when the instantaneous voltage reaches zero on positive slope.

- First the current image of the stator current is filtered and used directly for KVAR measure. Then it is derivated and used for KW measure. And then it is amplified to obtain square waves and integrated to give a sawtooth used to Ø measure.

- The voltage image is phase-shifted to compensate the phase shift of the current input filter and after amplification is fed to a monostable which gives the pulse signal (about 100µs) used by all the sample and hold circuits.

- KVAR and Ø values are compared with an internal and external (if used) setting and the difference is send to the PID card as an error signal. An external contact control an analog switch to select what information between KVAR and Ø will be regulated.

- Three informations (Ø, ΔØ, ΔKVAR) can be used as an alternative droop for solo operation.
- Ø gives no droop at cosØ=1 and the voltage decreases at lagging PF.
- ΔØ gives no droop at the cosØ setting and the voltage decreases at more lagging PF and opposite for more leading PF.
- ΔKVAR gives no droop at the KVAR value setting and the voltage decreases with more KVAR and increases if less.
- The selection between these is made by mean of jumper (CAV) on the card. (internal)

2) ADJUSTMENTS

- P1 : KVAR internal setting.
- P2 : PF (cosØ) internal setting.
- P3 : Voltage phase shifter (internal)
- P4 : PF (cosØ) gain setting
- P5 : KVAR gain setting.
- P6 : Différential droop setting
- P7 : Pulse width setting (internal)

- Jumper CAV : Selection of droop type

No : Reactive droop adjusted by P1 (sensing card)
CAV1 : No droop for cosØ=1 and droop if lagging.
CAV2 : No droop for KVAR setting (P1), voltage decreases if more KVAR (lagging) and opposite if less.
CAV3 : No droop for PF setting (P2), voltage decreases if more lagging and opposite if less or leading.

Nota : If the droop is used from this card, potentiometer P1 of the sensing card must be set to zero.

3) INPUTS / OUTPUTS

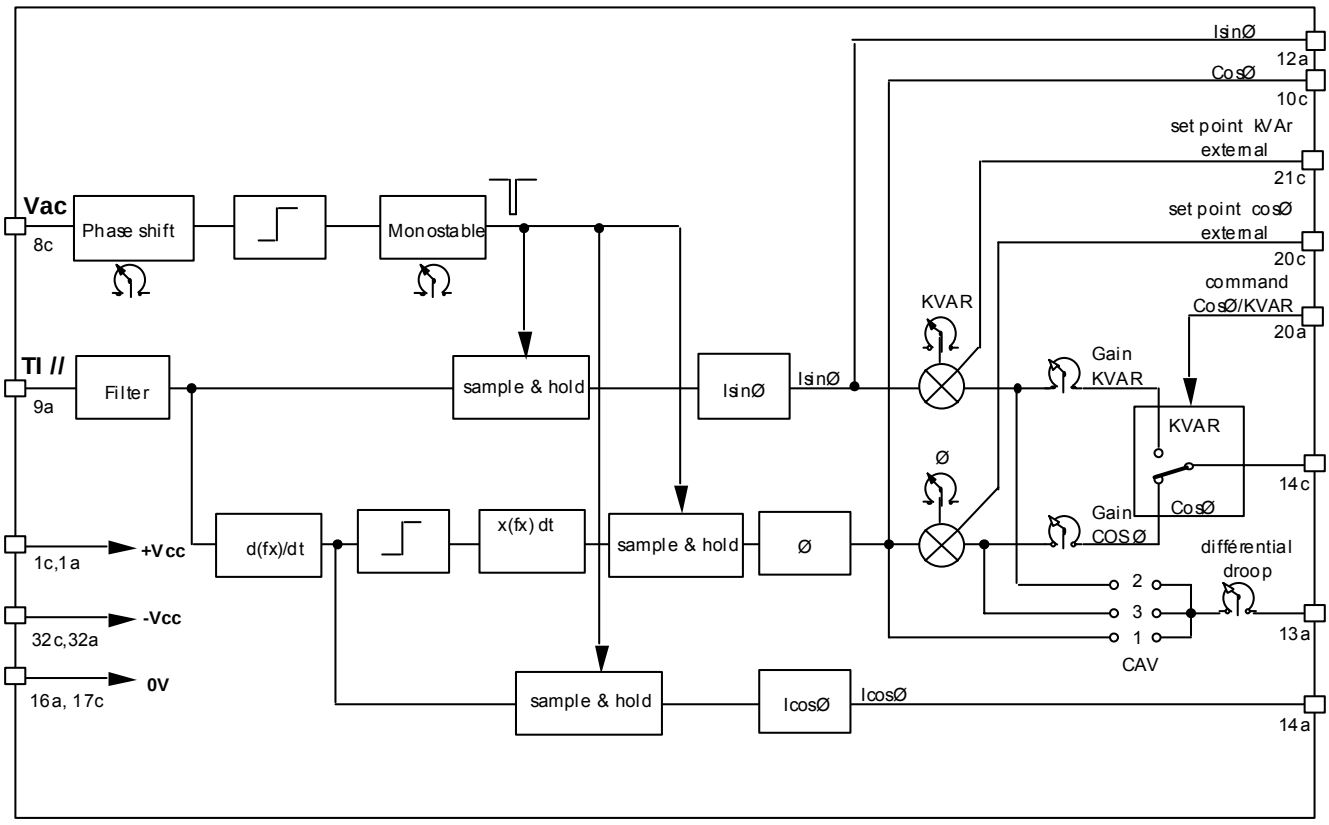
Flat cable (BUS 64points)

- 8c : Generator voltage image input
- 9a: Generator current image input
- 20a : Command input "cosØ / KVAR" (0V = "cosØ")
- 21c : External KVAR setting input
- 20c : External cosØ setting input
- 1a,1c : +15Vdc supply (Vcc)
- 32a,32c : -15Vdc supply (Vdd)
- 16a,17c : Common electronic ground
- 14c : Error signal output to PID card
- 13a : Droop signal output to sensing card
- 14a : KW signal output to PID card
- 12a : KVAR signal output
- 10c : Ø signal output

AVR MODEL R630

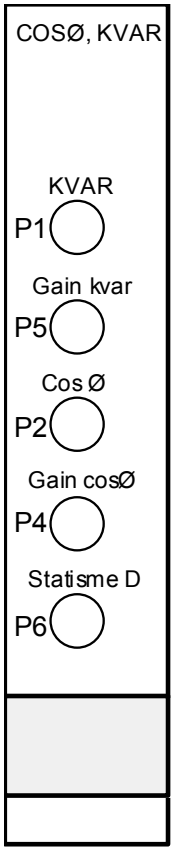
COSØ – KVAR OPTIONAL CARD

MIMIC DIAGRAM COSØ – KVAR CARD



FRONT VIEW

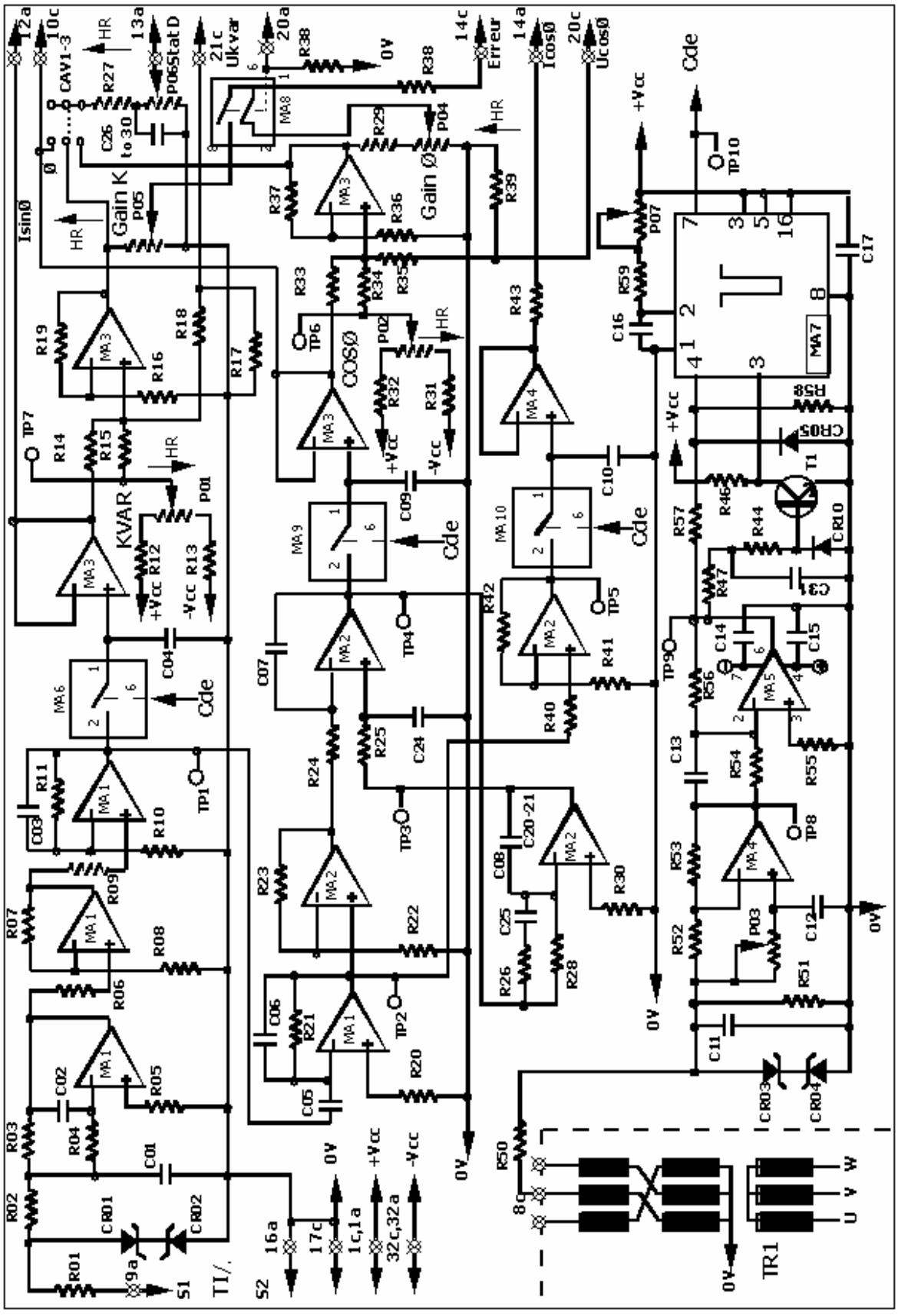
COSØ – KVAR CARD



AVR MODEL R630

COSØ – KVAR OPTIONAL CARD

Principle diagram –COSØ / KVAR card



GENERATOR / MAINS I/O (3F) OPTIONAL CARD

1) FUNCTIONAL

This option allows the automatic matching of the mains & generator voltage during synchronizing (also called 3F)
- This unit is mainly an interface between external signals and low power electronics.
- It is composed by :
- The adaptation three phases transformer between input voltages (generator (1F,2F) and mains (3Fonly) and measurement circuits.
- The burden resistor of parallel CT.
- The adaptation transformer between input voltage and low power electronic supplies.
- The interface input relays between command / control terminals and internal circuits.
- The interface between 64pts BUS and the analogic input / output terminals

2) ADJUSTMENTS

- Voltage matching adjustment (P1) (3Fonly)

3) INPUT / OUTPUT

- See following table

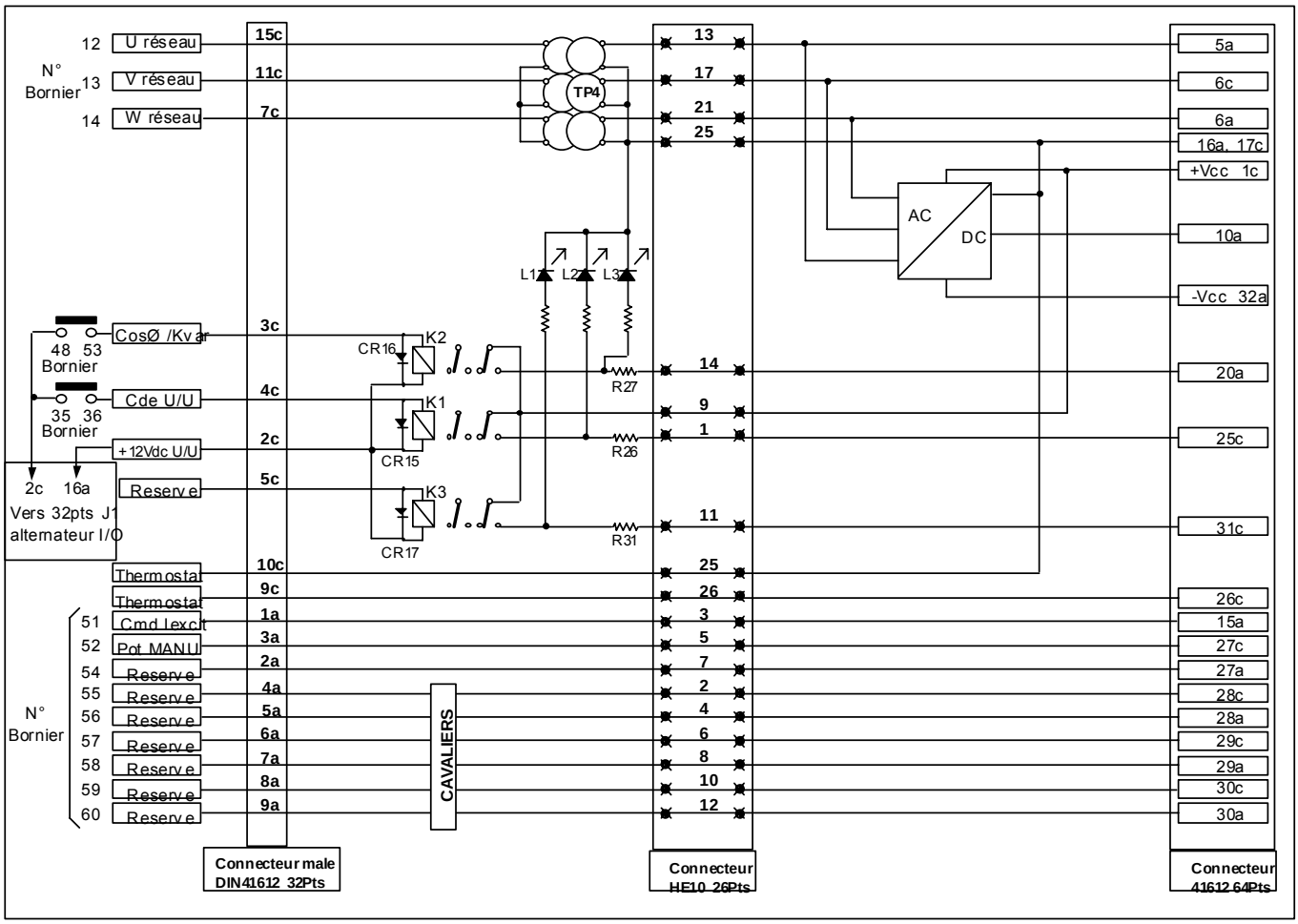
INPUT	Connector	Type	Interface	Connector	Connector
TERMINAL	32 PTS	I / O		26 PTS	BUS 64 PTS
12	15c	measure	transfo tri TP4	13	5a
13	13c	measure	transfo tri TP4	17	6c
14	11c	measure	transfo tri TP4	21	6a
51	1a	signal	direct	3	15a
52	3a	signal	direct	5	27c
54	2a	reserve		7	27a
55	4a	reserve		2	28c
56	5a	reserve		4	28a
57	6a	reserve		6	29c
58	7a	reserve		8	29a
59	8a	reserve		10	30c
60	9a	reserve		12	30a
36	4c	Cmd input	relay	1	25c
	2c	Cmd input	relay	9	1c
53	3c	Cmd input	relay	14	20a
	2c	Cmd input	relay	9	1c
	10c	Ground	direct	25	16a, 17c
	9c	thermostat	direct	26	26c

VOLTAGE INPUTS :

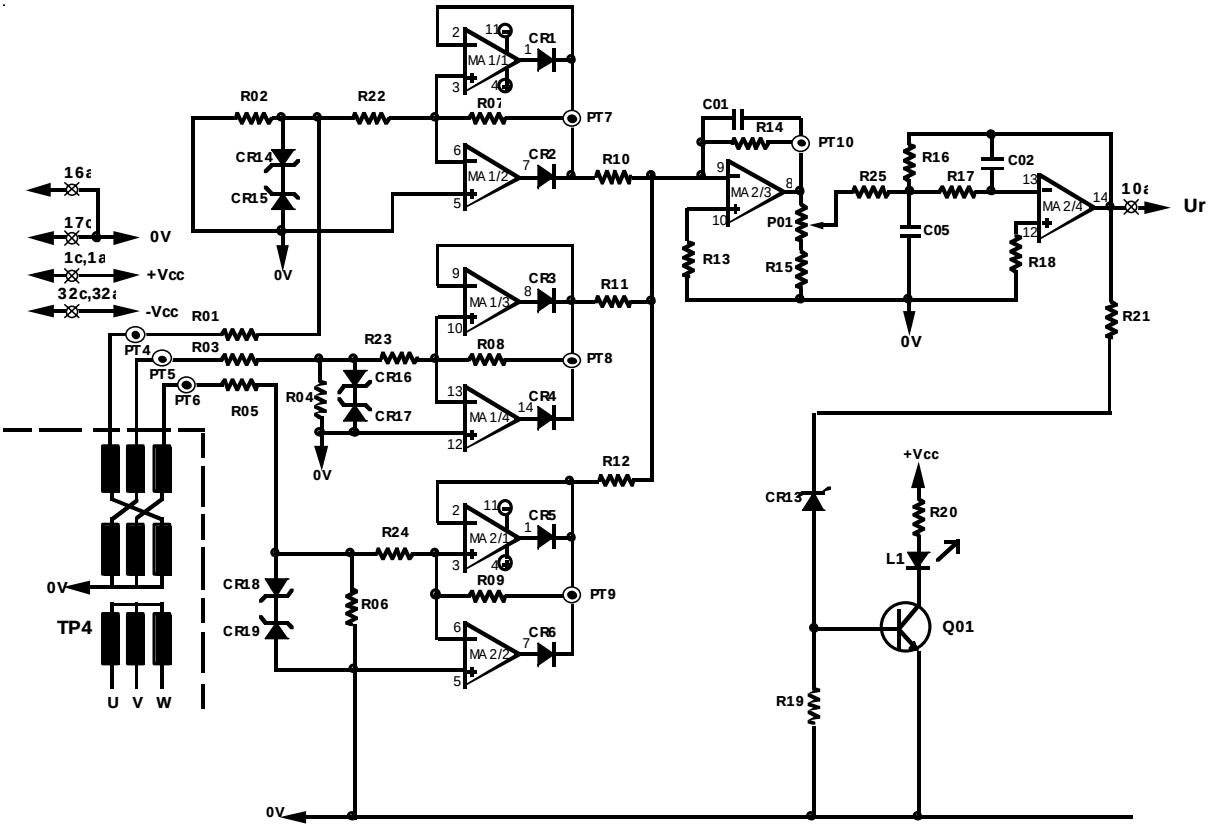
Reference	Functions	Mains sensing voltage
C5 195 0220	3F	100V to 120V 50/60Hz
C5 195 0222	3F	400V to 450V 50/60Hz
C5 195 0210	2F	none

AVR MODEL R630

GENERATOR / MAINS I/O (3F) OPTIONAL CARD

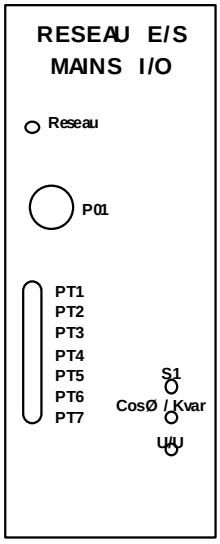


AC / DC converter schematic diagram



FRONT VIEW

MAINS I/O CARD



Digital pot U / P.F OPTIONAL CARD

1) FUNCTIONAL

This card replace two conventional motorized potentiometers:

- One for the remote voltage setting.
- One for power factor or reactive current setting.

- Switch between the two modes is made by the external P.F regulation order (terminals 33,34 on R630 & 30,31 on R610) and switch between P.F and KVAR setting is made by the external order (terminals 48,53 on R630 & 37,38 on R610)
- Each last position is memorized when the control is switched or when the machine is stopped.

- Jumps (SW1 and SW2) allow the choice between unipolar or bipolar voltage output and the range is adjusted by means of potentiometers P02 and P03.

- Jumps SW3 and SW4 must be open for normal operation and are only used for special applications.

- Speed of all adjustments is controled by potentiometer P01.

- Two LED's (L1,L2) indicate the command orders + or - and four other LED's (L3,L4 and L5,L6) indicates the maximum and minimum position of voltage and P.F settings

- NOTE: When this card fitted, the internal voltage setting (P05 on sensing card) must be used to give the center position of the range (if bipolar range) or the minimum setting in case of unipolar range (idem for P.F and Kvar internal setting on P.F card). An external setting potentiometer must not be used , the settings are made only by mean of push-buttons on terminals 42,43,44 with R630 and on 35,36,37 with R610.

2) ADJUSTMENTS

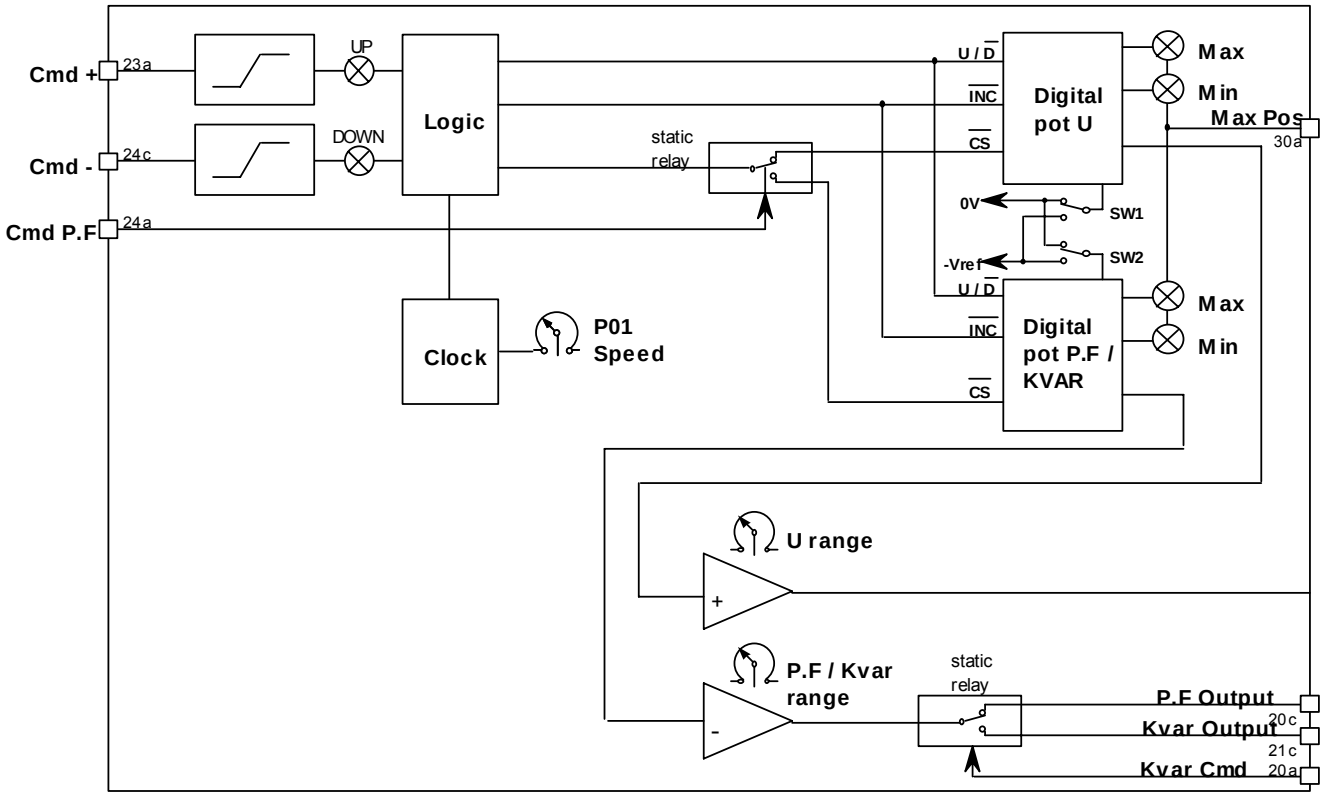
- P1 : Clock speed (total range time)
- P2 : Voltage range value
- P3 : P.F or KVAR range value
- SW1 : Voltage range polarity (0/+ or +/-)
- SW2 : P.F or KVAR range polarity (0/+ or +/-)

3) INPUTS / OUTPUTS

Flat cable (BUS 64points)

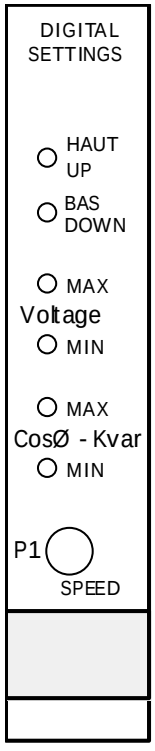
- 24c : Cmd lower
- 23a : Cmd upper
- 16c : If reference set point input
- 15c : If reference set point input "AUTO" channel
- 24a : External P.F regulation order
- 20a : External P.F or KVAR regulation order
- 13c : Voltage setting output to PID card
- 20c,21c : P.F or KVAR setting output to P.F card
- 30a : Maximum position of settings
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common ground (GND or 0V)

Digital U / P.F. Card Mimic Diagram



FRONT VIEW

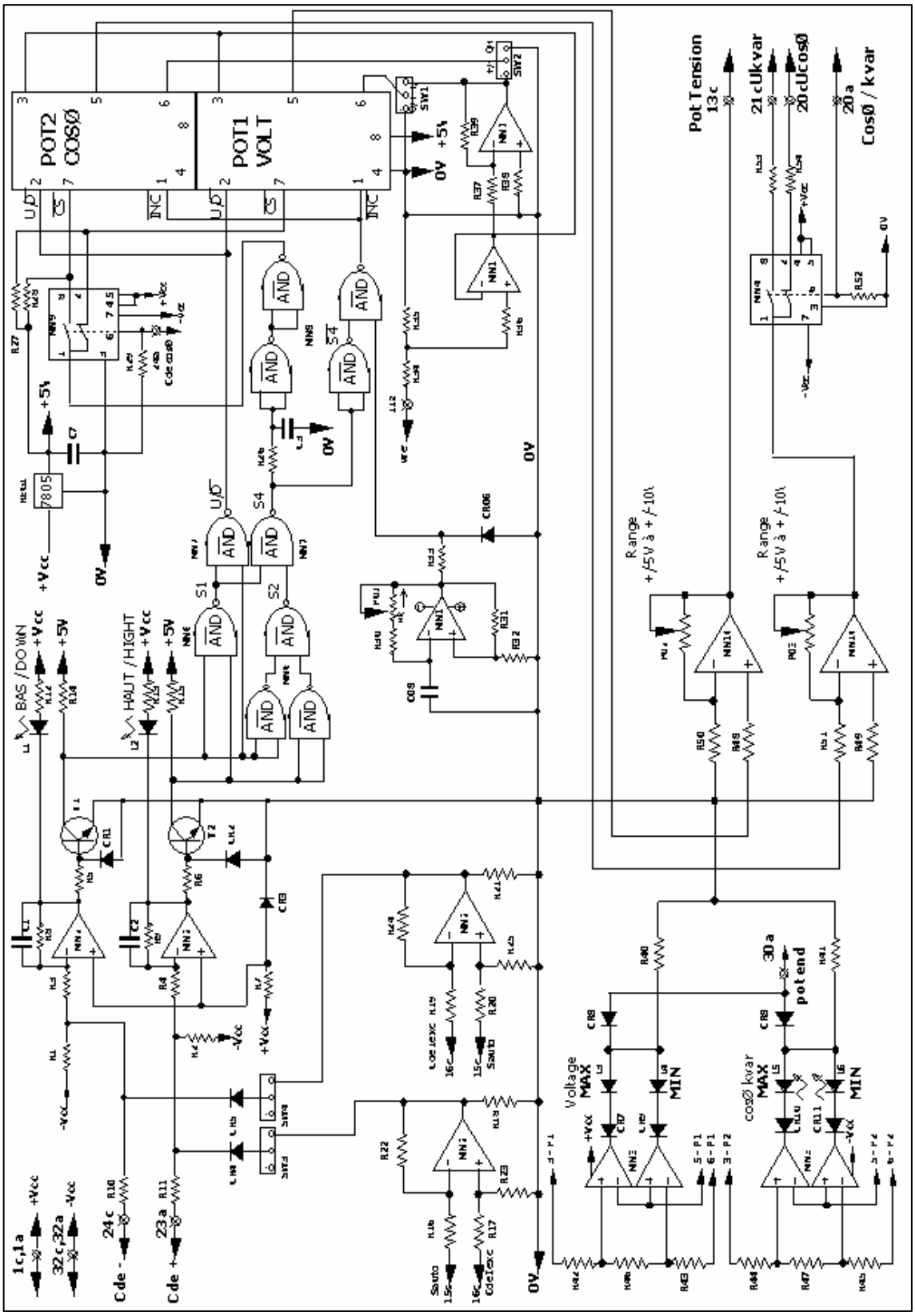
Digital Pot U / P.F.



AVR MODEL R630

Digital pot U / P.F OPTIONAL CARD

Principle diagram – Digital Pot U / P.F / KVAR



Manual mode 1 OPTIONAL CARD

1) FUNCTIONAL

This card elaborates from internal setting (PO2) and external setting informations, the Ifield command signal given to "MANU" channel of the driver card.
- The Ifield output signal is limited or reduced if the generator voltage exceeds the limitation value sets by the potentiometer P01 (trip of the main breaker on load for example).
- This case of operation is indicated by the LED "LIMIT" and the Ifield setting must be decreased to a point under control.

- On MANU operation, the difference between MANU output and AUTO channel output gives a compensation signal which is used to compensate the PID to have always the MANU and AUTO channels outputs identical. With this circuit a smooth switching between MANU to AUTO is possible and operation will go back to the AUTO channel own settings.

- The ceiling can be unlocked on this operation, that is why it can be necessary to wait some seconds after the switching to return on MANU operation.

- On AUTO operation, these two channels are also monitored and the difference is indicated by three LEDs.

- HIGH says that MANU channel is higher than AUTO
- LOW says that MANU channel is lower than AUTO

- OK says that MANU and AUTO channels are identical and smooth AUTO ---> MANU switching is possible.

-NOTE:

If a I field digital potentiometer is used, the internal setting (P02) must be set to 0 or under the no load field value and an external setting potentiometer must not be used. In that case the setting is made only by mean of push-buttons on terminals 44,45,46

2) ADJUSTMENTS

- P1 : Voltage limitation setting
- P2 : Internal Ifield value setting
- P3 : PID compensation gain setting
- P4 : Internal compensation setting

3) INPUTS / OUTPUTS

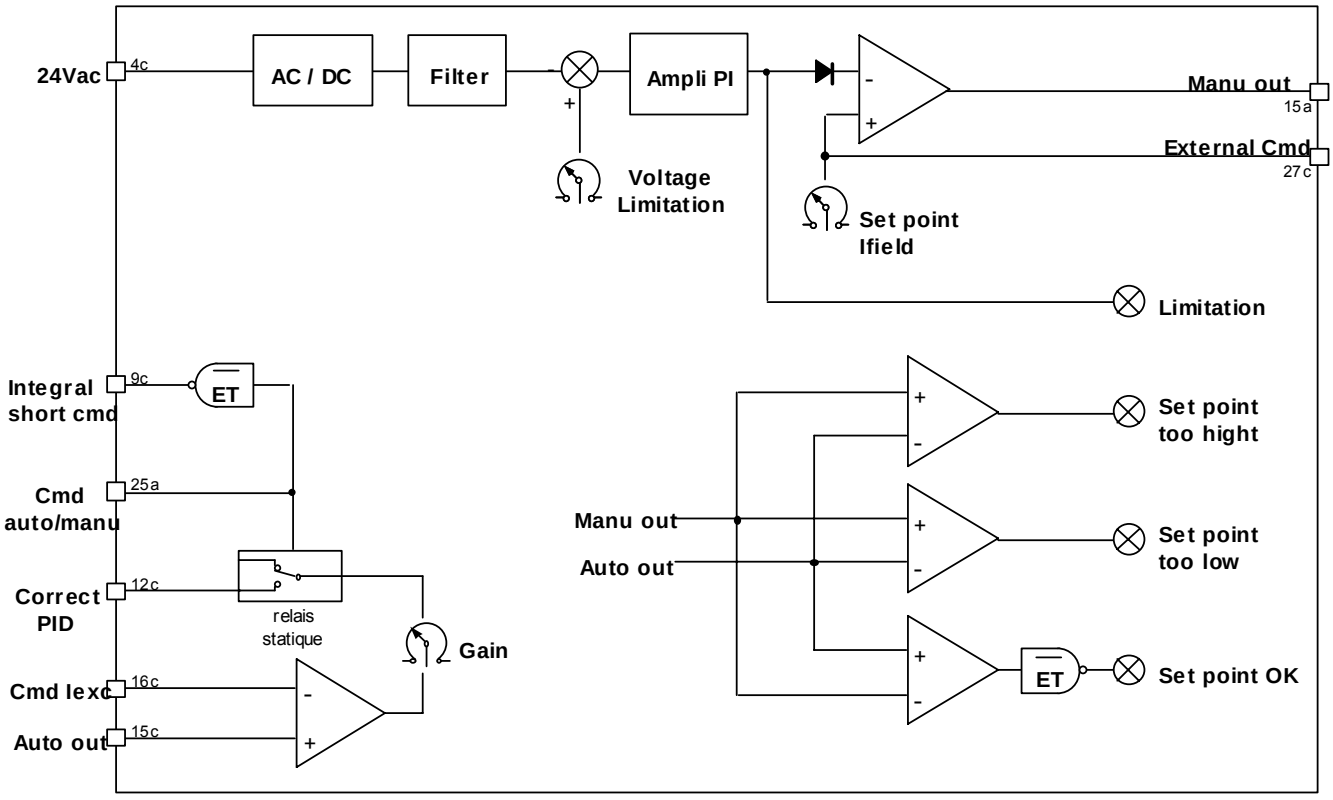
Flat cable (BUS 64points)

- 4c : 24Vac input image of the generator from "generator I/O" card
- 25a : "AUTO / MANU" command input (0V = "AUTO")
- 16c : If reference set point input
- 15c : If reference set point input "AUTO" channel
- 27c : External Ifield setting input
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common ground (GND or 0V)
- 15a : If set point output "MANU" channel
- 12c : PID compensation output
- 9c : Ceiling locked output

AVR MODEL R630

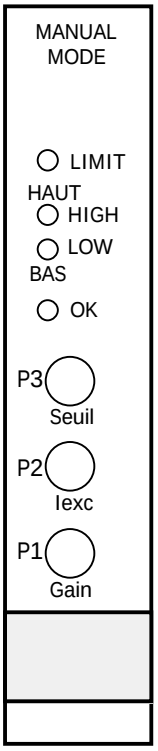
Manual mode 1 OPTIONAL CARD

MANUAL MODE CARD MIMIC DIAGRAM

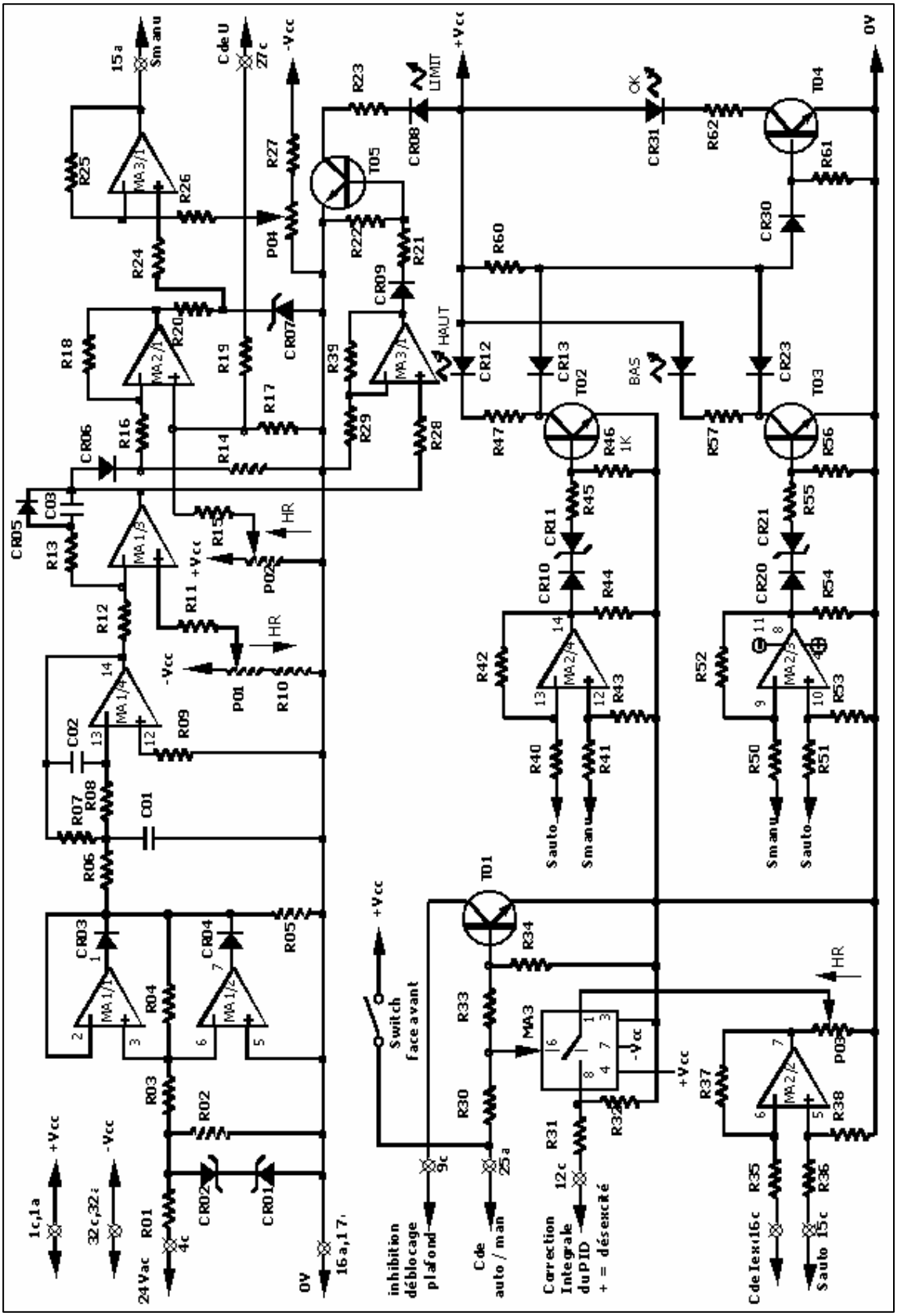


FRONT VIEW

Manual Mode 1



Principle diagram Manual mode 1



CARTE Digital Pot Iexc CARD (Option)

1) FUNCTIONAL

- This card replace one conventional motorized potentiometer in « MANU » mode and sets the « MANU » channel output always equal to the « AUTO » one to allow the smooth switching between the « AUTO » and « MANU » operationr at any load (follower in « AUTO » mode).

- Switch between the two modes is made by the external "AUTO/MANU" order (terminals 47, 48).

- Jump SW1 allows the choice between voltage output taken from U/F control of the sensing card or from a 5V fixed reference and the range is adjusted by means of potentiometer P03.

- Jumps SW3 and SW4 must be open for normal operation and closed for follower operation.

- Speed of the adjustment is controlled by potentiometer P01 in manual setting and by P02 in follower operation. P02 acts as a delay between an « AUTO » output variation and the « MANU » output response.

- Two LED's (L1, L2) indicate the command orders + or – and the two other LED's (L3, L4) indicate the maximum and minimum position of I field settings.

NOTE :
When this card is fitted, the internal I field setting (P02 of manual mode card) must be set to 0 or under the no load field value and an external setting potentiometer must not be used.
The I field setting is made only by mean of push buttons on AVR terminals 44,45,46.

2) ADJUSTMENTS

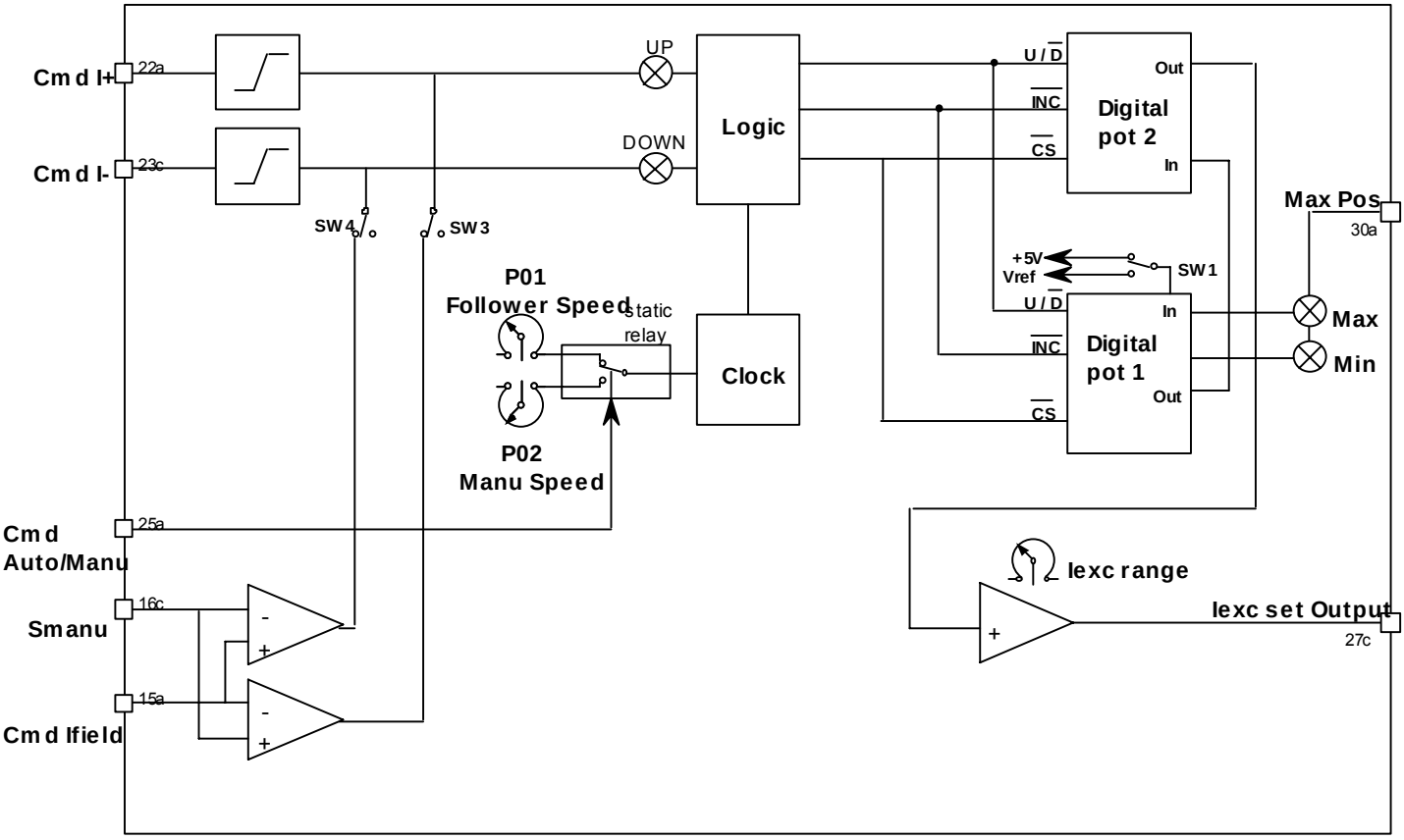
- P1 : clock speed (time delay in follower mode)
- P2 : clock speed (range time in "MANU" mode)
- P3 : I filed range value
- SW1 : fixed voltage range or U/f monitored
- SW3/4 : Normal (open) or follower (closed) operation

3) INPUTS / OUTPUTS

Flat cable (BUS 64 points)

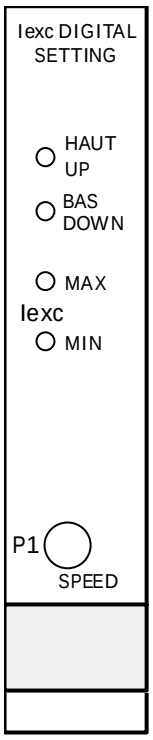
- 23c : Cmd lower
- 22a : Cmd upper
- 25a : Cmd "AUTO / MANU"
- 11a : U/f voltage reference
- 16c : If reference set point input
- 15a : If reference set point input "MANU" channel
- 27c : If setting output to Manual mode card
- 30a : maximum position of settings
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c: Common ground (GND or 0V)

I field digital pot MIMIC DIAGRAM



FRONT VIEW

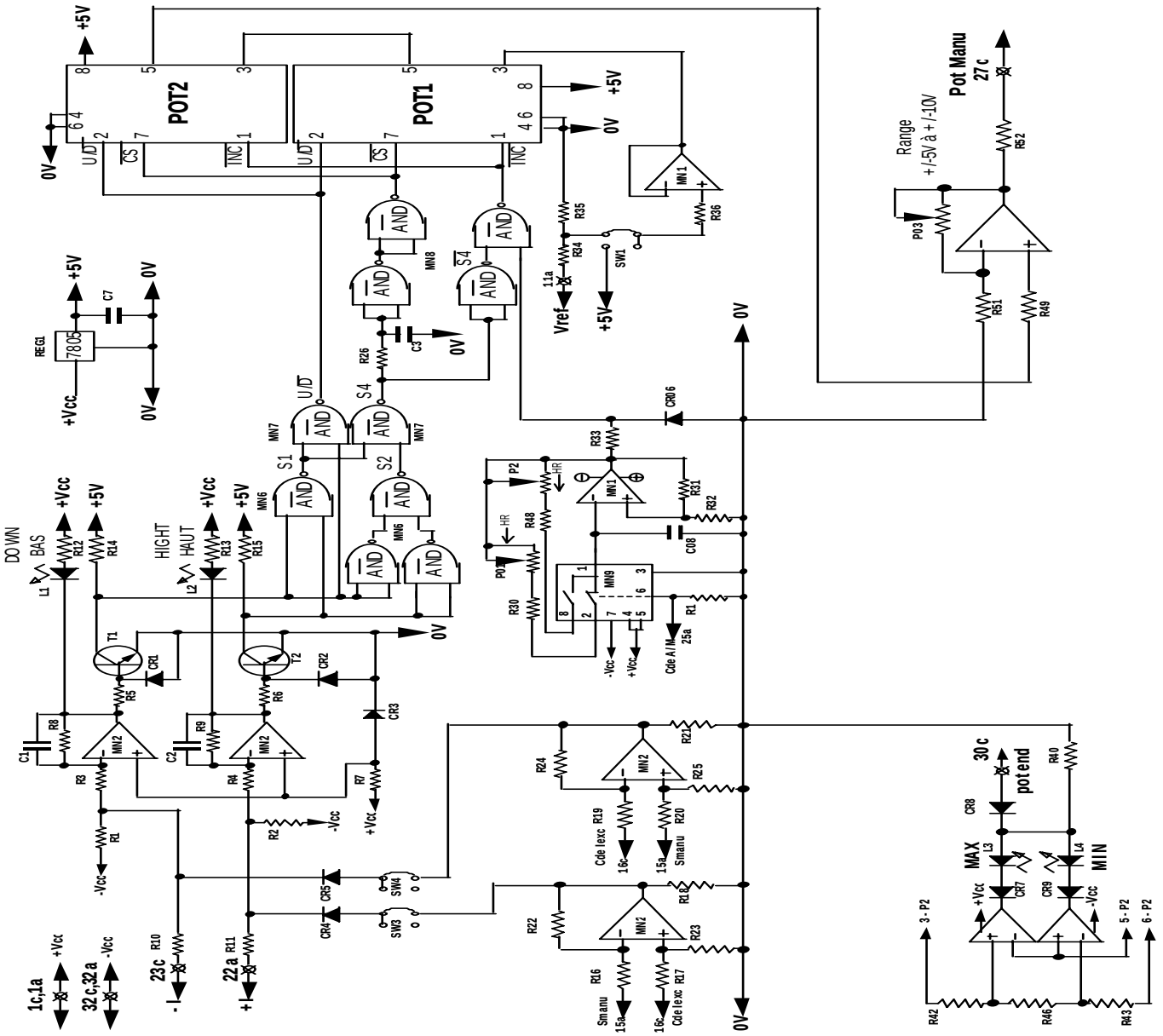
Digital Pot I field



AVR MODEL R630

Pot Digital Ifield CARD(Option)

Principal diagram I field digital potentiometer



Mains P.F Regulation OPTIONAL CARD

1) DESCRIPTION

This card is used when the P.F or KVAR regulation is wanted not at the generator terminals but at the mains input. For this a P.F or KVAR sensor with 4-20mA output is necessary and it must be located at the place where the regulation must be made.

2) FUNCTIONAL

This card elaborates from setting informations and 4-20mA signal image of P.F (or KVAR) of the mains, the errorvoltage dending to the PID of the PID card.
- The error signal have an ajustable gain and can be inversed depending of the 4-20mA sensor output.
- This kind of operation is indicated by the LED "L3" and by a contact (potential free) on the front connector.
- This operation is selected by mean of a contact on front connectort and will be active on coupling when contact between terminals 33,34 of main terminals will be closed. If the contact on front connector remains open, the regulation (P.For KVAR) will be made at the generator output, if it is closed, this is the 4-20mA information wich is regulate function of the internal settings (P2 or channel 2 4-20mA) or/and external by the front connector.

-If during operation, the measuring 4-20mA signal deseappears, control is automatically return to regulation on the generator output side and this failure is indicated by LED L1 ou L2 and by a contact on front connector .

- A second channel can be used as set point of the first channel or as a remote adjustment of voltage, P.F or KVAR on generator side. As on channel 1 if the 4-20mA deseappears, output is inhibited and indicated by LED L2.
- A field current limitation is given, active when a contact (front connector) is closed and indicated by LED L4. The limitatio is adjusted by P7 (Limit 2 set) and can be set between a maximum value preset by P7 on driver card and a minimum value preset by P8 on driver card.

- A signaling contact on the front connector gives (if they are used) the indication that one or more of the digital potentiometers are at maximum position .

3) ADJUSTMENTS

Potentiometers

- P1 : Channel 1 range adjustment
- P2 : Reference set point channel 1
- P3 : Gain channel 1
- P4 : Channel 2 range adjustment
- P5 : Reference set point channel 2
- P6 : Gain channel 2
- P7 : Limit 2I adjustment

Jumpers

- CV1 A : Channel 1 used
- CV1 B : Channel 1 not used
- CV2 A : Channel 1 used
- CV2 B : Channel 2 not used
- CV3 A : Non inverting error channel 1
- CV3 B : Inverting error channel 1
- CV4 A : Non inverting error channel 2
- CV4 B : Inverting error channel 2
- CV5 A : Channel 1 in 4-20mA regulation channel 1
- CV5 B : Channel 1 in voltage setting
- CV5 C : Channel 1 in generator P.F setting
- CV5 D : Channel 1 in generator KVAR setting
- CV6 A : Channel 2 in 4-20mA regulation channel 2
- CV6 B : Channel 2 in voltage setting
- CV6 C : Channel 2 in generator P.F setting
- CV6 D : Channel 2 in generator KVAR setting
- CV6 E : Channel 2 in channel 1 setting

4) INPUTS / OUTPUTS

Flat cable (BUS 64points)

- 12c : Error output to PID
- 21a : Output to voltage setting
- 20c : Output to generator P.F setting
- 21c : Output to generator KVAR setting
- 30a, c : Digital pot at maximum position
- 1a,1c : Supply +15Vdc regulated (Vcc)
- 32a,32c : Supply -15Vdc regulated (Vdd)
- 16a,17c: Common ground
- 23a : Cmd + U or + P.F
- 24c : Cmd - U or - P.F
- 14c : Output of generator side P.F card
- 24a : P.F regulation order
- 26c : Limitation 2 output to driver card

Front connector (DB25 points)

- 13 : + 4-20mA input channel 1
- 25 : 4-20mA output channel 1
- 20 : 12V to external setting potentiometer ch 1
- 12 : External setting potentiometer cursor ch 1
- 24 : Ground to external setting potentiometer
- 11 : + 4-20mA input channel 2
- 23 : 4-20mA output channel 2
- 20 : 12V to external setting potentiometer (ch 2)
- 10 : External setting potentiometer cursor ch 2
- 22 : Ground to external setting potentiomete
- 9 : 4-20mA failure (NO)
- 21 : 4-20mA failure (NF)
- 8 : 4-20mA failure (Commun)
- 3 : Digital pot at max position (NO)
- 15 : Digital pot at max position (NF)
- 2 : Digital pot at max position (Common)
- 7,19 : Contact regulation ch 1 active (mains P.F)
- 14,1 : Contact limitation 2 active

LED

- L1, L2 : 4-20mA failure channel 1 or 2
- L3 : Channel 1 active
- L4 : Ifield limitation 2 active

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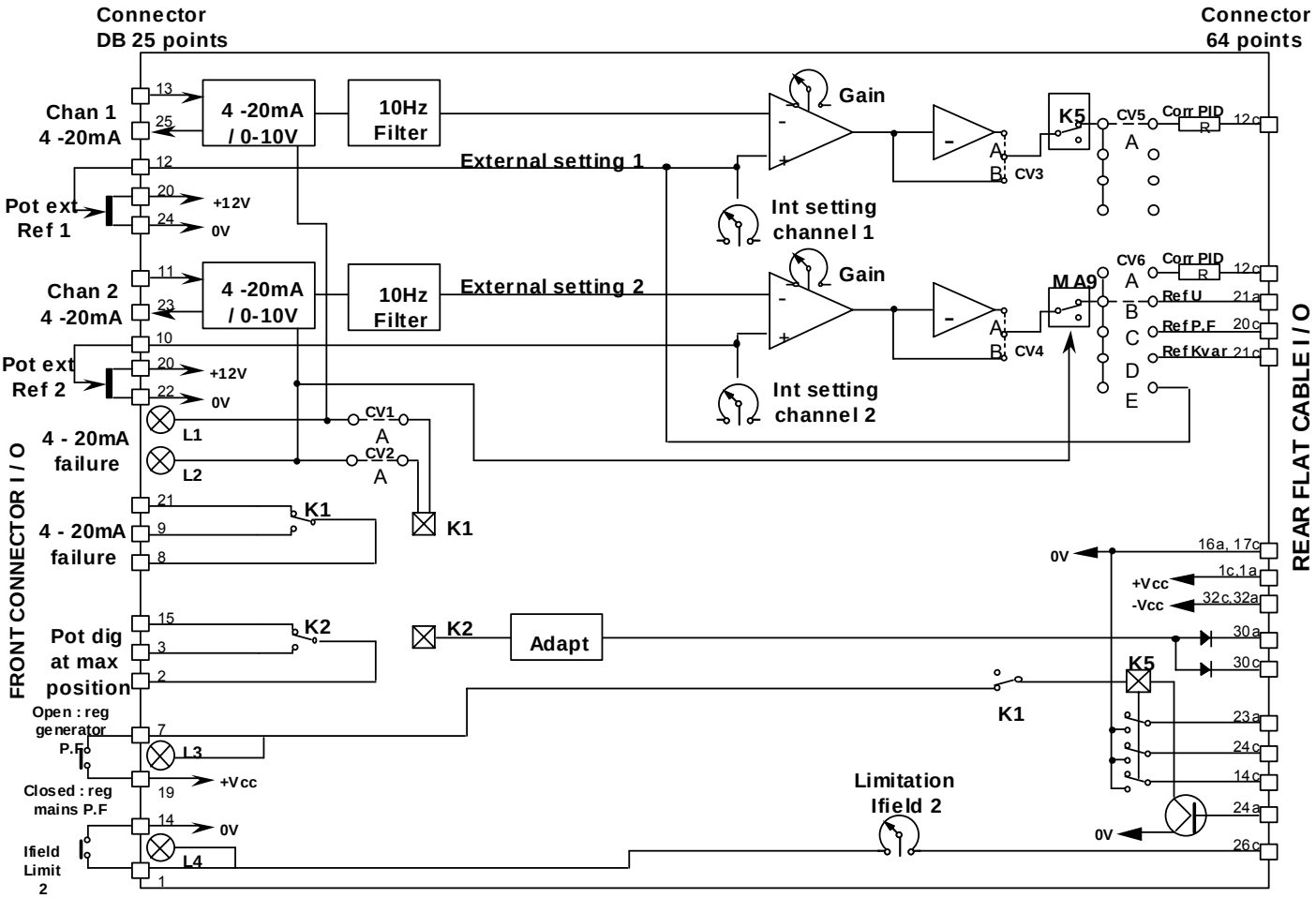
AVR MODEL R630

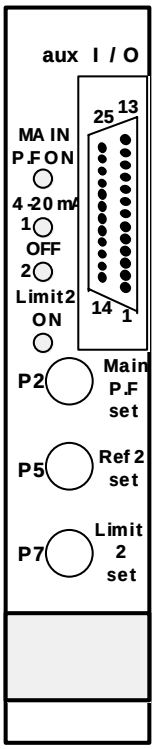
Mains P.F Regulation OPTIONAL CARD

MAINS P.F REGULATION CARD MIMIC DIAGRAM



FRONT VIEW

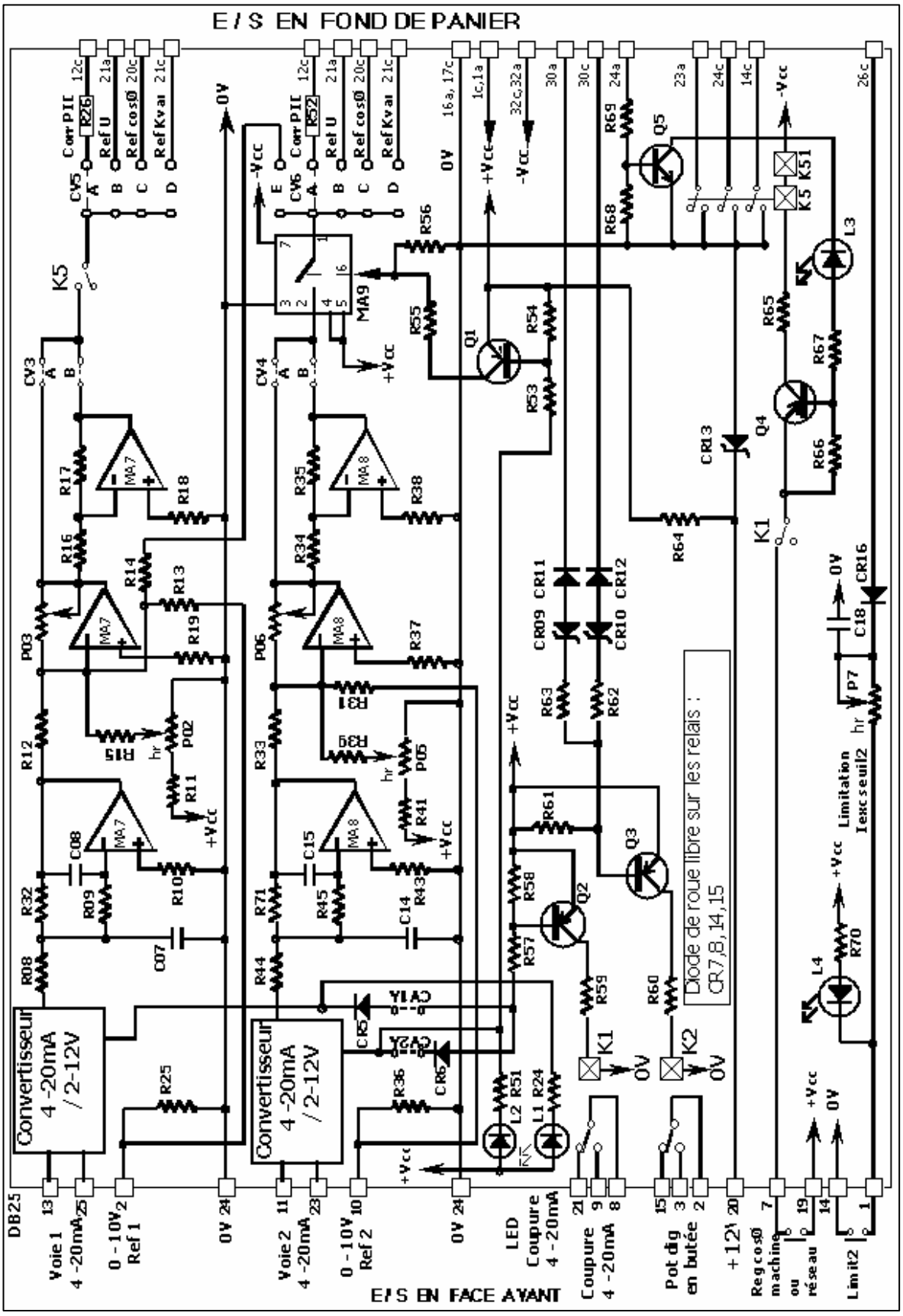
MAINS P.F REG



AVR MODEL R630

Mains P.F Regulation OPTIONAL CARD

Principle diagram mains P.F. reg card



LIMIT I Stator OPTIONAL CARD

1) FUNCTIONAL

- A voltage, image of the stator current of the machine, fed from the "ALTERNATOR I / O" card is rectified, filtered and compared to a reference voltage. The error signal gives a voltage correction which is added to the main PID input to maintain the stator current equal to the adjusted value.
- The reference voltage is applied with an initial ramp ajustable from 0,5 to about 4s.
- A front LED signals stator current limitation operation.

- When this card is used for soft-start operation, the AVR power transformer must be fed from a separate source during the start operation and can be switched on the generator output when the voltage have reached the nominal value. The switching must be as fast as possible (by relay , not by manual switch)

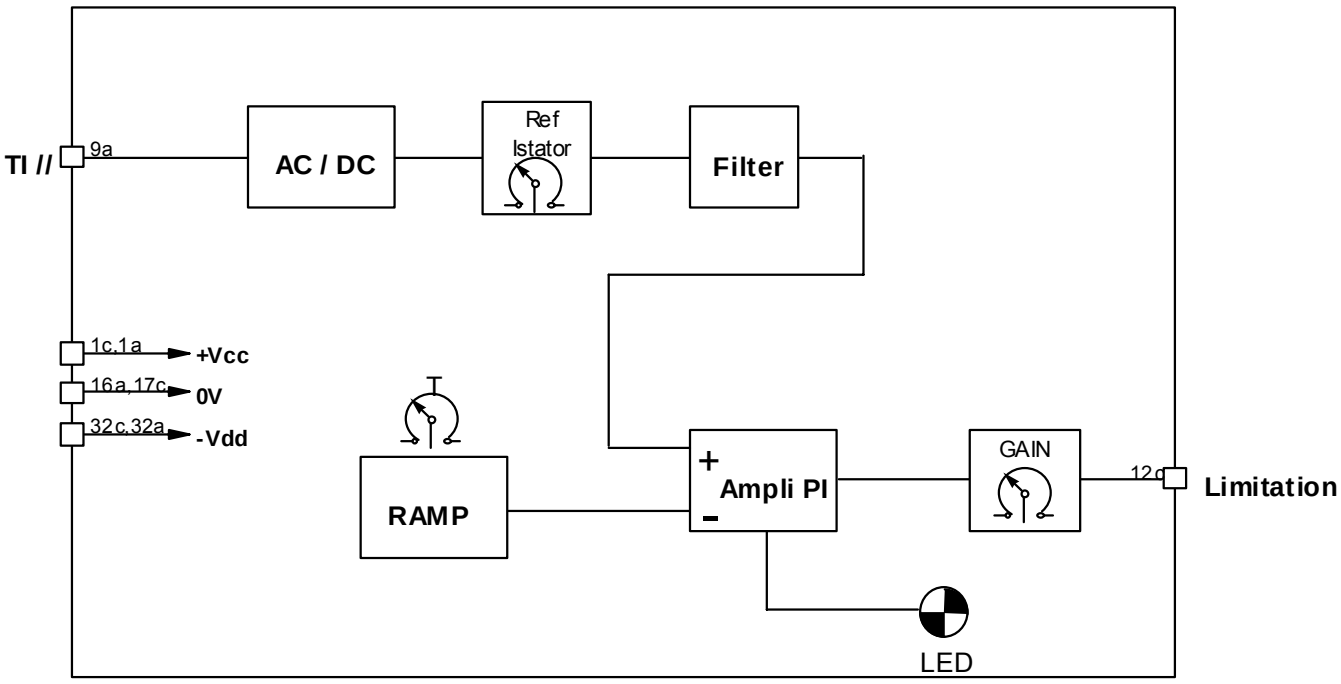
2) ADJUSTMENTS

- P1 : Stator current limit adjust. (about 2In to 4In)
- P2 : Ramp-up time adjust. (0,5 à 4s environ)
- P3 : Output signal gain

3) INPUTS /OUTPUTS

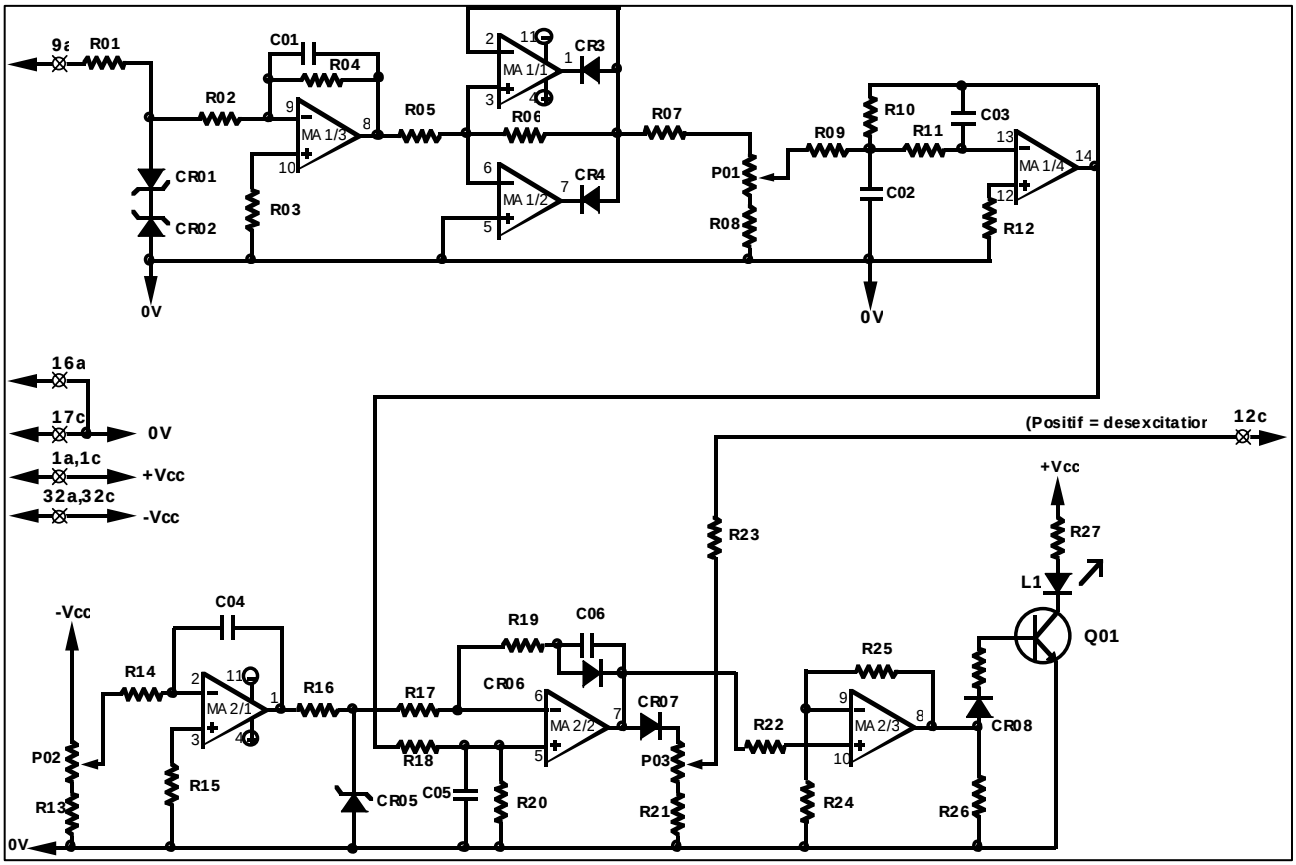
- 9a : Stator current image input (1Vac for In)
- 1a,1c : +15Vdc regulated (Vcc)
- 32a,32c : -15Vdc regulated (Vdd)
- 16a,17c : Common ground (GND or 0V)
- 12c : Voltage correction output to PID.

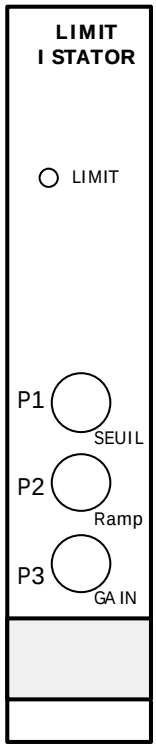
MIMIC DIAGRAM I stator limit card



AVR MODEL R630

LIMIT I Stator OPTIONAL CARD





FRONT VIEW
Limit I stator card

START - UP

CAUTION

Never energize the AVR when the driver card is removed. An overvoltage can appear and the power transistor can be damaged

1) STARTING WITH MANUAL MODE CARD

- For initial start-up, the best is to use the manual mode for testing the sensing wires between the generator and the AVR.

- For this it is necessary to have a manual mode card plugged in the AVR. If not, see directly §2.

- Short circuit terminals 47 & 48 'AVR terminal block).

- Set the potentiometer P2 on manual card maximum CCW, start the prime mover up to the nominal speed.

- Turn slowly the potentiometer CW to obtain the nominal voltage.

- Check the presence and the value of the three phases at the AVR terminal block (terminals 1, 2, 3)

- Set the voltage to 5% above the nominal voltage.

- Check that the voltage between terminal 25 and 26 of the AVR terminal block is about one volt.

- If yes, remove the strap between terminals 47 & 48 of AVR terminal block.

- The voltage must reach the nominal value.

- Go to §3

2) STARTING WITHOUT MANUAL MODE CARD

- Start the prime mover up to the nominal speed..

- If the voltage does not appear, check wires between AVR and the generator field (terminals 5 and 6 of AVR),and the also the wires between AVR and power transformer (terminals 18 and 19 of AVR). Check also the fuse inside the terminal 19 of AVR terminal block.

- If the voltage is too hight, check that the sensing voltages at the terminals 1, 2, 3 of the AVR terminal block, and the auxiliary voltage at terminals 16 & 17 of AVR, are present.

- Adjust the nominal voltage with Vref (P5) of the sensing card for the middle position of the external voltage potentiometer (if used).

3) DE-ENERGIZING (optional)

- External contacts E01 and E02 must be used.

- E01 must be serie with terminal 19 of AVR (power input) and is opened for de-energizing.

- E02 must short-circuit the booster output (if used) (terminals 7 and 8 of AVR) and is closed for de-energizing.

4) ADJUSTMENTS

- Refer also to card descriptions.

- The AVR is normally preset in factory.

- The nominal voltage can be set by Vref (P5) on sensing card. Fine adjustment can be made by an external voltage potentiometer (10KΩ), (terminals 21,22,23)

-If an adjustment must be moved, note carefully the original setting for resetting in case of problems.

- If the strap V/Hz of sensing card is on kV/Hz position, the original setting is V/Hz and can be changed between V/Hz and 2V/Hz by potentiometer P4.

-The stability is adjusted with the machine in factory . If necessary, the response time can be changed by the setting of potentiometer P4 of PID card.

- Other settings are difficult to adjust without specific electronics equipments. It is better to not change them.

5) FIELD FLASHING

- Generally, field flashing is not necessary, but in some cases like long stop time or fault trip, it can be possible that the voltage does not appear naturally.
In this case, connect a 12Vdc to 24Vdc voltage source to the terminals 4 and 8 of AVR terminal block, + to 4 for a short time and remove it when the voltage increases.

6) PARALLEL OPERATION(1F)

- The generator voltages must be as equal as possible.

- Same for the droop. If it is not possible to measure it, set the potentiometers P1 of the sensing cards all in the same position. (middle set for example). If the droop setting is made from cosØ/KVAR card (when used), see notice NT 1950080.

- The reactive currents (KVAR) must be shared, immediatly after coupling, even the KW are not shared.

- If, immediatly after coupling, the current increases abnormally, check if the parallel CT wires are not reversed. (9 et 10 of AVR terminal block)

- If the coupling is OK but if when the load increases, the cosØ or the current have an abnormal value, check that the sensing phases at the input of the AVR are right connected. (U, V, W respectively to the terminals 1, 2, 3 if clockwise rotation or W, V, U, if counter clockwise rotation)

7) PARALLEL WITH THE MAINS (2F)

- The generator and mains voltages must be as equal as possible. (see GENERATOR/ MAIN I/O card manual). **The contact between terminals 33, 34** of AVR terminal block **must be closed at the same time as the coupling** and will remain closed as long as the generator is connected to the mains.

It will be open when parallel between generators.

- If, immediatly after coupling, the current increases abnormally, check if the parallel CT wires are not reversed. (9 et 10 of AVR terminal block)

- If the coupling is OK but if when the load increases, the cosØ or the current have an abnormal value, check that the sensing phases at the input of the AVR are right connected. (U, V, W respectively to the terminals 1, 2, 3 if clockwise rotation or W, V, U, if counter clockwise rotation)

- The PF value is normally factory set to 0.9 . It can be adjust by mean of potentiometer P2 on cosØ/KVAR card or by mean of an external potentiometer (10KΩ-1W) connected to AVR terminal block (27, 28, 29)

- If the KVAR regulation is required terminals 48 and 53 must be short-circuited and the KVAR can be set by mean of potentiometer P1 on cosØ/KVAR card or by mean of an external potentiometer (10KΩ-1W) connected to AVR terminal block (30,31,32)

-For droop setting, see notice NT 1950080.

8) VOLTAGE EQUALISATION (3F)

- The following procedure must be made one time to take account of the mains transformer primary/secondary ratio.
- At no load and mains voltage present at terminals 12,13,14 of the AVR terminal block.
- Short circuit terminals 35,36 of the AVR terminal block
- Adjust P1 of MAIN I/O card to have generator and mains voltage as equal as possible.
- Remove the strap between terminals 35,36 of the AVR terminal block.
- The initial setting is made.

In normal operation the contact between terminals 35,36 of the AVR terminal block must be closed with synchronizer operation and can be opened after coupling.

9) MANUAL OPERATION (if used)

-If a manual mode card is used, it is possible to control directly the field current of the generator.
- In automatic mode, adjust the potentiometer P2 on manual mode card to have the LEDs "HIGHT" and "LOW" off and the LED OK ligthing. At this time the manual setting is equal to the automatic channel control.

- short circuit the terminals 47,48 of the AVR terminal block gives control to the manual channel and the field current is adjusted by potentiometer P2 and/or by an external optional potentiometer (10k – 1W) connected to the terminals 30,52,23 of the AVR terminal block cursor on 52 and hot point on 30.

- This mode can be used when initial start-up of the generator, to make test after problems or when operating with the mains. It cannot be used when solo operation because it is not possible to follow the load variations.

- When coupling with the mains on load, if trip of the generator occurs, an overvoltage may occurs due to the fact that the field current setting is too hight regarding the load of the generator. On this case, an internal circuit of the card decreases the field current to limit the overvoltage approximatively to 110% of nominal, the voltage in this case can be unstable but protect faster the equipments. LED "LIMIT" on front of the card will light. The setting of field current must be reset manually to the no load value and the LED "LIMIT" will switch off.

AVR MODEL R630

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