LINE REGENERATION CONVERTER
VF51RG

INSTRUCTION MANUAL

MARCH, 1995

Drivecon
MOTOR DRIVES AND CONTROLS

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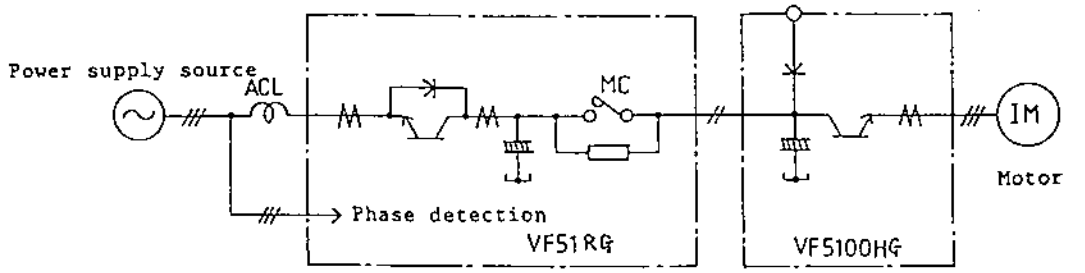
REGENCVR.P65

1. Introduction

Regeneration converter, VF51RG series, has been developed for the purpose of performing continuous regeneration or high peak regeneration back to utility power source. In combined use with our standard VF5100HG series inverter, or VF5100HG-V vector type A.C. Drive, characteristics identical to those of current source inverters or D.C. regenerative drives are obtainable.



1 line drawing of VF51RG converter and VF5100HG inverter

2. Control System and Special Features

1) Fixed phase angle and powering-regeneration transistion.

In VF51RG, transistors and diodes connected in a reverse parallel configuration, the transistors and diodes are connected in a 3 phase bridge circuit, as in the output circuit of a VF5100HG A.C. Drive. A constant transistor drive signal of 180 degrees duration in phase with power source voltage resulting in a 120 degree conduction period is provided. The transistor drive signal is present regardless of whether VF5100HG is in powering or regeneration operation.

By employing such a control system, internal DC bus voltage is determined only by main circuit elements (power source voltage, powering or regenerated power of VF5100HG and AC reactor (ACL) provided at the input side of VF51RG). As a result, the problem of instable voltage control can be completely phased out, and a stable D.C. voltage is obtained on the internal D.C. bus circuit. Since the transistor required for regenerative operation are always actuated, the relation between D.C. bus voltage and power source voltage automatically determines whether VF51RG performs forward conversion or reverse generation. When operation of VF5100HG is changed very quickly between powering and regeneration, the power direction of VF51RG changes in accordance with D.C. voltage so that the transient D.C. voltage change can be suppressed. This also reduces the peak power to be regenerated by VF51RG back to the line.

2) Performance with power source commutation dip or line notch.

Should a commutation dip width of 0.5ms of the power source occur, the regeneration transistors of the VF51RG maintain operation just as before the commutation dip occurs. When the commutation dip continues for over 0.6ms, however, the transistors are switched off. Although regenerating capability is maintained over a commutation dip width of 0.5ms, regeneration will be reduced slowly for dips over 0.6ms.

3. Protective Functions

1) High speed current limit FCL1
When regnerative DC current or forward power source current reaches the value of regenerative converter output peak current specified in Table 1, 2 or 3, the transistors are modulated in such a way as to reduce the current flow through the regenerative converter.

In the regenerative mode, the regenerative current decreases due to this modulation. The advantage of this current-limiting method is that the reduction of regenerative capability is controlled by the current-limiting function. The reduced switching cycle also reduces the possibility of transistor failure in an over current mode.

2) High speed current limit FCL2
When current increases by 10% or more than the regenerative output peak current, all transistors of converter are temporarily modulated on and off to limit peak regen current.

3) Overcurrent trip IOC
If overcurrent, for example, short-circuit current that rises suddenly and that cannot be protected by FCL, all transistors of converter are switched off. In this case, converter stops with "IOC" illuminated on either LEDs provided on main control board of VF51RG or IOC LEC on driver PC board. IOC level is +20% over FCL level. Should IOC trip occur immediately after Run signal is applied to the regenerative converter, problem may lie in phasing of input connections. Terminals RA, SA, and TA MUST be in phase with R, S and T. If not, the regeneration converters transistors will conduct out of phase with line, resulting in high current peak. If phasing is true, then problem is within regenerative converter.

4) Overload trip OL
To protect the unit and motor from overload, electronic thermal circuit is provided. This function starts to operate with 105% of rated current. When 150% of rated current is drawn for one minute, all transistors of converter are switched off. Regenerative converter stops and "OL" LED is illuminated.

5) DC Low voltage (LV)
When DC voltage is below predetermined level, the transistors of converter are all switched off. Under the condition that the transistors of converter are on, the D.C. bus voltage varies in accordance with power source voltage. That is, when power source voltage drops abnormally, the D.C. bus voltage drops, by regenerating to power source. The L.V. function, not only prevents unnecessary regenerating, but also reduces inrush current when the power source voltage rises sharply.

6) Detection of phase loss (0)
When phase loss occurs, VF51RG is driven in a single phase condition, which results in abnormal FCL operation. If this condition is left as is, the regeneration transistors may be damaged and the D.C. bus voltage ripple increases. To prevent this trouble, the converter stops operation after two of three confirmation cycles and illuminates '0' trip on LED display. When the phase is restored, converter restarts its operation.

7) Phase rotation error (ROT)
Driving a converter in reverse phase order does not cause any particular trouble. But, since regenerative power capability is slightly (around 5%) reduced under FCL condition, 'ROT' trip is illuminated on LED display to draw attention to a reverse phase condition which should be corrected by reversing two incoming phases directly at power source coupling point, not at regenerative converter input.

8) Power failure
9) Overheat of fin (TH)
10) Over DC voltage (OV)
11) Overcurrent (IOC)

} Same as VF5100HG series inverter LED indicators located on BAC driver P.C. Board. Consult VF5100HG manual for explanation of fault conditions.

4. Display

1) Following displays are provided on main control board CNVAMP of VF51RG from left to right.

1) OL Overload (white)
2) ROT Phase rotation error (red)
3) IOC Overcurrent detection (white)
4) 0 Phase loss detection (red)
5) RUN Illuminated when the transistors of converter VF51HG are on (green)
6) REG Illuminated when D.C. current is in regeneration back to supply (green)

2) Following displays are provided on the driver board BACHG of VF51RG

1)TH Fin overheat
2)OV DC overvoltage
3)FU Fuse blown
Illuminated in normal condition and turned off when fuse is open
4)CHG DC bus charge
Illuminated while voltage is present at DC bus circuit.
5)IOC Overcurrent detection

CAUTION: Turn off power suply and make sure that both LEDs of FU and CHG are off before removing cover and inspecting the internal parts of regen converter of VFD or internal parts of VFD since they are interconnected.

5. External Output Relay Signals

1) Run relay contact (52MA2)
Form 'C' contact actuated by RUN condition of VF51RG
2) Fault contact (86A)
Form 'C' contact which is actuated when Fault Detection occurs.
3) MCA actuation contact
Normally open contact which is closed when MC for charging the D.C. bus circuit is closed. This signifies VF51RG is ready to start operation.

6. Explanation of Tables and Figures

Table 1	VF51RG 22 Specifications (200-230V)
Table 2	VF51RG 44 Specifications (380-440V)
Table 3	VF51RG 48 Specifications (460-480V)
Table 4	Regenerative capability
Table 5	Input power factor characteristics
Fig. 1	Fundamental connection diagram .....Converter x 1 & Inverter x 1
Fig. 2	Multiple inverters .....Converter x 1 & Inverter x 2 or more
Fig. 3	Regeneration converter parallel connection .....For capacities exceeding 150 KVA in 400V and 480V .....For capacities exceeding 90KVA in 220V

7. Components

Each regnerative control consists of 2 main parts, the VF51RG regen converter and the VF5100HG series inverter. Beyond these items other accessories are included as an integral part of the control. Depending upon the capacity of your control various items will appear different. A basic system consists of the following:

1) VF51RG regenerative converter
2) VF5100HG A.C. Drive
3) 3 phase fuse block with fuse blown detector
4) 3 phase line reactor
5) optional isolation transformer

8. Installation

Refer to VF5100 instruction manual for location selection and guide lines. Dimension outlines for VF51HG and accessories are provided for each particular item. Since D.C. bus connections are routed between VF51HG and VF5100HG use sufficient wire size to handle motor current x 1.7, also use wire with sufficient voltage rating for level of D.C. voltage. It is a good practice to mount VF51RG and VF5100HG in close proximiity to reduce length of D.C. bus cables P and N. Main power input terminals R, S and T must be phased identically with phase detection terminals RA, SA and TA. If not correctly phased, an IOC detection will result, which may cause damage to regenerative converters output transistors. VERIFY CORRECT PHASING OF R, S AND T AND RA, SA AND TA BEFORE POWER IS APPLIED TO REGENERATIVE CONVERTER.

9. Technical Assistance

If problems are encountered, please contact Drivecon Corporation for technical assistance at (708) 918-1406. The Regen converter contains no user servicable parts and should be returned to Drivecon for repair.

Table 1. VF51RG22 Specifications

	Type	VF51RG Series								
		10	22	45	60	90	120	180	270	360
Input power supply source	No. of phases	3 phase 3 wire								
	Rated voltage, frequency	200V 50Hz, 200/230V 60Hz								
	Voltage variance range	+/-10% of rated value								
	Frequency variance range	+/- 5% of rated value								
	Instant variance range	+15%, -25% of rated value								
	Voltage unbalance	+/-3%								
	Allowance distortion	Notch width within 0.5 ms (whereas capacity is reduced complying to commutation dip width)								
Ambient condition	Place installation	Indoor (free from corrosive gas, water and oil)								
	Temperature	0-40 degrees C								
	Humidity	Less than 85%RH (No condensation)								
	Elevation	Less than 1000 meters								
Converter	Control system	Phase angle fixation (firing angle 180 degrees, continuity period 120 degrees) powering, or regeneration.								
	Rated DC voltage	270V								
	DC voltage	Power source voltage x 1.35 (at no load)								
	DC voltage regulation	-5% at powering rated capacity								
	Rated capacity (KW)	9.7	19.8	40.5	58	81	106	162	243	324
	Overload durability	150% of rated capacity, 1 minute								

Protective function		
	High speed current limit (FCL1)	Phase loss (Ø)
	High speed current limit (FCL2)	Phase rotation error (ROT)
	Overcurrent trip (IOC)	Power supply interruption
	Overload (OL)	Overheat of fin (TH)
	DC low voltage (LV)	Over voltage (OV)
		Communication dip (GAP)

Table 2. VF51RG44 Specifications

	Type	VF51RG44 Series							
		10	25	37	75	150	300	450	600
Input power supply source	No. of phases	3 phase 3 wire							
	Rated voltage, frequency *	380/440V 50Hz, 400/440V 60Hz Control power source tap for 400V, 440V							
	Voltage variance range	+/-10% of rated value							
	Frequency variance range	+/- 5% of rated value							
	Instant voltage variance range	+15%, -25% of rated value							
	Voltage unbalance	+/-3%							
Ambient condition	Allowance distortion	Notch width within 0.5 ms (wheras capacity is reduced complying to commutation dip width)							
	Place installation	Indoor (free from corrosive gas, water and oil)							
	Temperature	0-40 degrees C							
	Humidity	Less than 85%RH (No condensation)							
	Elevation	Less than 1000 meters							
	Control system	Phase angle fixation (firing angle 180 degrees, continuity period 120 degrees), powering or regeneration							
Converter	Rated DC voltage	540V							
	DC voltage	Power source voltage x 1.35 (at no load)							
	DC voltage regulation	-5% at powering rated capacity							
	Rated capacity (KW)	9.7	24	33.3	71	143	286	429	572
	Overload durability	150% of rated capacity, 1 minute							

Protective function		
	High speed current limit (FCL1)	Phase loss (Ø)
	High speed current limit (FCL2)	Phase rotation error (ROT)
	Overcurrent trip (IOC)	Power supply interruption
	Overload (OL)	Overheat of fin (TH)
	DC low voltage (LV)	Over voltage (OV) Commutation dip (GAP)

* Note at 380V rated capacity and regenerative output peak current is de-rated by 5%

Table 3. VF51RG48 Specification

	Type	VF51RG48 Series							
		10	25	37	75	150	300	450	600
Input power supply source	No. of phases	3 phase, 3 wire							
	Rated voltage, frequency	460V 50Hz, 460/480V 60Hz Control power source tap for 460V, 480V							
	Voltage variance range	+10%, -15% of rated value							
	Frequency variance range	+/- 5% of rated value							
	Instant variance range	+15%, -25% of rated value							
	Voltage unbalance	+/- 3%							
	Allowance distortion	Notch width within 0.5 ms (whereas capacity is reduced complying to commutation dip width)							
Ambient condition	Place installation	Indoor (free from corrosive gas, water and oil)							
	Temperature	0 - 40 degrees C							
	Humidity	Less than 85%RH (No condensation)							
	Elevation	Less than 1000 meters							
	Control system	Phase angle fixation (firing angle 180 degrees continuity period 120 degrees) powering regeneration							
Converter	Rated DC voltage	621V							
	DC voltage	Power source voltage x 1.35 (at no load)							
	DC voltage regulation	-5% at powering rated capacity							
	Rated capacity (KW)	9.7	24	33.3	71	143	296	429	572
	Overload durability	150% of rated capacity, 1 minute							

Protective fundtion		
	High speed current limit (FCL1)	Phase loss (Ø)
	High speed current limit (FCL2)	Phase rotation error (ROT)
	Overcurrent trip (IOC)	Power supply interruption
	Overload (OL)	Overheat of fin (TR)
	DC low voltage (LV)	Over voltage (OV) Commutation dip (GAP)

TABLE 4 CAPACITY OF VF51RG

TYPE OF EQUIPMENT VF51RG-kVA-V	CONTINUOUS RATED CAPACITY		1 MIN. OVERLOAD CAPACITY	
	POWERING * REGENERATION		POWERING * REGENERATION	
	Kw	AC Line Amps	Kw	AC Line Amps
VF51RG- 1022	9.7	32.0	14.6	48.6
- 2222	19.8	66.0	29.6	98.6
- 4522	40.5	135.0	60.8	202.6
- 6022	58.0	193.3	87.1	290.3
- 9022	81.0	270.0	121.0	403.3
-12022	106.0	353.0	159.0	530.0
-18022	162.0	540.0	242.0	806.6
-27022	243.0	810.0	363.0	1210.0
-36022	324.0	1080.0	474.0	1580.0
VF51RG- 1044	9.7	16.0	14.6	24.3
- 2544	24.0	40.0	36.0	60.0
- 3744	33.3	55.5	50.2	83.6
- 7544	71.0	118.3	107.0	178.3
-15044	143.0	238.3	215.0	358.3
-30044	286.0	476.6	430.0	716.6
-45044	429.0	715.0	645.0	1075.0
-60044	572.0	953.3	860.0	1433.3
VF51RG- 1048	9.7	15.0	14.6	23.5
- 2548	24.0	35.0	36.0	52.5
- 3748	33.3	48.3	50.2	73.0
- 7548	71.0	108.6	107.0	155.0
-15048	143.0	207.2	215.0	311.6
-30048	286.0	414.5	430.0	623.2
-45048	429.0	621.7	645.0	934.8
-60048	572.0	829.0	860.0	1246.4

DRIVECON CORPORATION
LINE REGENERATIVE CONVERTER
WIRE SIZE DATA TABLE

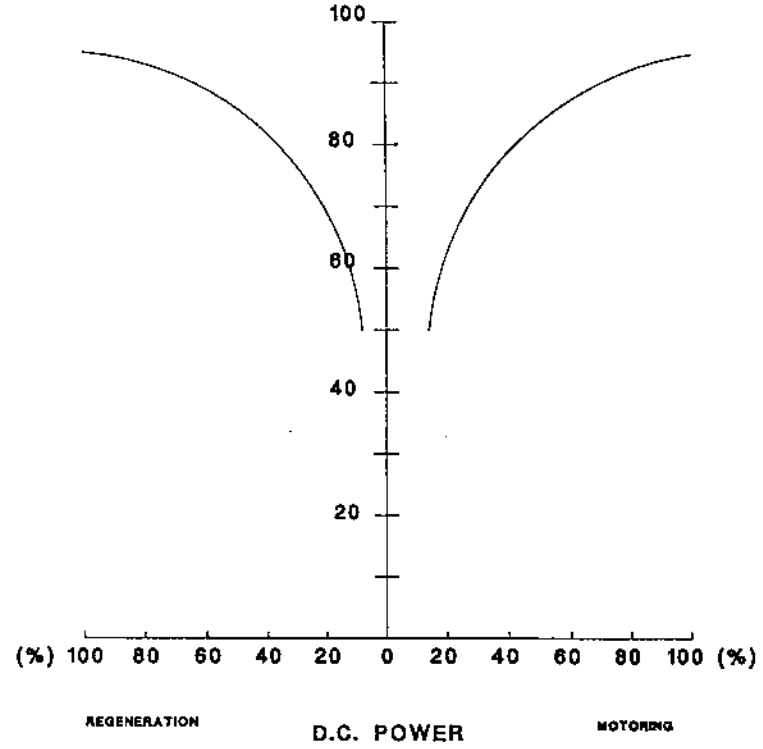
REGENERATIVE CONVERTER	LINE VOLTAGE	REGENERATIVE CAPACITY	TERMINALS		
			R,S,T	RA,SA,TA	P,N
VF51RG1022	200-220V 50/60HZ	10 KVA	12AWG	16AWG	10AWG
VF51RG2222	200-220V 50/60HZ	22 KVA	8AWG	16AWG	6AWG
VF51RG4522	200-220V 50/60HZ	45 KVA	6AWG	16AWG	4AWG
VF51RG6022	200-220V 50/60HZ	60 KVA	4AWG	16AWG	1AWG
VF51RG9022	200-220V 50/60HZ	90 KVA	00AWG	16AWG	250MCM
VF51RG1044 VF51RG1048	380-440V 460-480V 50/60HZ	10 KVA	14AWG	16AWG	12AWG
VF51RG2544 VF51RG2548	380-440V 460-480V 50/60HZ	25 KVA	12AWG	16AWG	8AWG
VF51RG3744 VF51RG3748	380-440V 460-480V 50/60HZ	37 KVA	10AWG	16AWG	6AWG
VF51RG5044 VF51RG5048	380-440V 460-480V 50/60HZ	50 KVA	8AWG	16AWG	4AWG
VF51RG7544 VF51RG7548	380-440V 460-480V 50/60HZ	75 KVA	6AWG	16AWG	3AWG
VF51RG10044 VF51RG10048	380-440V 460-480V 50/60HZ	100 KVA	4AWG	16AWG	1AWG
VF51RG15044 VF51RG15048	380-440V 460-480V 50/60HZ	150 KVA	1AWG	16AWG	000AWG

NOTES (1) WIRE SIZE BASED ON CONDUCTORS IN FREE AIR AT 30^0C

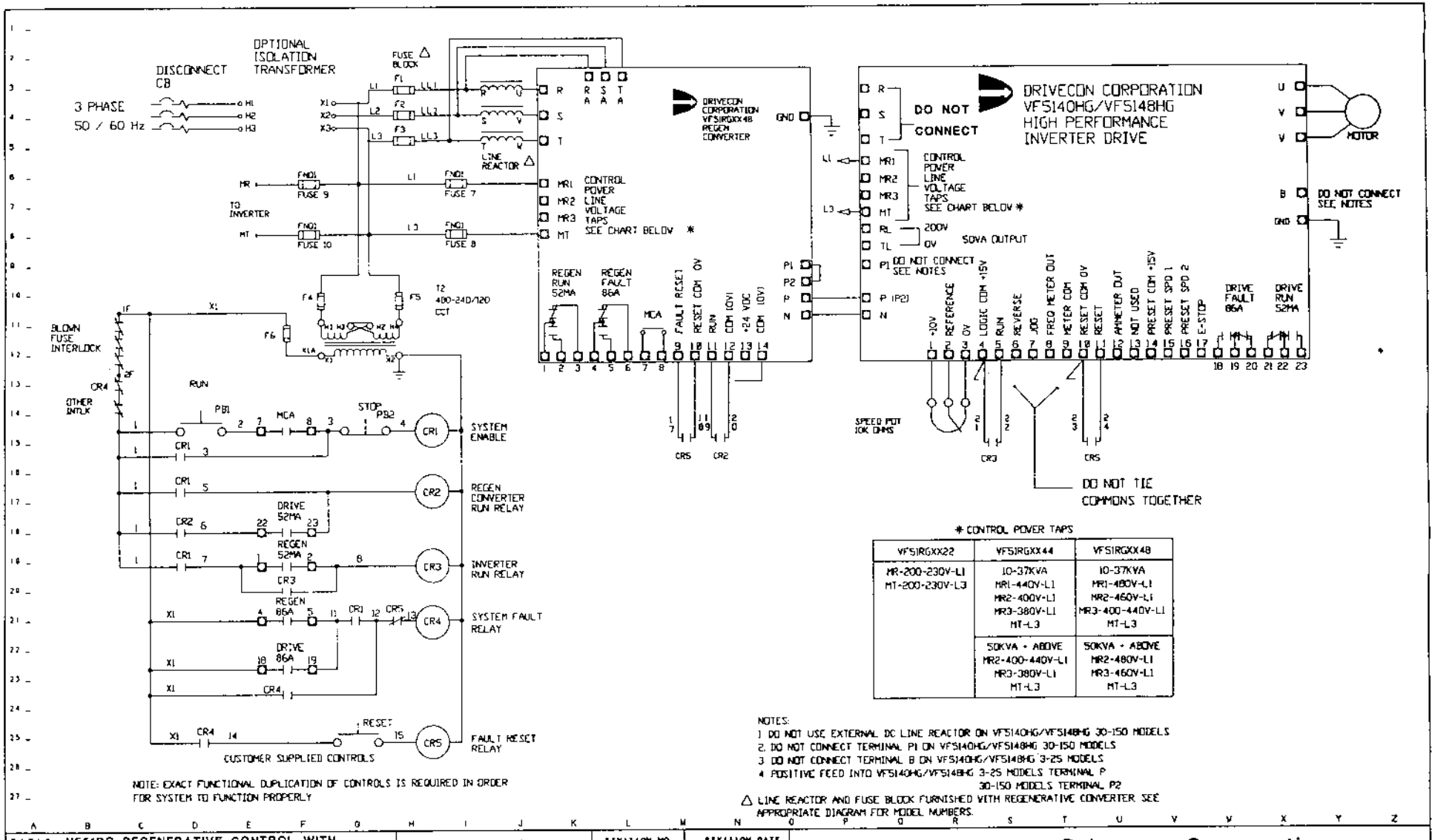
DRIVECON CORPORATION 1840 INDUSTRIAL DRIVE, SUITE 220

8/24/92

INPUT POWER FACTOR



TITLE: VF61RG REGEN CONVERTER POWER FACTOR GRAPH		DRAWING VERSION	REVISION NO. / REVISION DATE	Drivecon Corporation
CLIENT:		FINAL		
LOCATION:		DATE: 07/07/82		
DESIGNER:	PROJECT:	START-UP DATE: MM/DD/YY	SHEET # XXX OF XXX	



* CONTROL POWER TAPS

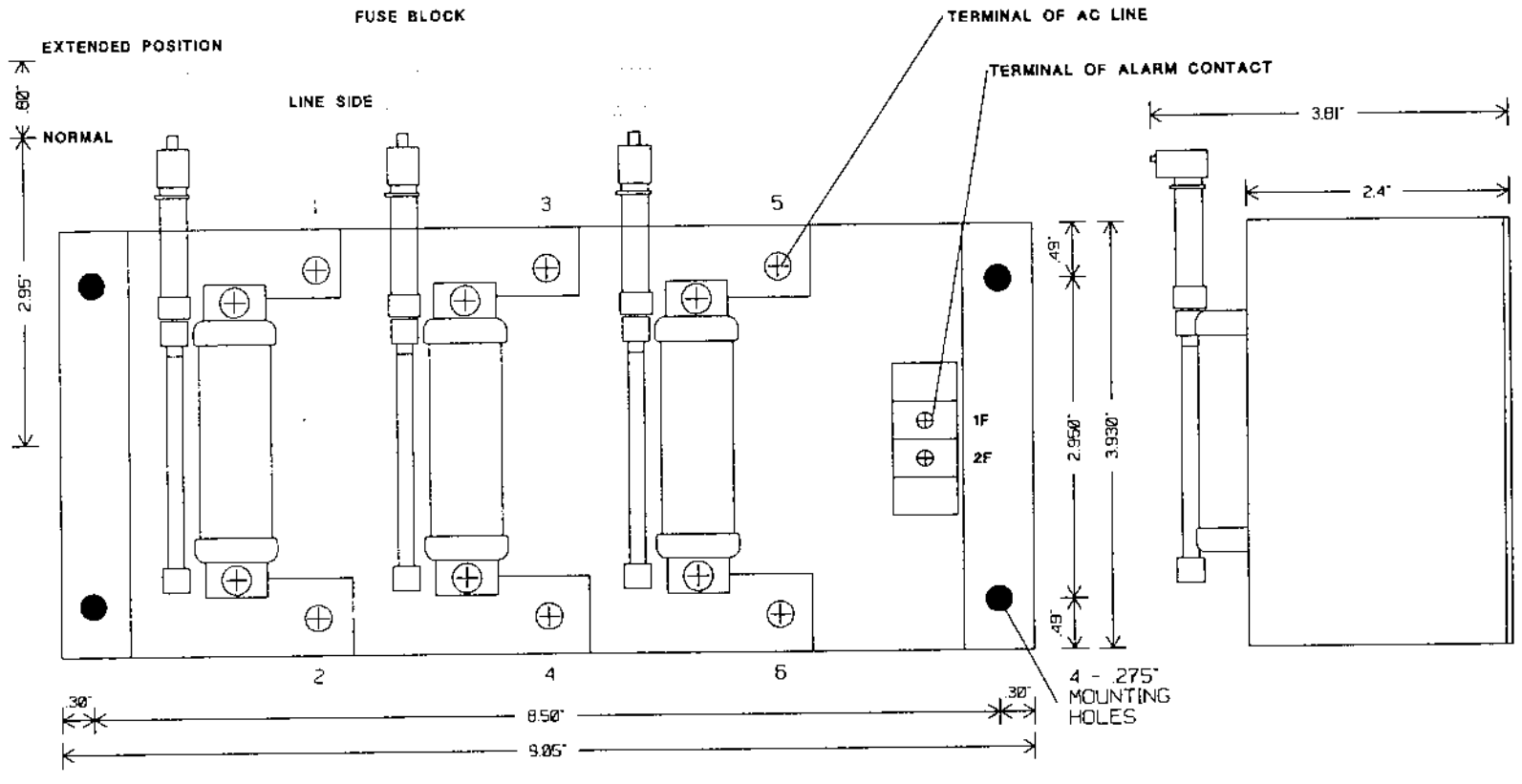
VFS1RGXX22	VFS1RGXX44	VFS1RGXX48
MR-200-230V-L1 MT-200-230V-L3	10-37KVA MR1-440V-L1 MR2-400V-L1 MR3-380V-L1 MT-L3	10-37KVA MR1-480V-L1 MR2-460V-L1 MR3-400-440V-L1 MT-L3
	50KVA + ABOVE MR2-400-440V-L1 MR3-380V-L1 MT-L3	50KVA + ABOVE MR2-480V-L1 MR3-460V-L1 MT-L3

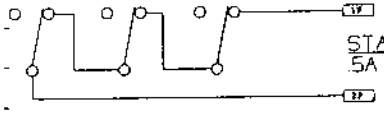
NOTES:
1. DO NOT USE EXTERNAL DC LINE REACTOR ON VFS140HG/VFS148HG 30-150 MODELS
2. DO NOT CONNECT TERMINAL P1 ON VFS140HG/VFS148HG 30-150 MODELS
3. DO NOT CONNECT TERMINAL B ON VFS140HG/VFS148HG 3-25 MODELS
4. POSITIVE FEED INTO VFS140HG/VFS148HG 3-25 MODELS TERMINAL P
   30-150 MODELS TERMINAL P2

△ LINE REACTOR AND FUSE BLOCK FURNISHED WITH REGENERATIVE CONVERTER SEE APPROPRIATE DIAGRAM FOR MODEL NUMBERS.

TITLE: VFS1RG REGENERATIVE CONTROL WITH VFS100HG INVERTER 10-150KVA 440-480V 10-90KVA 220V		DRAWING VERSION	REVISION NO. / REVISION DATE
CLIENT:		FINAL	
LOCATION:		DATE: 07/01/92	
DESIGNER: RP	PROJECT: VFS1RG-C	START-UP DATE: 07/01/92	SHEET # 001 OF 001

Drivecon Corporation





STANDARD CONFIGURATION
5A 110V PILOT DUTY ONLY

NOTE: TERMINAL NUMBER OF 1F AND 2F NOT MARKED AT TERMINAL STRIP

FUSE DATA. MANUFACTURER: G.E.C

FUSE BLOCK MODEL	FUSE TYPE	REGEN. CONVERTER SIZE	REGEN. CONVERTER MODEL 400V/480
GSGB16F	GSG1000-16		
GSGB55F	GSG1000-55	10KVA	VF5IRG1044/48

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

TITLE: FUSE BLOCK FOR REGENERATIVE CONVERTER GSGB16F ~ 55F		DRAWING VERSION	REVISION NO. / REVISION DATE
CLIENT:		FINAL	
LOCATION:		DATE: 07/01/92	
DESIGNER:	PROJECT: GSGB1655	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001

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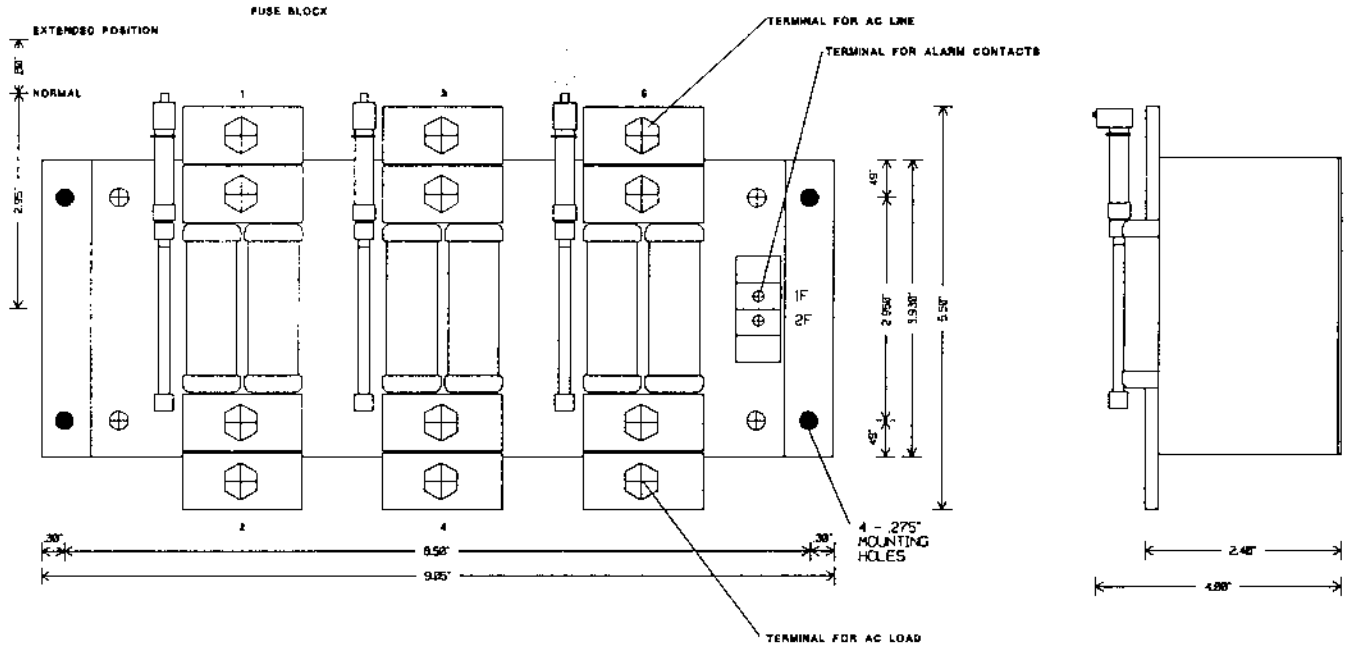
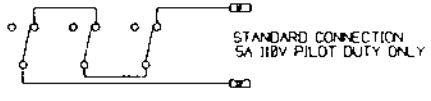


NOTE: TERMINAL NUMBER OF 1F AND 2F NOT MARKED AT TERMINAL STRIP
ALL DIMENSIONS IN INCHES



FUSE DATA. MANUFACTURER: G.E.C

FUSE BLOCK MODEL	FUSE TYPE	REGEN. CONVERTER SIZE	REGEN. CONVERTER MODEL 400V/460
GSGB75F	GSGI000-75	25KVA	VF5IRG2544/48
GSGB150F	GSGI000-150	37KVA	VF5IRG3744/48

TITLE: FUSE BLOCK FOR REGENERATIVE CONVERTER GSGB75F ~ 150F		DRAWING VERSION	REVISION NO.	REVISION DATE
CLIENT:		FINAL		
LOCATION:		DATE: 07/01/92		
DESIGNER:	PROJECT: GSG75150	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001	

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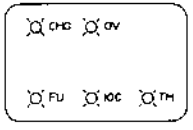
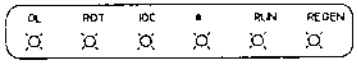
STATUS DISPLAY OF DRIVER BOARD



STATUS DISPLAY OF CONVERTER AMP

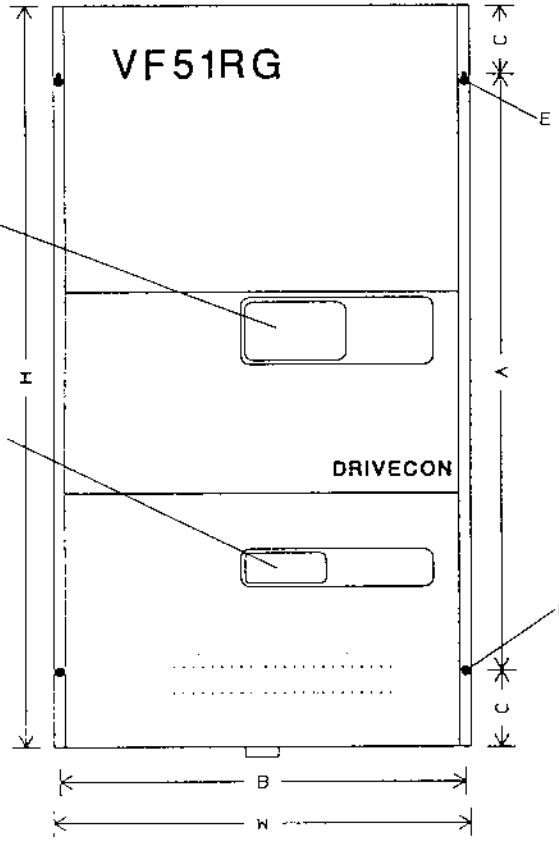


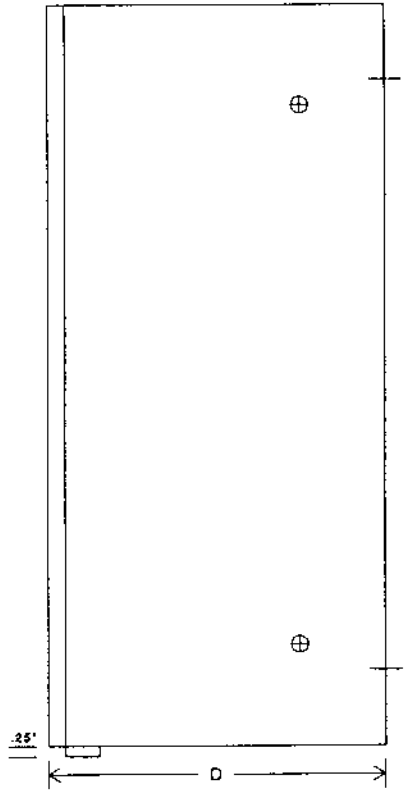
MODEL	TERMINAL	SIZE
10/25	1 - 15	M3.5
10/25	MR1, MR2, MR3, MT RL, TL, RA, SA, TA	M3.5
10	P1, P2, N, P, R, S, T	M4
25	P1, P2, N, P, R, S, T	M5

NOTE:

MAINTAIN 3" OF CLEARANCE ON TOP AND BOTTOM OF THE UNIT FOR PROPER AIR CIRCULATION!

(ALL DIMENSIONS ARE APPROXIMATE AND ARE NOT INTENDED FOR EXACT LAYOUT REFERENCE!)
ALL DIMENSIONS IN INCHES.

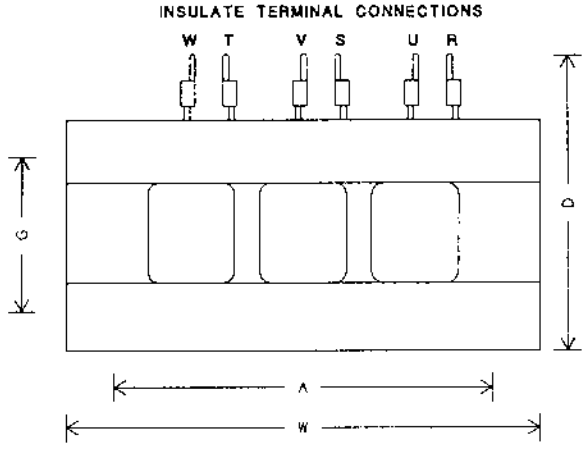


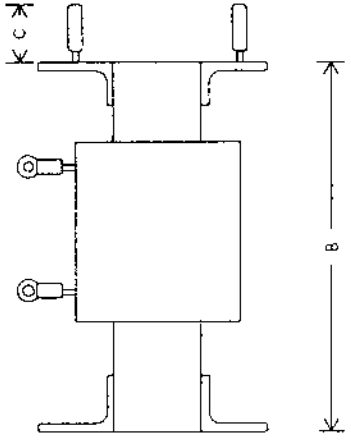


DIMENSIONS (INCHES)

	H	W	D	A	B	C	E	WGT
VF51RG1044 VF51RG1048	19.75	11.25	9.055	15.75	10.625	2.00	.250	38 lbs
VF51RG2544 VF51RG2548	21.75	13.62	10.25	17.75	12.75	2.00	.312	60 lbs
VF51RG3744 VF51RG3748	21.2	15.0	12.4	17.7	14.2	1.61	.312	70 lbs
VF51RG5044 VF51RG5048	26.5	18.4	13.0	25.6	15.8	5.0	.43	110 lbs
VF51RG7544 VF51RG7548	26.5	18.4	13.0	25.6	15.8	5.0	.43	115 lbs
VF51RG10044 VF51RG10048	42.3	18.4	13.6	41.3	15.8	5.0	.43	220 lbs
VF51RG15044 VF51RG15048	42.3	18.4	13.6	41.3	15.8	5.0	.43	230 lbs

TITLE: REGEN CONVERTER PHYSICAL DIMENSIONS 400/480V 10-150KVA		DRAWING VERSION	REVISION NO.	REVISION DATE	Drivecon Corporation
CLIENT:		FINAL			
LOCATION:		DATE: 07/01/92			
DESIGNER: GLC	PROJECT: VF51RGMD	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001		





FREQUENCY	50 / 60 HZ
INSULATION	CLASS B
CONNECTION	R — U S — V T — W

REGEN. MODEL	REGEN. CAPACITY	TYPE	CURRENT	INDUCTANCE	W	D	A	B	C	G
VF51RG10	10KVA	AL1048RG	13.4A	2.6mH	7.50	5.35	4.73	6.10	—	2.40
VF51RG25	25KVA	AL2548RG	31.6A	1.1mH	8.65	5.75	5.51	7.21	1.26	3.19
VF51RG37	37KVA	AL3748RG	46.6A	0.74mH	8.65	6.54	5.51	7.64	1.26	3.39
VF51RG50	50KVA	AL5048RG	63.0A	0.55mH	10.65	6.54	7.48	9.53	1.26	2.99
VF51RG75	75KVA	AL7548RG	94.7A	0.37mH	10.65	7.52	7.48	9.76	1.26	3.58
VF51RG100	100KVA	AL10048RG	121.0A	0.28mH	11.45	8.86	8.27	10.59	1.26	4.13
VF51RG150	150KVA	AL15048RG	189.0A	0.185mH	12.40	9.45	9.25	12.21	1.26	4.72
VF51RG300	300KVA	AL30048RG	378.0A	0.043mH	15.35	14.25	12.21	13.66	2.01	6.18
VF51RG450	450KVA	AL45048RG	567.0A	0.062mH	17.35	15.04	14.17	16.38	2.01	6.97

TITLE: LINE REACTOR FOR REGENERATIVE CONVERTER DIMENSIONS		DRAWING VERSION	REVISION NO. / REVISION DATE
CLIENT:		FINAL	
LOCATION:		DATE: 07/07/92	
DESIGNER:	PROJECT: ALXX48RG	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001

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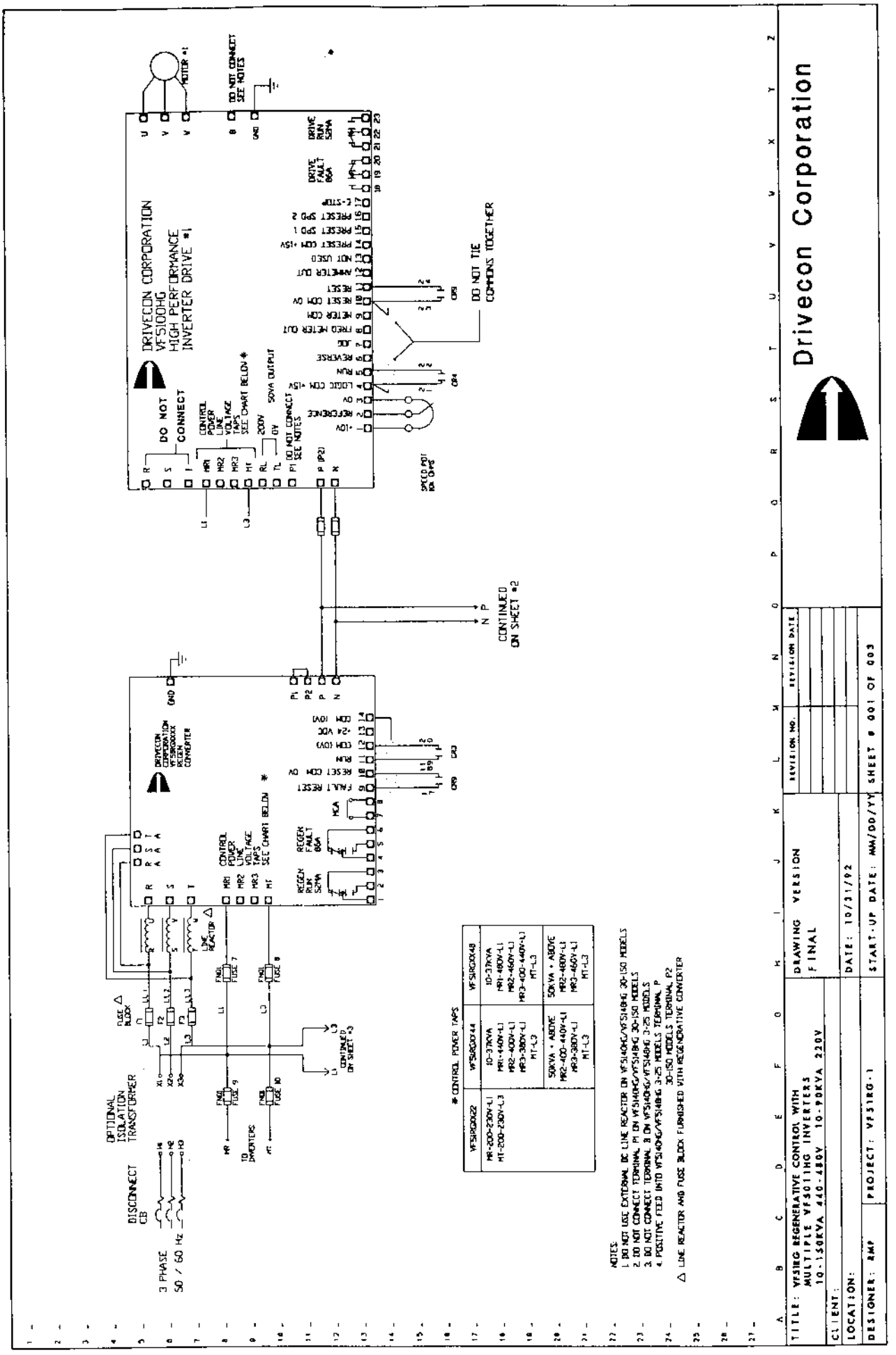
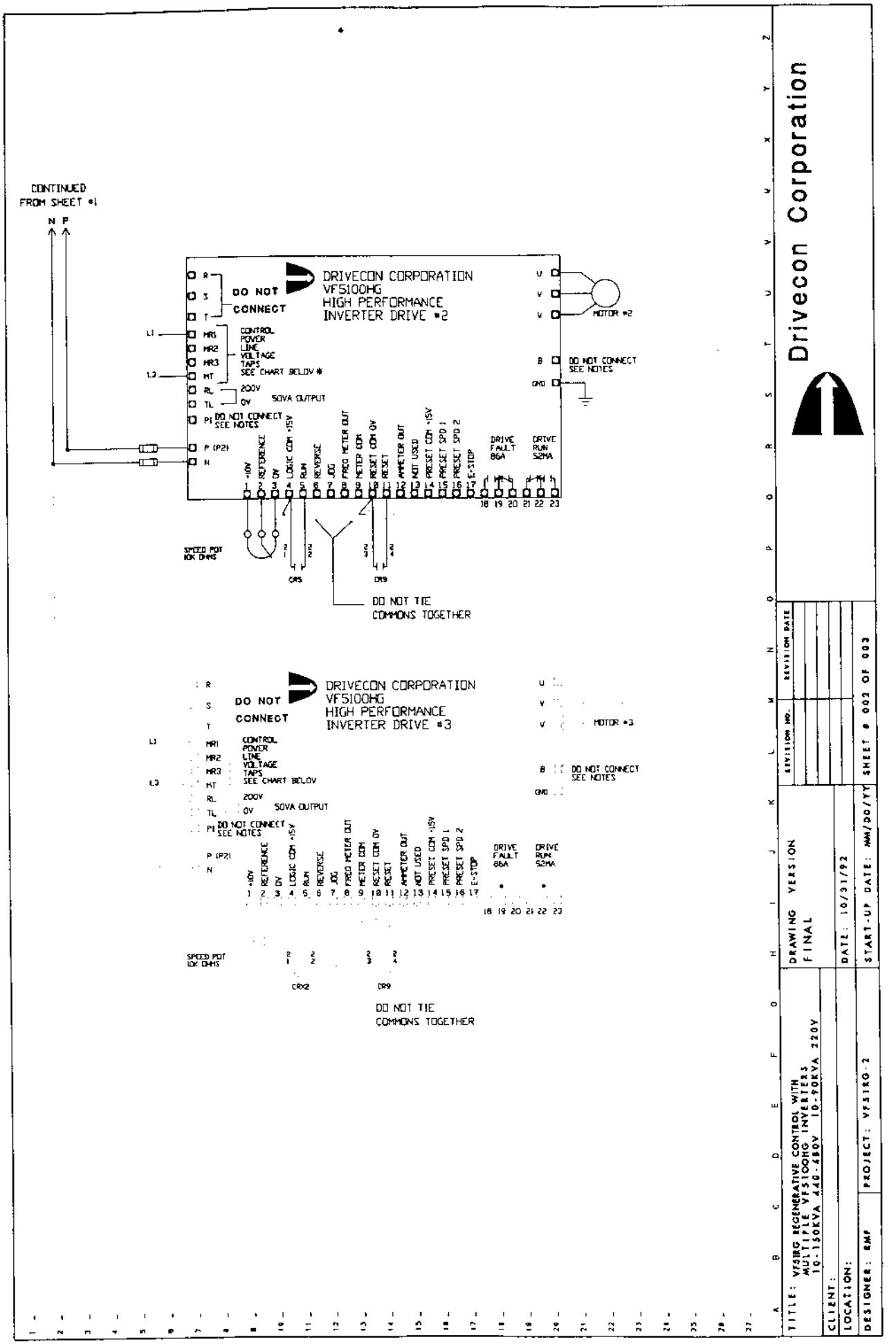
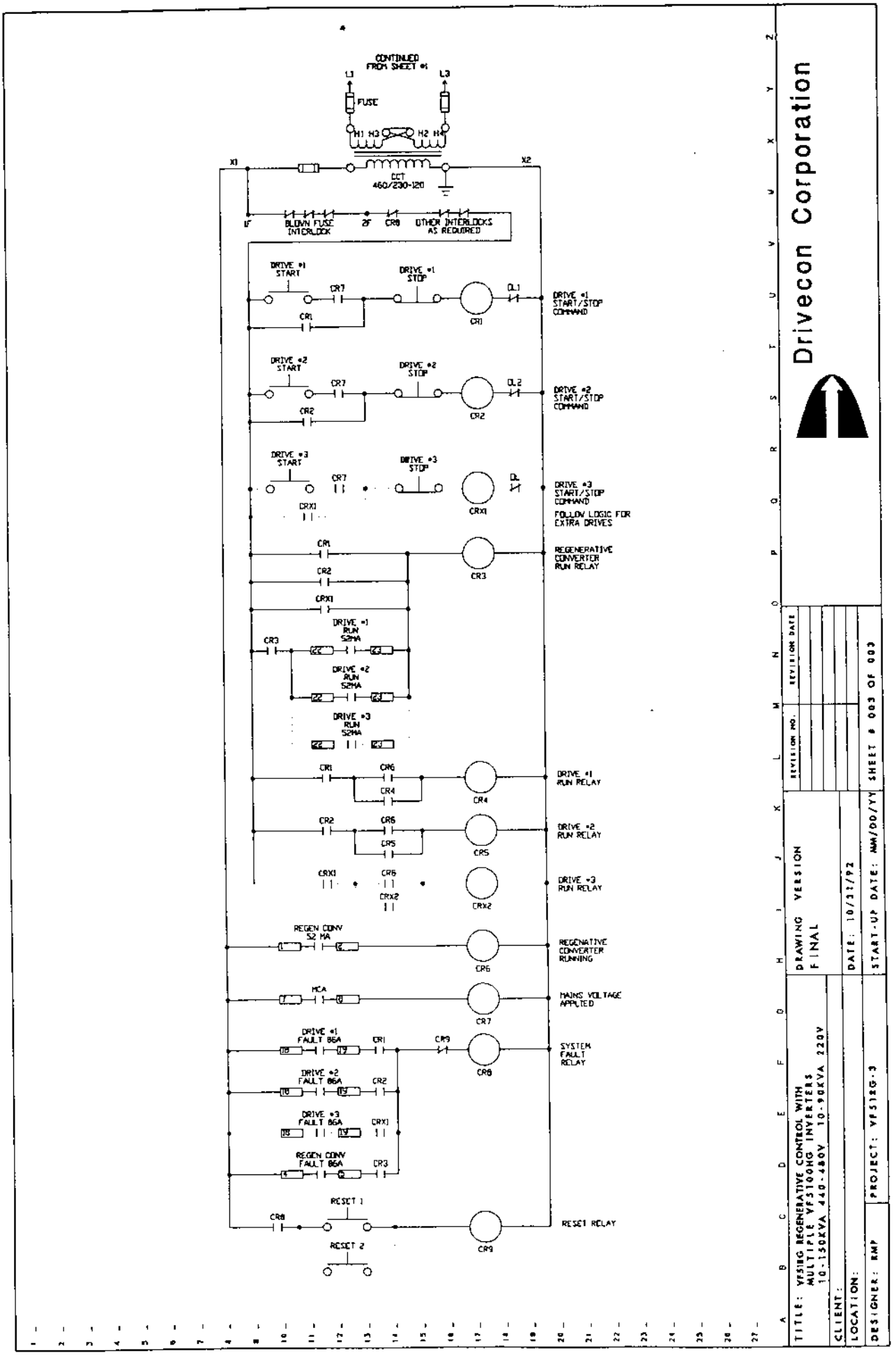
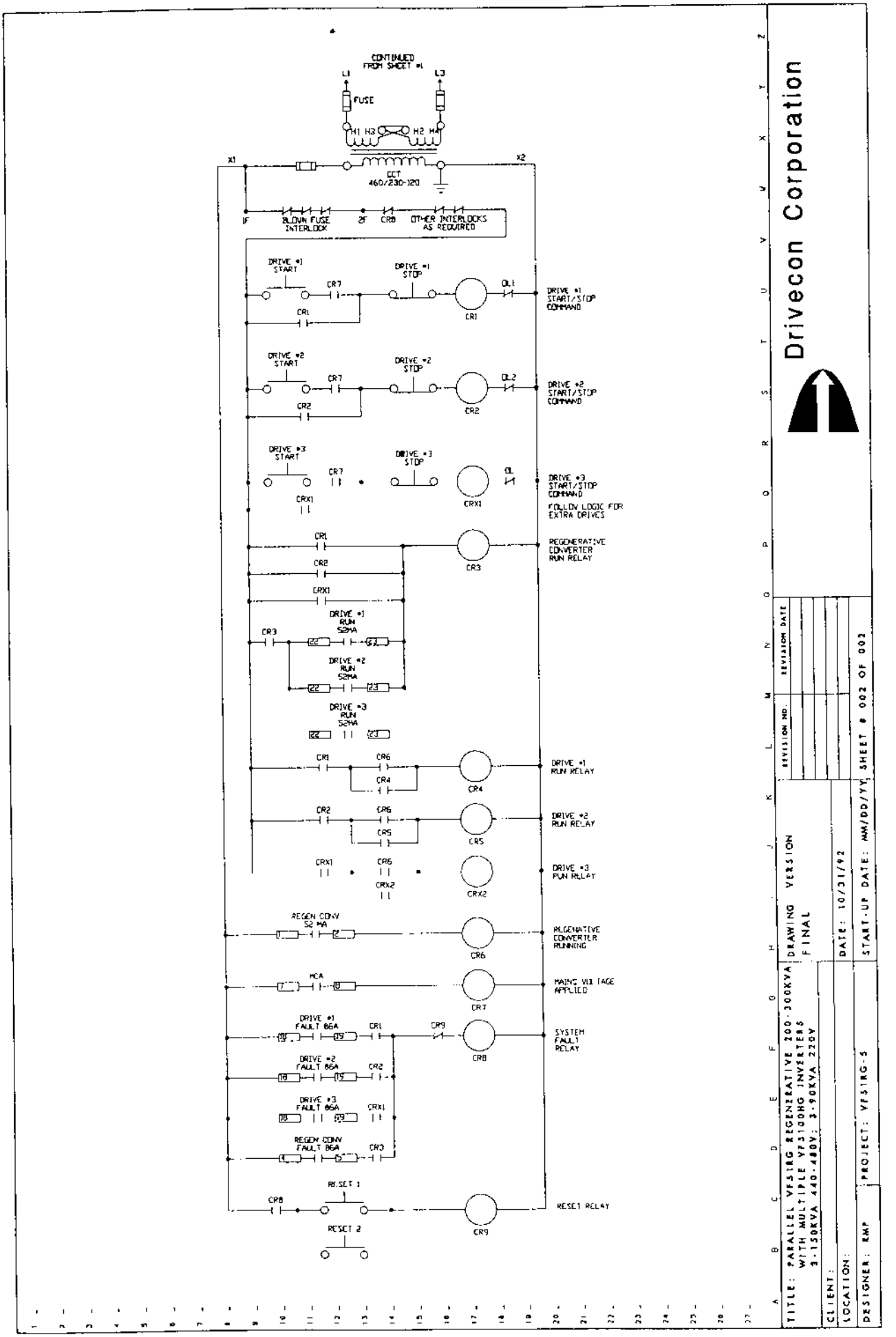
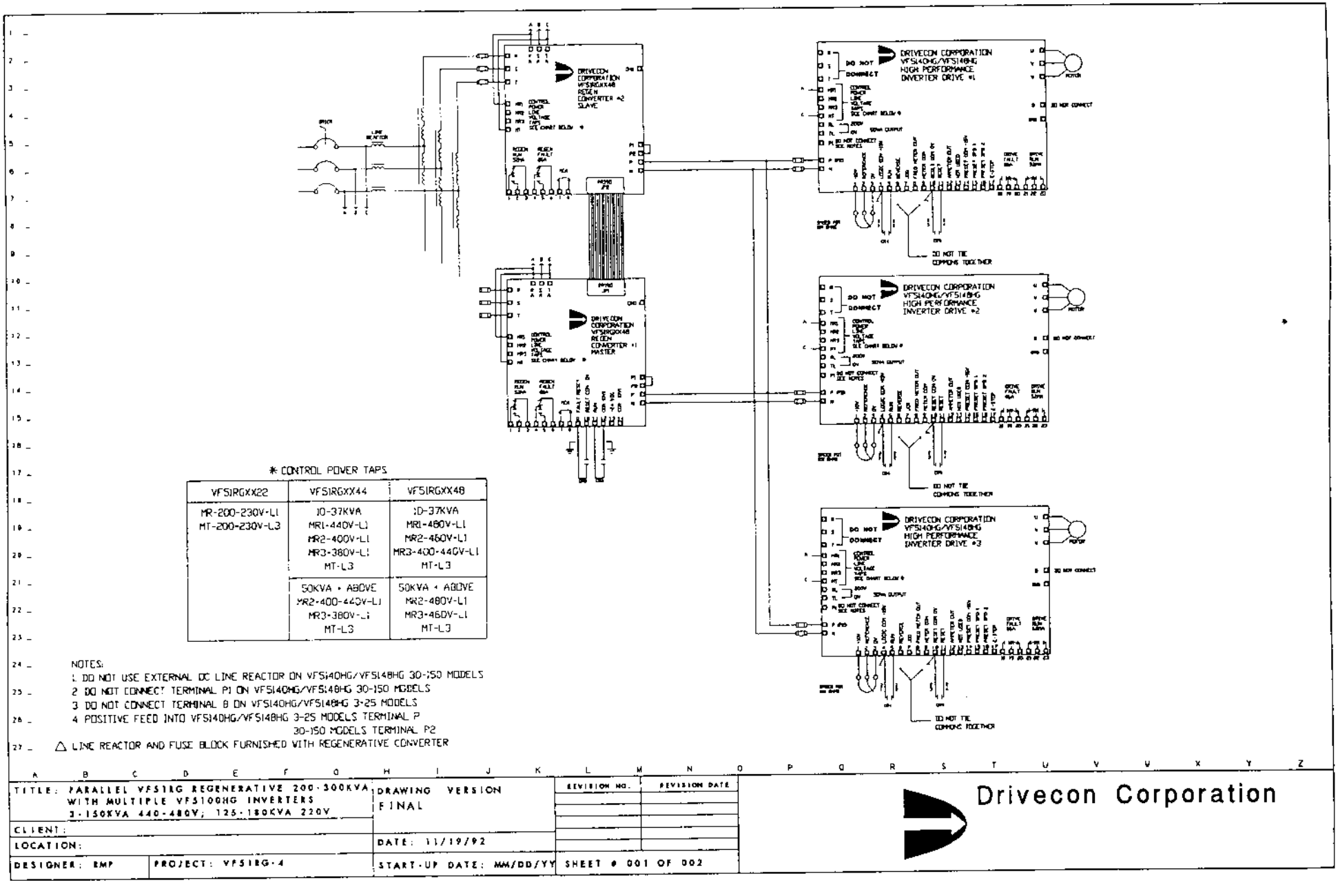

DRIVECON CORPORATION
VFS100HG
HIGH PERFORMANCE
INVERTER DRIVE #1
DO NOT CONNECT
CONTROL POWER LINE VOLTAGE TAPS SEE CHART BELOW *
200V
50VA OUTPUT
DO NOT CONNECT SEE NOTES
DO NOT TIE COMMONS TOGETHER
MOTOR #1
DO NOT CONNECT SEE NOTES
DRIVE RUN 30VA
DRIVE FAULT 86A
SPEED POT 10k OHMS
CONTINUED ON SHEET #2
DRIVECON CORPORATION VFSIRGXXX REGEN CONVERTER
REGEN RUN 30VA
REGEN FAULT 86A
MCA
FAULT RESET
RUN
+24 VDC
+10V
LINE REACTOR
FUSE BLOCK
FUSE 7
FUSE 8
FUSE 9
FUSE 10
DISCONNECT CB
3 PHASE
50 / 60 Hz
OPTIONAL ISOLATION TRANSFORMER
TO INVERTERS
CONTINUED ON SHEET #2
* CONTROL POWER TAPS
VFSIRG022
VFSIRG044
VFSIRG048
MR-200-230V-L1
MT-200-230V-L3
10-37KVA
MR1-440V-L1
MR2-400V-L1
MR3-380V-L1
MT-L3
50KVA + ABOVE
MR2-480V-L1
MR3-460V-L1
MT-L3
10-37KVA
MR1-480V-L1
MR2-460V-L1
MR3-400-440V-L1
MT-L3
50KVA + ABOVE
MR2-480V-L1
MR3-460V-L1
MT-L3
NOTES
1. DO NOT USE EXTERNAL DC LINE REACTOR ON VFS140HG/VFS148HG 30-150 MODELS
2. DO NOT CONNECT TERMINAL P1 ON VFS140HG/VFS148HG 30-150 MODELS
3. DO NOT CONNECT TERMINAL 8 ON VFS140HG/VFS148HG 3-25 MODELS
4. POSITIVE FEED INTO VFS140HG/VFS148HG 3-25 MODELS TERMINAL P
30-150 MODELS TERMINAL P2
△ LINE REACTOR AND FUSE BLOCK FURNISHED WITH REGENERATIVE CONVERTER
TITLE: VFSIRG REGENERATIVE CONTROL WITH MULTIPLE VFS011HG INVERTERS 10-150KVA 440-480V 10-90KVA 220V
DRAWING VERSION FINAL
REVISION NO.
REVISION DATE
CLIENT:
LOCATION:
DATE: 10/31/92
DESIGNER: RMP
PROJECT: VFSIRG-1
START-UP DATE: MM/DD/YY
SHEET # 001 OF 003
Drivecon Corporation


CONTINUED FROM SHEET #1
N P
DRIVECON CORPORATION
VF5100HG
HIGH PERFORMANCE
INVERTER DRIVE #2
DO NOT CONNECT
CONTROL POWER LINE VOLTAGE TAPS SEE CHART BELOW *
200V
0V
50VA OUTPUT
DO NOT CONNECT SEE NOTES
MOTOR #2
DO NOT CONNECT SEE NOTES
+10V
REFERENCE
0V
LOGIC COM +15V
RUN
REVERSE
JOG
FREQ METER OUT
METER COM
RESET COM 0V
RESET
AMMETER OUT
NOT USED
PRESET COM +15V
PRESET SPD 1
PRESET SPD 2
E-STOP
DRIVE FAULT 86A
DRIVE RUN S2MA
SPEED POT 10K OHMS
CR5
CR9
DO NOT TIE COMMONS TOGETHER
DRIVECON CORPORATION
VF5100HG
HIGH PERFORMANCE
INVERTER DRIVE #3
DO NOT CONNECT
CONTROL POWER LINE VOLTAGE TAPS SEE CHART BELOW
200V
0V
50VA OUTPUT
DO NOT CONNECT SEE NOTES
MOTOR #3
DO NOT CONNECT SEE NOTES
CR2
CR9
DO NOT TIE COMMONS TOGETHER
Drivecon Corporation
TITLE: VF5IRG REGENERATIVE CONTROL WITH MULTIPLE VF5100HG INVERTERS 10-150KVA 440-480V 10-90KVA 220V
CLIENT:
LOCATION:
DESIGNER: RMF
PROJECT: VF5IRG-2
DRAWING VERSION FINAL
DATE: 10/31/92
START-UP DATE: MM/DD/YY
REVISION NO.
REVISION DATE
SHEET # 002 OF 003


CONTINUED FROM SHEET #1
L1
L3
FUSE
H1 H3
H2 H4
X1
X2
CCT 460/230-120
1F
BLOWN FUSE INTERLOCK
2F
CR8
OTHER INTERLOCKS AS REQUIRED
DRIVE #1 START
DRIVE #1 STOP
CR7
CR1
DL1
DRIVE #1 START/STOP COMMAND
DRIVE #2 START
DRIVE #2 STOP
CR2
DL2
DRIVE #2 START/STOP COMMAND
DRIVE #3 START
DRIVE #3 STOP
CRX1
DRIVE #3 START/STOP COMMAND
FOLLOW LOGIC FOR EXTRA DRIVES
REGENERATIVE CONVERTER RUN RELAY
CR3
DRIVE #1 RUN S2MA
DRIVE #2 RUN S2MA
DRIVE #3 RUN S2MA
CR6
CR4
DRIVE #1 RUN RELAY
CR5
DRIVE #2 RUN RELAY
CRX2
DRIVE #3 RUN RELAY
REGEN CONV S2 MA
REGENERATIVE CONVERTER RUNNING
MCA
CR7
MAINS VOLTAGE APPLIED
DRIVE #1 FAULT 86A
CR9
CR8
SYSTEM FAULT RELAY
DRIVE #2 FAULT 86A
DRIVE #3 FAULT 86A
REGEN CONV FAULT 86A
RESET 1
RESET 2
RESET RELAY
Drivecon Corporation
TITLE: VFS1RG REGENERATIVE CONTROL WITH MULTIPLE VFS100HG INVERTERS 10-150KVA 440-480V 10-90KVA 220V
CLIENT:
LOCATION:
DESIGNER: RMP
PROJECT: VFS1RG-3
DRAWING VERSION FINAL
DATE: 10/31/92
START-UP DATE: MM/DD/YY
REVISION NO.
REVISION DATE
SHEET # 003 OF 003


CONTINUED FROM SHEET #1
L1
L3
FUSE
H1 H3
H2 H4
X1
X2
CCT 460/230-120
IF
BLOWN FUSE INTERLOCK
2F
CR8
OTHER INTERLOCKS AS REQUIRED
DRIVE #1 START
DRIVE #1 STOP
CR7
CR1
OL1
DRIVE #1 START/STOP COMMAND
DRIVE #2 START
DRIVE #2 STOP
CR7
CR2
OL2
DRIVE #2 START/STOP COMMAND
DRIVE #3 START
DRIVE #3 STOP
CR7
CRX1
OL
DRIVE #3 START/STOP COMMAND
FOLLOW LOGIC FOR EXTRA DRIVES
CR1
CR2
CRX1
CR3
REGENERATIVE CONVERTER RUN RELAY
DRIVE #1 RUN S2MA
DRIVE #2 RUN S2MA
DRIVE #3 RUN S2MA
CR1
CR6
CR4
CR4
DRIVE #1 RUN RELAY
CR2
CR6
CR5
CR5
DRIVE #2 RUN RELAY
CRX1
CR6
CRX2
CRX2
DRIVE #3 RUN RELAY
REGEN CONV S2 MA
CR6
REGENERATIVE CONVERTER RUNNING
MCA
CR7
MAINS VOLTAGE APPLIED
DRIVE #1 FAULT 86A
CR1
CR9
DRIVE #2 FAULT 86A
CR2
DRIVE #3 FAULT 86A
CRX1
REGEN CONV FAULT 86A
CR3
CR8
SYSTEM FAULT RELAY
RESET 1
CR8
RESET 2
CR9
RESET RELAY
Drivecon Corporation
TITLE: PARALLEL VFS1RG REGENERATIVE 200-300KVA WITH MULTIPLE VFS100HG INVERTERS 3-150KVA 440-480V; 3-90KVA 220V
DRAWING VERSION FINAL
CLIENT:
LOCATION:
DESIGNER: RMP
PROJECT: VFS1RG-S
DATE: 10/31/92
START-UP DATE: MM/DD/YY
SHEET # 002 OF 002
REVISION NO.
REVISION DATE



* CONTROL POWER TAPS

VFS1RGXX22	VFS1RGXX44	VFS1RGXX48
MR-200-230V-L1 MT-200-230V-L3	10-37KVA MR1-440V-L1 MR2-400V-L1 MR3-380V-L1 MT-L3	10-37KVA MR1-460V-L1 MR2-460V-L1 MR3-400-440V-L1 MT-L3
	50KVA + ABOVE MR2-400-440V-L1 MR3-380V-L1 MT-L3	50KVA + ABOVE MR2-480V-L1 MR3-460V-L1 MT-L3

NOTES:

1. DO NOT USE EXTERNAL DC LINE REACTOR ON VFS140HG/VFS148HG 30-150 MODELS
2. DO NOT CONNECT TERMINAL P1 ON VFS140HG/VFS148HG 30-150 MODELS
3. DO NOT CONNECT TERMINAL B ON VFS140HG/VFS148HG 3-25 MODELS
4. POSITIVE FEED INTO VFS140HG/VFS148HG 3-25 MODELS TERMINAL P
   30-150 MODELS TERMINAL P2

△ LINE REACTOR AND FUSE BLOCK FURNISHED WITH REGENERATIVE CONVERTER

TITLE: PARALLEL VFS1RG REGENERATIVE 200-300KVA WITH MULTIPLE VFS100HG INVERTERS 3-150KVA 440-480V; 125-180KVA 220V	DRAWING VERSION: FINAL	REVISION NO.	REVISION DATE
CLIENT:			
LOCATION:	DATE: 11/19/92		
DESIGNER: RMP / PROJECT: VFS1RG-4	START-UP DATE: MM/DD/YY	SHEET # 001 OF 002	

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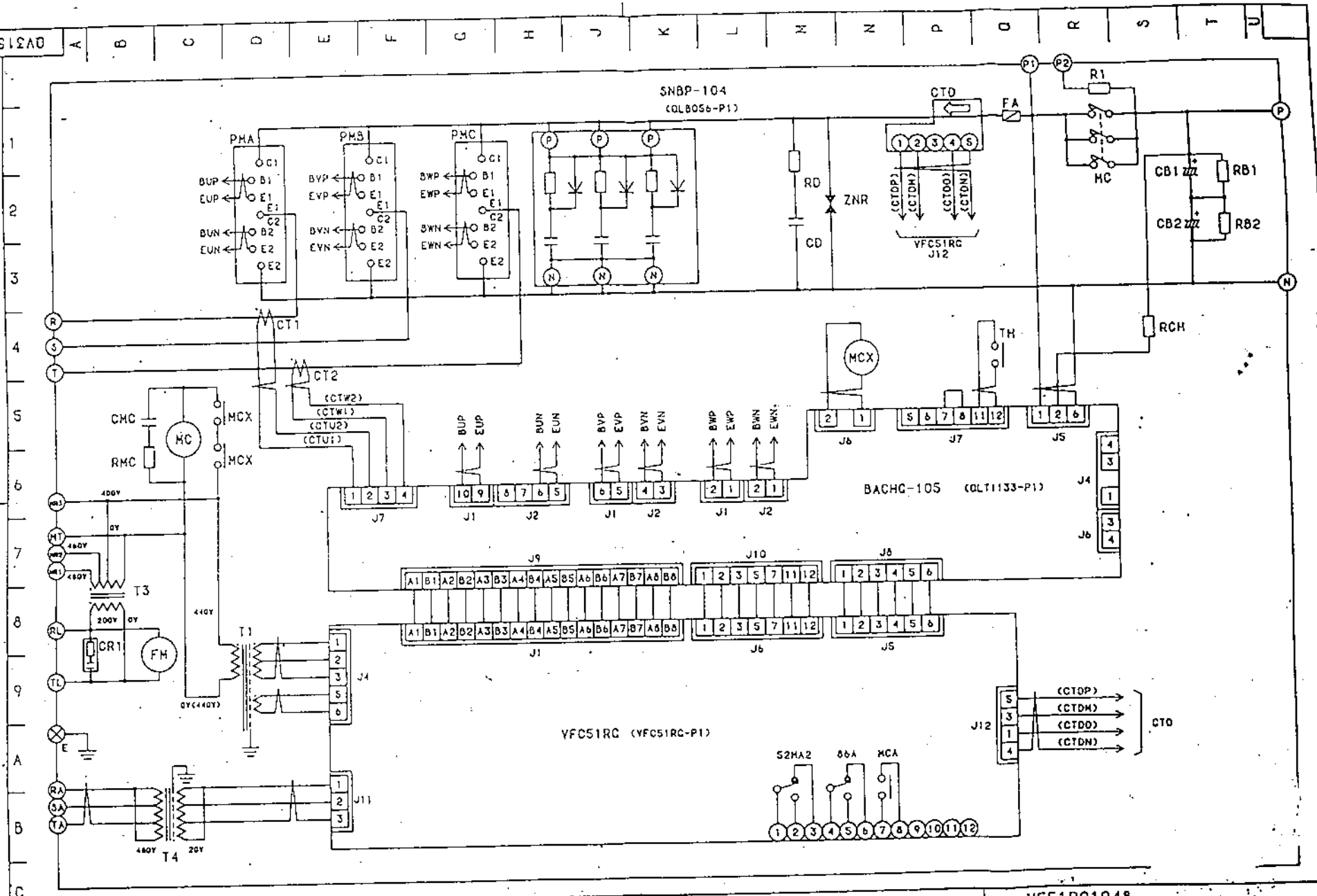

MANUFACTURED EXCLUSIVELY FOR:
Drivecon Corporation

VF51RG1048

DWG.NO. QV315606

REV.NAR

3-3 Regeneration Converter Circuit Composition.

VF51RG's circuit composition is shown below.

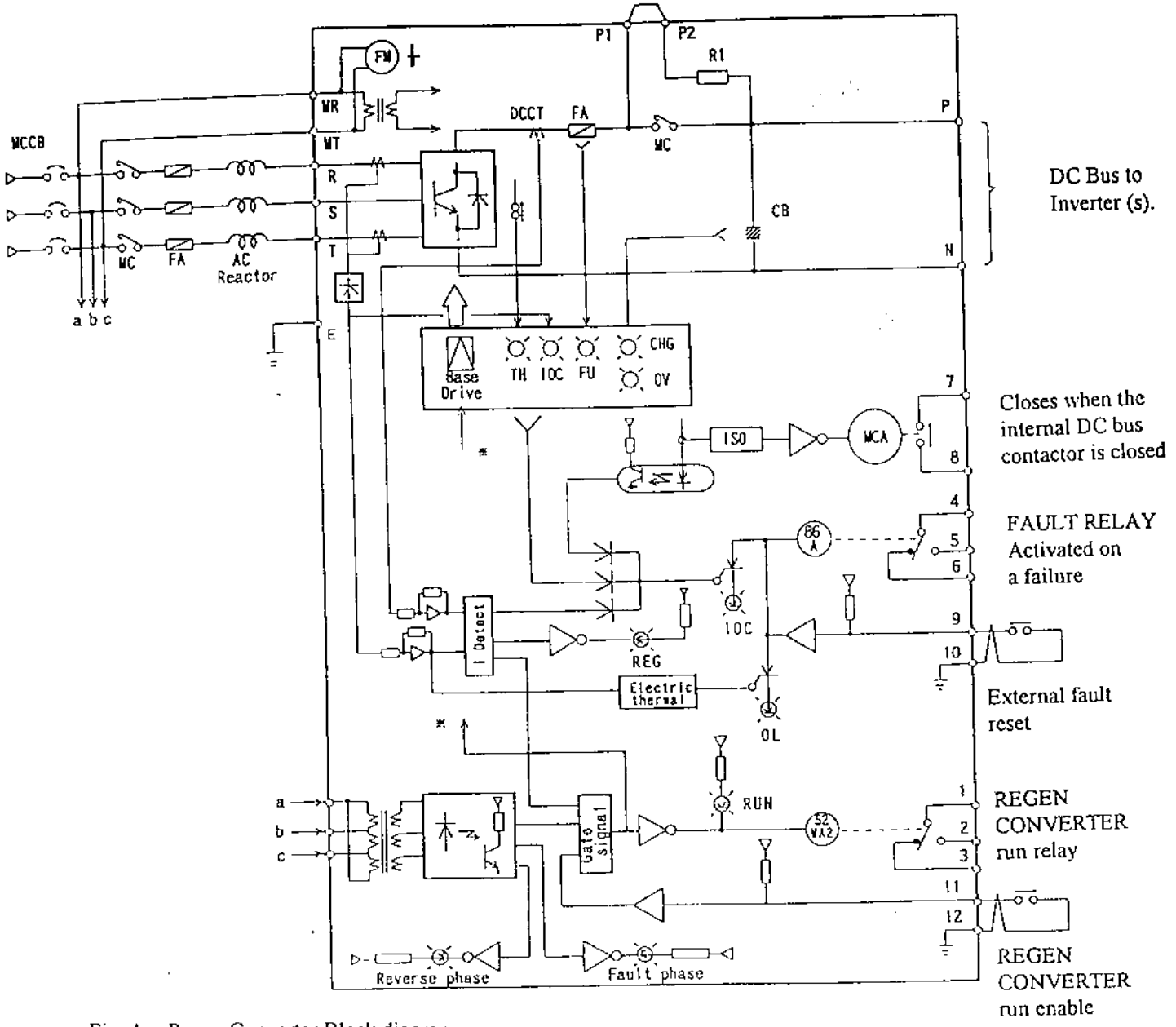

Fig. 4 Regen Converter Block diagram.

Note 1: The block diagram above refers to the 440V series of Regenerative Converters. The control power terminals labeled MR and MT reflect the connections for a 440v class regen converter. The designations are different for 230v and 460v units. For detailed connection information refer to page 16 and 18 of the instruction manual.

Control terminals 1 through 14 are arranged and function identically for every class of regen converter.

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