Voltage To Frequency Module

Instruction Manual
VTF230-000
VTF230-001

CAROTRON

Driven by Excellence

D.C. DRIVES, A.C. INVERTERS,
SOLID STATE STARTERS, SYSTEM INTERFACE
CIRCUITS AND ENGINEERED SYSTEMS

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1 General Description

Model VTF230-XXX (Voltage to Frequency Module) is designed to provide a means of converting analog signals to a digital pulse train. The module will accept a voltage and/or a process current input (the signals are summed together internally). A +10VDC power supply is provided to allow a potentiometer to be easily connected as the input. Calibration of the minimum and maximum analog levels is accomplished by a contact closure connected to the Teach input terminal.

After the signals are summed, an adjustable ramp time of 0 to 60s can be applied via the accel and decel potentiometers. The reference is enabled via a contact closure connected to the Enable input terminal.

The frequency output is generated via an open collector transistor output. The minimum and maximum frequency output levels can be set via the GAIN and BIAS potentiometers. An optional pull-up resistor is also provided on board.

2 Specifications

2.1 Electrical

D.C. Power Input
- 24 VDC ±10%, 60mA max, internally fused

Voltage Input
- Range: 0-10VDC
- Input Impedance: 10^{12} Ω

Current Input
- Range: 0-20mA DC
- Input Impedance: 250 Ohms

Frequency Output
- Range:
  VTF230-000: 0 to 50 kHz
  VTF230-001: 0 to 1 kHz
- Max Current (sink): 20mA
- Max Voltage: 24V

Pull-up Resistor
- 10kΩ to +15VDC

Potentiometers
- Turns: 15
- Accel/Decel Range: 0 to 60s
- Bias Range:
  VTF230-000: 0 to 5 kHz
  VTF230-001: 0 to 100 Hz
- Gain Range:
  VTF230-000: 0 to 50 kHz
  VTF230-001: 0 to 1 kHz

Temperature Range
- 0-55ºC

2.2 Physical

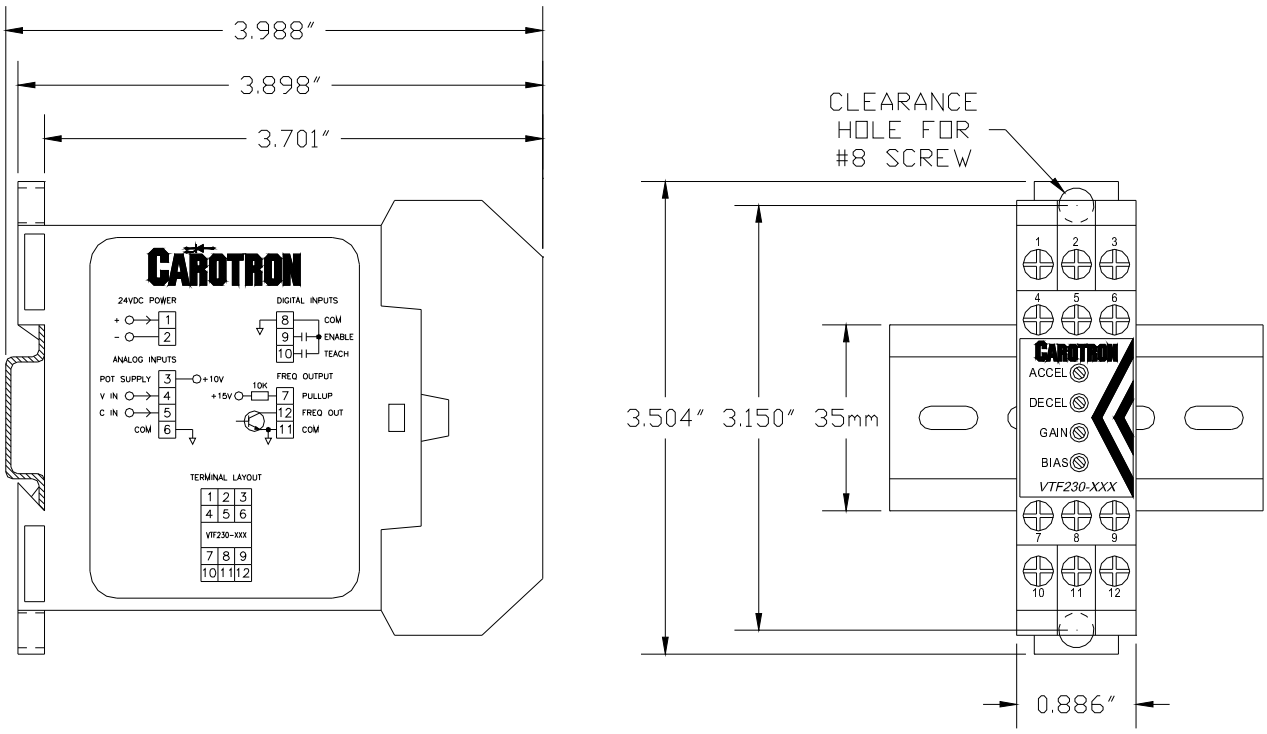


Figure 1: Physical Dimensions

3 Installation

3.1 Wiring Guidelines

To prevent electrical interference and to minimize start-up problems, adhere to the following guidelines:

Use fully insulated and shielded cable for all signal wiring. The shield should be connected to circuit common at one end only. The other end of the shield should be clipped and insulated to prevent the possibility of accidental grounding.

Signal level wiring such as listed above should be routed separately from high level power wiring (such as the A.C. line, motor, operator control, and relay control wiring). When these two types of wire must cross, they should cross at right angles to each other.

Any relay, contactor, starter, solenoid or other electro-mechanical device located in close proximity to or on the same line supply as the VTF230-XXX should have a transient suppression device such as an MOV or R-C snubber connected in parallel with its coil. The suppressor should have short leads and be connected as close to the coil as possible.

3.2 Signal Connections

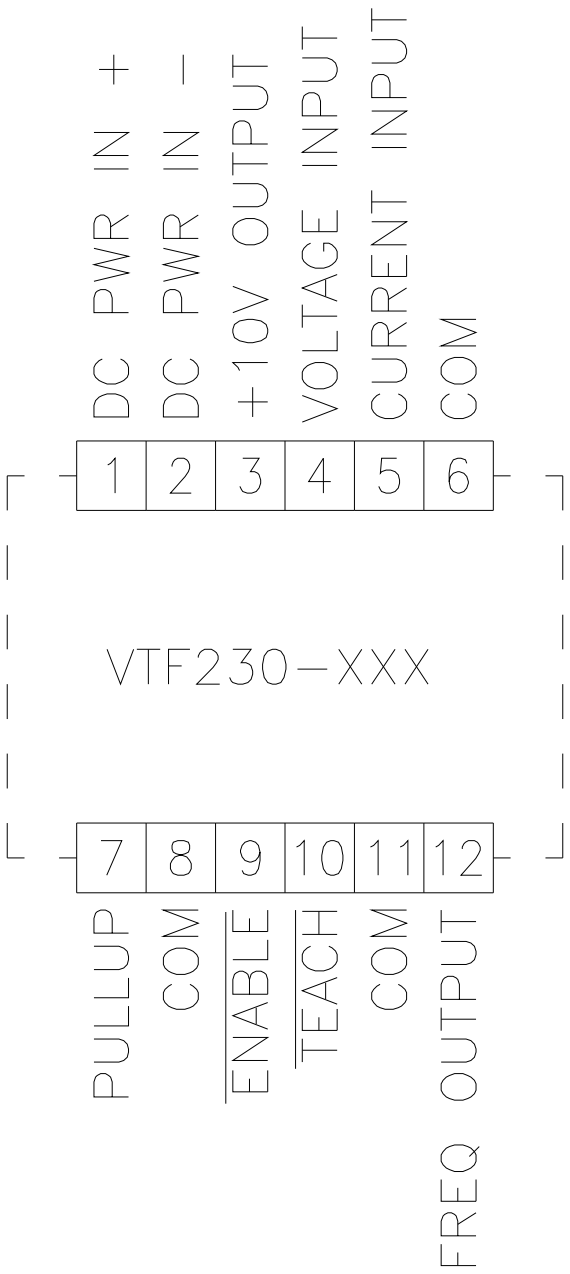


Figure 2: General Connections

4 Description of Adjustments

TEACH Input
This input is used to calibrate (or teach) the module the min and max analog input levels. A contact (or switch) closure from the teach input to common will teach the module the first calibration level. Opening the contact will teach the module a second calibration level. The slope of the frequency output is controlled by the order in which the analog levels are taught.

ENABLE Input
This input is used to enable the reference to the ramp block. When this input is connected to common, the frequency output level ramps up to a level based on the analog inputs and the GAIN potentiometer. When this input opens, the frequency output level ramps down to the level set by the BIAS potentiometer.

ACCEL Potentiometer
This adjustment is used to set the amount of time that the frequency output takes to increase from minimum output to maximum output. Range is from 0 to 60s.

DECEL Potentiometer
This adjustment is used to set the amount of time that the frequency output takes to decrease from maximum output to minimum output. Range is from 0 to 60s.

GAIN Potentiometer
This adjustment is used to set the maximum output frequency level. Range is 0 to 50 kHz on -000 models and 0 to 1 kHz on -001 models.

BIAS Potentiometer
This adjustment is used to set the minimum output frequency level. Range is 0 to 5 kHz on -000 models and 0 to 100 Hz on -001 models.

5 Adjustment Procedure

WARNING! DURING CALIBRATION, THE VTF230-XXX MODULE WILL PRODUCE A FREQ OUTPUT. PLEASE DISCONNECT ANY EQUIPMENT FROM THE MODULE THAT COULD BE DAMAGED OR CAUSE INJURY DURING THIS PROCESS.

Step 1: Connections

1. Make connections per drawing C13692. Typically, a single voltage or current input signal is used. However, if desired, both a voltage and current can be used simultaneously. Internally, the levels from each input are summed together. Note that a temporary contact/switch connection is required between Terminals 8 and 10 for teaching the min and max analog input levels. The switch should initially be in the open position.

2. Apply power to the VTF230-XXX Module.

Step 2: Teach Analog Levels

1. The VTF230-XXX is capable of producing a frequency output with either a positive or negative slope (refer to Figure 3). A positive slope (solid line) is obtained by teaching the minimum analog level first, followed by the maximum analog level. A negative slope (dashed line) is obtained by teaching the maximum analog level first, followed by the minimum analog level.
2. Apply to terminals 4 and/or 5 the analog level that corresponds to the minimum frequency output from the VTF230-XXX module. Close the Teach switch between terminals 8 and 10 to capture this analog level.
3. Apply to terminals 4 and/or 5 the analog level that corresponds to the maximum frequency output from the VTF230-XXX module. Open the Teach switch between terminals 8 and 10 to capture this analog level.

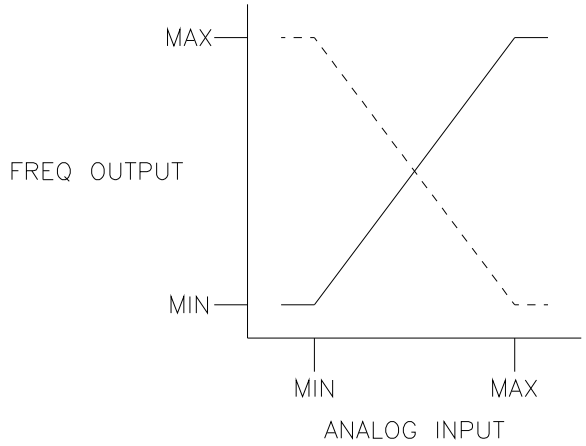


Figure 3: Analog Output Slope

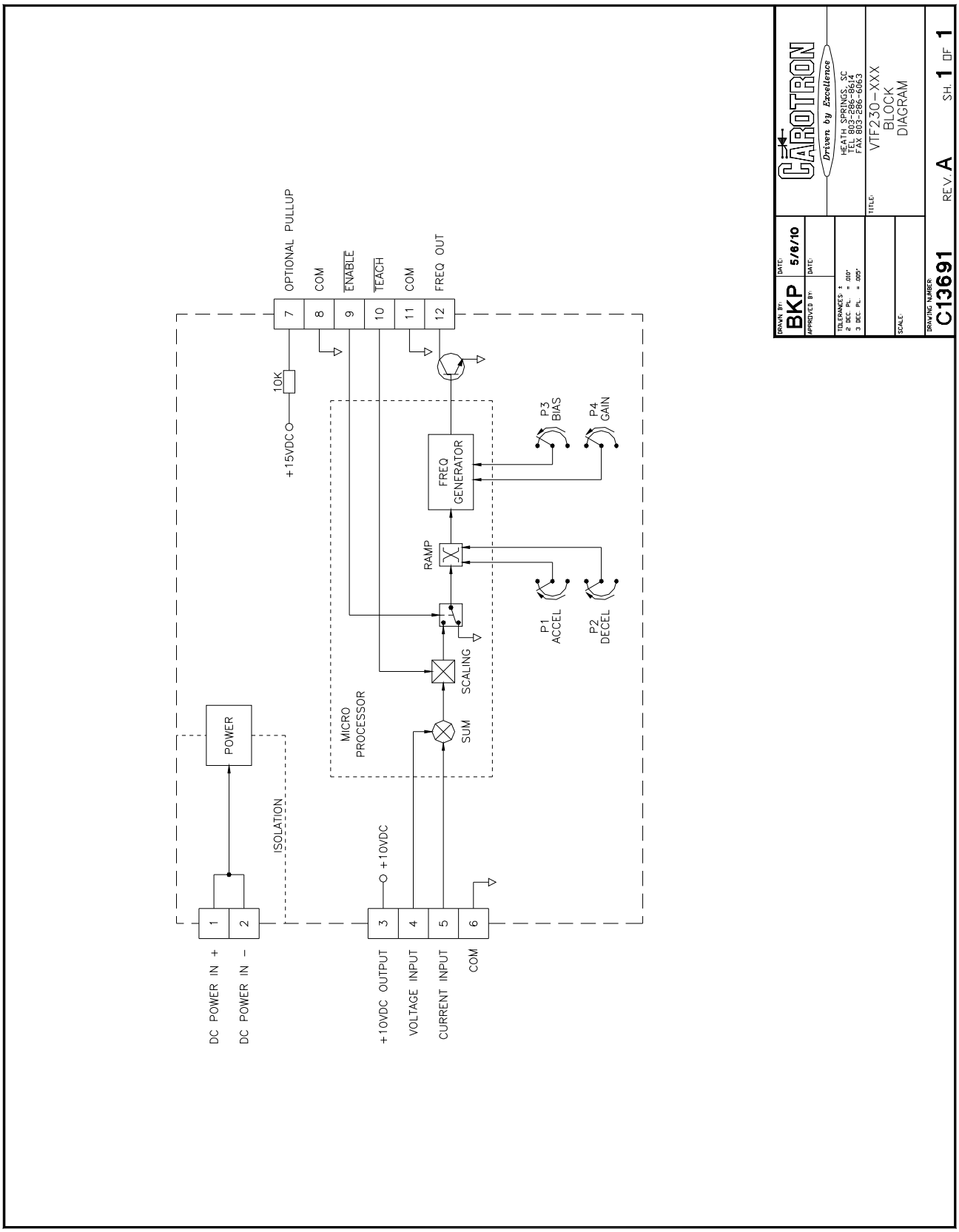
Step 3: Set Min/Max Frequency Levels

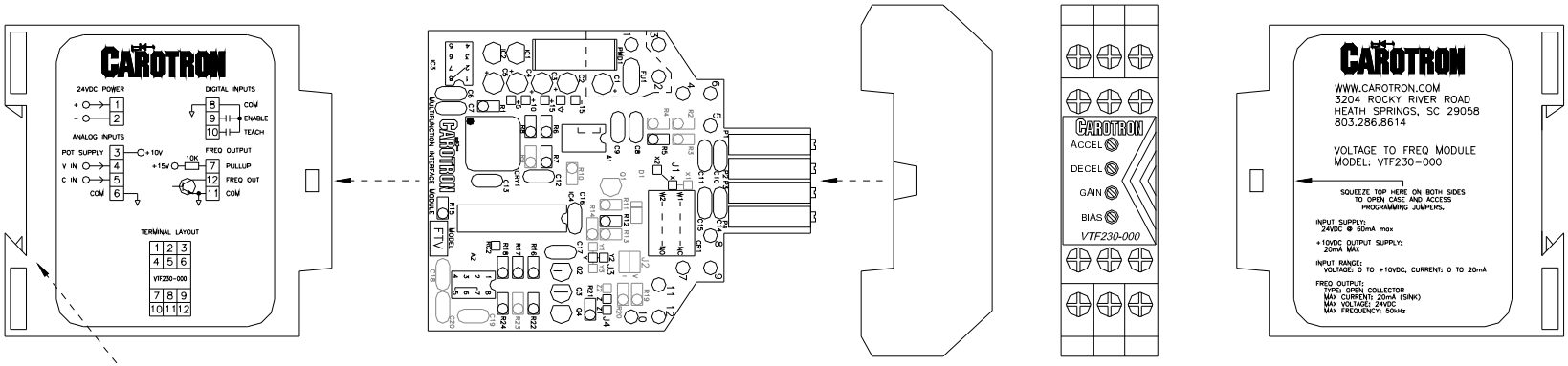
1. In the following steps, a multimeter that can measure frequency will be required for precise setup. Furthermore, since the output of the module is an open collector transistor, the output (terminal 12) must be connected to a voltage supply through the load in order to measure the output frequency. If needed, Terminal 7 provides a pull-up resistor to +15VDC that can serve as the load by connecting Terminal 7 to Terminal 12.
2. With the Enable contact open, adjust the BIAS potentiometer until the desired minimum frequency is obtained on Terminal 12. If zero Hertz is desired, adjust BIAS potentiometer clockwise until an output is obtained. Next, slowly rotate BIAS counter clockwise until the output just reaches zero Hertz.
3. Apply the analog level that corresponds to the maximum frequency output. Close the Enable contact between Terminals 8 & 9 to cause the output frequency to ramp up from minimum to maximum. Adjust the GAIN potentiometer until the maximum desired output frequency level is obtained. Open the Enable contact.

Step 4: Set Accel/Decel Times

1. Apply the analog level that corresponds to maximum frequency output.
2. Close the Enable contact and make note of the time it takes for the frequency output to ramp up from minimum to maximum. Adjust the ACCEL potentiometer clockwise to increase the time and counter-clockwise to decrease the time.
3. Open the Enable contact and make note of the time it takes for the frequency output to ramp down from maximum to minimum. Adjust the DECEL potentiometer clockwise to increase the time and counter-clockwise to decrease the time.

6 Prints

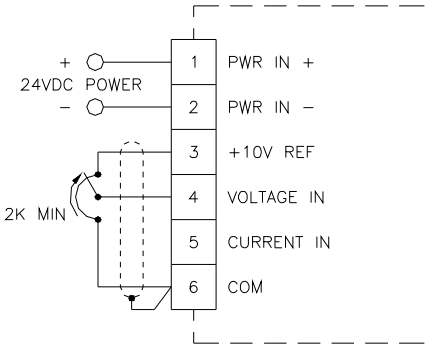

OPTIONAL PULLUP
COM
ENABLE
TEACH
COM
FREQ OUT
7
8
9
10
11
12
10K
+15VDC
P3 BIAS
P4 GAIN
FREQ GENERATOR
RAMP
P1 ACCEL
P2 DECEL
SCALING
SUM
MICRO PROCESSOR
POWER
ISOLATION
+10VDC
1
2
3
4
5
6
DC POWER IN +
DC POWER IN –
+10VDC OUTPUT
VOLTAGE INPUT
CURRENT INPUT
COM
DRAWN BY: BKP
DATE: 5/18/10
APPROVED BY:
DATE:
TOLERANCES: 2 DEC PL. = .010" 3 DEC PL. = .005"
SCALE:
GAROTRON
Driven by Excellence
HEATH SPRINGS, SC
TEL 803-286-8614
FAX 803-286-6063
TITLE: VTF230-XXX BLOCK DIAGRAM
DRAWING NUMBER: C13691
REV. A
SH. 1 OF 1



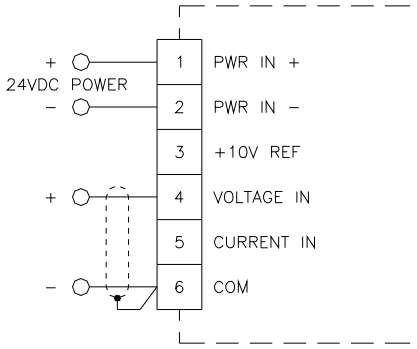
NOTE ORIENTATION OF ENCLOSURE BASE

DRAWN BY: BKP	DATE: 5/14/10	CAROTRON Driven by Excellence
APPROVED BY:	DATE:	HEATH SPRINGS, SC TEL 803-286-8614 FAX 803-286-6063
TOLERANCES: ± 2 DEC. PL. = .010" 3 DEC. PL. = .005"		TITLE: VOLTAGE TO FREQUENCY MODULE VTF230-000 ASSEMBLY
SCALE:		
DRAWING NUMBER: C13696	REV. A	SH. 1 OF 1

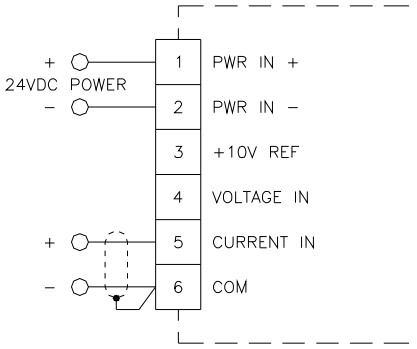
POTENTIOMETER INPUT



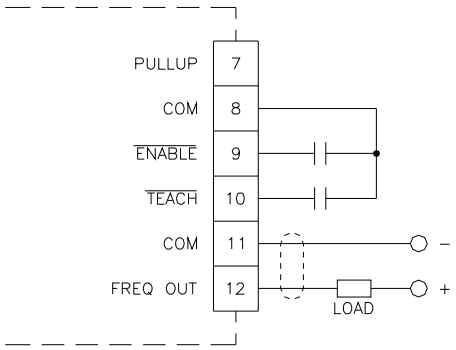
VOLTAGE INPUT



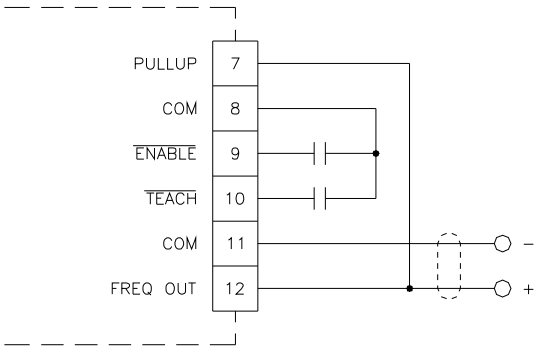
CURRENT INPUT



SINKING OUTPUT



SOURCING OUTPUT



DRAWN BY: BKP	DATE: 5/17/2010
APPROVED BY:	DATE:
TOLERANCES: ± 2 DEC. PL. = .010" 3 DEC. PL. = .005"	
SCALE:	
DRAWING NUMBER: C13692	REV. A

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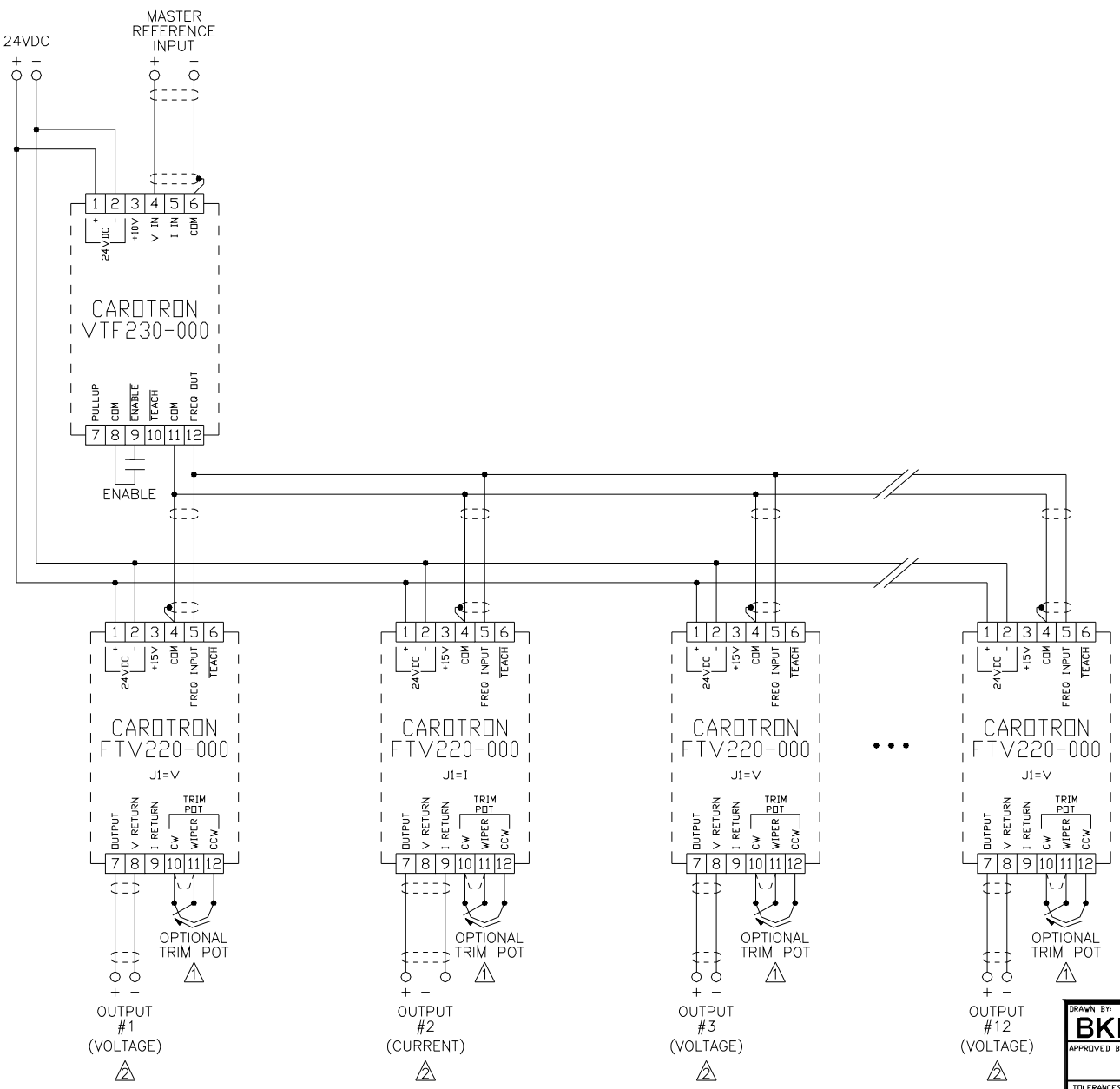
TEL 803-286-8614
FAX 803-286-6063

TITLE: VTF230-XXX GENERAL CONNECTIONS

SH. 1 OF 1



1. IF TRIM POTENTIOMETER IS NOT USED, JUMPER TERMINALS 10 TO 11.
2. EACH OUTPUT CAN BE CONFIGURED FOR EITHER VOLTAGE OR CURRENT. EACH OUTPUT IS ELECTRICALLY ISOLATED FROM THE INPUT AND THE OTHER OUTPUTS.

DRAWN BY: BKP	DATE: 6/2/10
APPROVED BY:	DATE:
TOLERANCES: ± 2 DEC. PL. = .010" 3 DEC. PL. = .005"	
SCALE:	
DRAWING NUMBER: C13698	REV. A

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TITLE: MASTER REFERENCE USING A VTF230-000 AND MULTIPLE FTV220-000

SH. 1 OF 1

7 Standard Terms & Conditions of Sale

1. General
The Standard Terms and Conditions of Sale of Carotron, Inc. (hereinafter called "Company") are set forth as follows in order to give the Company and the Purchaser a clear understanding thereof. No additional or different terms and conditions of sale by the Company shall be binding upon the Company unless they are expressly consented to by the Company in writing. The acceptance by the Company of any order of the Purchaser is expressly conditioned upon the Purchaser's agreement to said Standard Terms and Conditions. The acceptance or acknowledgement, written, oral, by conduct or otherwise, by the Company of the Purchaser's order shall not constitute written consent by the Company to addition to or change in said Standard Terms and Conditions.

2. Prices
Prices, discounts, allowances, services and commissions are subject to change without notice. Prices shown on any Company published price list and other published literature issued by the Company are not offers to sell and are subject to express confirmation by written quotation and acknowledgement. All orders of the Purchaser are subject to acceptance, which shall not be effective unless made in writing by an authorized Company representative at its office in Heath Springs, S.C. The Company may refuse to accept any order for any reason whatsoever without incurring any liability to the Purchaser. The Company reserves the right to correct clerical and stenographic errors at any time.

3. Shipping dates
Quotation of a shipping date by the Company is based on conditions at the date upon which the quotation is made. Any such shipping date is subject to change occasioned by agreements entered into previous to the Company's acceptance of the Purchaser's order, governmental priorities, strikes, riots, fires, the elements, explosion, war, embargoes, epidemics, quarantines, acts of God, labor troubles, delays of vendors or of transportation, inability to obtain raw materials, containers or transportation or manufacturing facilities or any other cause beyond the reasonable control of the Company. In no event shall the Company be liable for consequential damages for failure to meet any shipping date resulting from any of the above causes or any other cause.

In the event of any delay in the Purchaser's accepting shipment of products or parts in accordance with scheduled shipping dates, which delay has been requested by the Purchaser, or any such delay which has been caused by lack of shipping instructions, the Company shall store all products and parts involved at the Purchaser's risk and expense and shall invoice the Purchaser for the full contract price of such products and parts on the date scheduled for shipment or on the date on which the same is ready for delivery, whichever occurs later.

4. Warranty
The Company warrants to the Purchaser that products manufactured or parts repaired by the Company, will be free, under normal use and maintenance, from defects in material and workmanship for a period of one (1) year after the shipment date from the Company's factory to the Purchaser. The Company makes no warranty concerning products manufactured by other parties.

As the Purchaser's sole and exclusive remedy under said warranty in regard to such products and parts, including but not limited to remedy for consequential damages, the Company will at its option, repair or replace without charge any product manufactured or part repaired by it, which is found to the Company's satisfaction to be so defective; provided, however, that (a) the product or part involved is returned to the Company at the location designated by the Company, transportation charges prepaid by the Purchaser; or (b) at the Company's option the product or part will be repaired or replaced in the Purchaser's plant; and also provided that Cc) the Company is notified of the defect within one (1) year after the shipment date from the Company's factory of the product or part so involved.

The Company warrants to the Purchaser that any system engineered by it and started up under the supervision of an authorized Company representative will, if properly installed, operated and maintained, perform in compliance with such system's written specifications for a period of one (1) year from the date of shipment of such system.

As the Purchaser's sole and exclusive remedy under said warrant in regard to such systems, including but not limited to remedy for consequential damages, the Company will, at its option, cause, without charges any such system to so perform, which system is found to the Company's satisfaction to have failed to so perform, or refund to the Purchaser the purchase price paid by the Purchaser to the Company in regard thereto; provided, however, that (a) Company and its representatives are permitted to inspect and work upon the system involved during reasonable hours, and (b) the Company is notified of the failure within one (1) year after date of shipment of the system so involved.

The warranties hereunder of the Company specifically exclude and do not apply to the following:

a. Products and parts damaged or abused in shipment without fault of the Company.

b. Defects and failures due to operation, either intentional or otherwise, (l) above or beyond rated capacities, (2) in connection with equipment not recommended by the Company, or (3) in an otherwise improper manner.

c. Defects and failures due to misapplication, abuse, improper installation or abnormal conditions of temperature, humidity, abrasives, dirt or corrosive matter.

d. Products, parts and systems which have been in any way tampered with or altered by any party other than an authorized Company representative.

e. Products, parts and systems designed by the Purchaser.

f. Any party other than the Purchaser.

The Company makes no other warranties or representation, expressed or implied, of merchantability and of fitness for a particular purpose, in regard to products manufactured, parts repaired and systems engineered by it.

5. Terms of payment
Standard terms of payment are net thirty (30) days from date of the Company invoice. For invoice purposed, delivery shall be deemed to be complete at the time the products, parts and systems are shipped from the Company and shall not be conditioned upon the start up thereof. Amounts past due are subject to a service charge of 1.5% per month or fraction thereof.

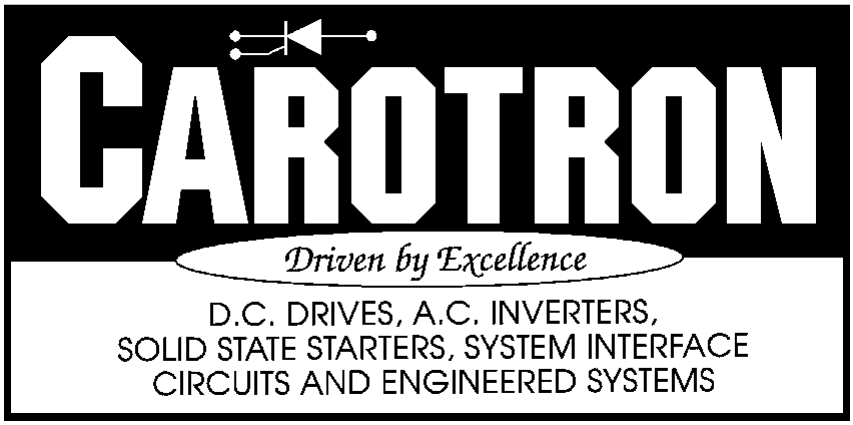
6. Order cancellation
Any cancellation by the Purchaser of any order or contract between the Company and the Purchaser must be made in writing and receive written approval of an authorized Company representative at its office in Heath Springs, S.C. In the event of any cancellation of an order by either party, the Purchaser shall pay to the Company the reasonable costs, expenses, damages and loss of profit of the Company incurred there by, including but not limited to engineering expenses and expenses caused by commitments to the suppliers of the Company's subcontractors, as determined by the Company.

7. Changes
The Purchaser may, from time to time, but only with the written consent of an authorized Company representative, make a change in specifications to products, parts or systems covered by a purchase order accepted by the company. In the event of any such changes, the Company shall be entitled to revise its price and delivery schedule under such order.

8. Returned material
If the Purchaser desires to return any product or part, written authorization thereof must first be obtained from the Company which will advise the Purchaser of the credit to be allowed and restocking charges to be paid in regard to such return. No product or part shall be returned to the Company without a "RETURNTAG" attached thereon which has been issued by the Company.

9. Packing
Published prices and quotations include the Company's standard packing for domestic shipment. Additional expenses for special packing or overseas shipments shall be paid by the Purchaser. If the Purchaser does not specify packing or accepts parts unpacked, no allowance will be made to the Purchaser in lieu of packing.

10. Standard transportation policy
Unless expressly provided in writing to the contrary, products, parts and systems are sold f.o.b. first point of shipment. Partial shipments shall be permitted, and the Company may invoice each shipment separately. Claims for non-delivery of products, parts and systems, and for damages thereto must be filed with the carrier by the Purchaser. The Company's responsibility therefor shall cease when the carrier signs for and accepts the shipment.



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MAN1055-00 Rev C
Issued 12-28-2012