

# SYNTECHTRON

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## TC6B Variable Rate Electronic Controller Assembly



## Installation, Operation & Maintenance Manual

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## 1.0 Product Support after Sales.

- **Urgent Breakdown Response & Assistance.**  
Our Service team consists of experienced “hands on” personnel.
- **Spare Parts.**  
We have a large inventory of critical spare parts – backed up by a highly responsive multi disciplined manufacturing facility.
- **Preventative Maintenance.**  
On – site inspection and report to assist your Preventative Maintenance.
- **Refurbishment.**  
We provide full overhaul services for all sizes of Syntron, ICAL and Transfield feeding, screening and vibratory conveying equipment.
- **Commissioning & Auditing.**  
Commissioning & Auditing are available for all equipment and systems supplied by Syntechtron.
- **Training.**  
Structured equipment training courses On / or Off / Site.

## 1.1 Safety Instructions.

This manual highlights several safety hazards that may be encountered when working with this equipment. A brief description of these symbols is shown below.



General Caution covering a broad spectrum of hazards.



Specific Danger restricting access to a hazard.



Specific Warning covering Live Circuitry hazards



General Warning covering a broad spectrum of hazards.



Specific Warning covering hazards in Explosive Environment.



Specific Warning covering Electromagnetism

## 2.0 TC6B Controller Instructions – General Instructions

### SAFETY FEATURES



Numerous safety precautions are mentioned through this Instruction Manual, failure to follow these instructions or to heed these precautions may result in serious personal injury or property damage.



Although components within the Controller enclosure are IP2X rated “finger safe”, the operator must be aware of the potential hazards associated with working around live equipment and circuits.

#### Installation\*

### 2.1 Installing the Controller

The Controller assembly should be installed as close to the Feeder as possible, preferably on a wall in a clean dry location, free from excessive vibration. The standard Controller is furnished in an enclosure with a Degree of Protection rating of IP65 that is adequate for most applications. Controllers may be supplied to meet a variety of environmental conditions or applications requiring a higher degree of protection.

If at all possible, the Controller should be installed at a location where it will receive good ventilation. The life of most electrical components is reduced when operating in an atmosphere of intense heat. Good ventilation in the area of the control enclosure will permit internal heat to be dissipated through the enclosure external surfaces and into the outside atmosphere, thus prolonging component life. The Controller should be installed at a location where it is easily seen and accessible to the operator and maintenance technician.

### 2.2 Wiring the Feeder and Controller



**The power supply voltage and frequency must be as stamped on the equipment rating nameplate.**

The supply conductors and the conductors between the Feeder and Controller must be of a size sufficient to carry the current and voltage as stamped on the equipment nameplate. The distance between the Controller and the Feeder is an important factor that must be taken into consideration when determining the size of the conductor. The voltage drop through conductors of insufficient size for the distances involved will result in a definite lack of Feeder stroke and performance during operation. The further the distance, the larger is the required size of conductor.

Connection to the Feeder must be by flexible cable furnished with the machine which should be connected to the fixed wiring by a junction box adjacent to, but not affixed to, the drive housing. A similar cable gland to that by which the cable enters the housing should be used at the junction box. The flexible cable should be quite slack between these two glands.

## 2.3 Earthing

The Feeder drive unit is fitted with a three core flexible cable, the Green/Yellow conductor of which is connected to the magnet core assembly and must be earthed. The Controller is provided with an earth stud or terminal through which the Feeder earth connection is normally made.



**Both the Feeder and its Controller must be properly connected to an efficient earth, such as a water pipe, earth rod, etc, in accordance with Supply Authority Regulations.**

### Operation\*

## 2.4 Operation

Each SYNTRON Vibrator or Feeder requires a SYNTRON Controller for its operation. The Model TC6B is the standard controller for a rectified current equipment rated up to 6 amperes at 240 Volts. This controller has a double pole single throw switch "OFF" and "ON", which control the starting and stopping of the vibrator or feeder.

A silicon rectifier (SCR) is used to control the voltage applied to the vibrator or feeder magnet coil. The SCR and its control components, including a control potentiometer, are encapsulated in a TC6B module. A potentiometer control the SCR and hence the voltage of the vibrator or feeder magnet coil. The magnet coil, in turn controls the magnitude of vibration of the vibrator or feeder. The controller also contains a terminal block for making electrical connections to the vibrator or feeder and to the power supply.

The control box should be installed as close as possible to the vibrator or feeder, preferably on a wall. It is most important that the controller is kept in a clean and dry a location as possible which **is free from excessive vibration.**

### Maintenance\*

## 2.5 Setting-Up Procedure

During commissioning or for maintenance purposes, the following procedure should be carried out. This will ensure the Controller functions correctly and the Feeder maximum stroke is as per the **Specific Data Section** of this manual.

**NOTE:** Before proceeding to adjust the control potentiometer, check that the air gap is set as per the **Specific Data Sheet.**

1. Before applying power, set the variable controls as follows: "**Rate Set**" potentiometer – midway.
2. Check the power supply voltage and frequency to see that it corresponds to the ratings shown on the vibrator or feeder nameplates.
3. Check all of the connections.
4. Check the vibrator or feeder for shorted or open circuited magnet coil.

## 2.6 Field Checking the Silicon Controlled Rectifier (SCR)

An **SCR** can be difficult to check in field, because its characteristics under load are somewhat different than when in a cold state.

A simple and effective cold state check of an **SCR** to determine a complete open or short is outlined below:



**Isolate equipment prior to commencement of any work.**

1. Disconnect the **SCR** from the Controller circuit.
2. Referring to **Figure 10.1**, construct a simple **DC** circuit using two flashlight batteries and a flashlight bulb.
3. Connect the positive (+) lead to the **SCR** anode.
4. Connect the negative (-) lead to the **SCR** cathode.

**IF THE BULB LIGHTS AT THIS POINT, THE SCR IS SHORTED AND SHOULD BE REPLACED.**

If the bulb does not light, continue with the test.

5. Connect one end of a jumper on the anode side of the **SCR**.
6. Momentarily touch the gate of the **SCR** with the other end of the jumper lead. The bulb should now light and stay lit.

**IF THE BULB DOES NOT STAY LIT AFTER THE GATE IS MOMENTARILY TOUCHED, THE SCR IS OPEN AND SHOULD BE REPLACED.**

As mentioned before, this test is effective only if the rectifier is completely open or shorted. Any partial breakdown of an **SCR** under load conditions can be determined and remedied only by replacement of the defective **SCR**.

**NOTE:** A portable **SCR** tester, Part No. **047C0001**, is available to perform the above functions.

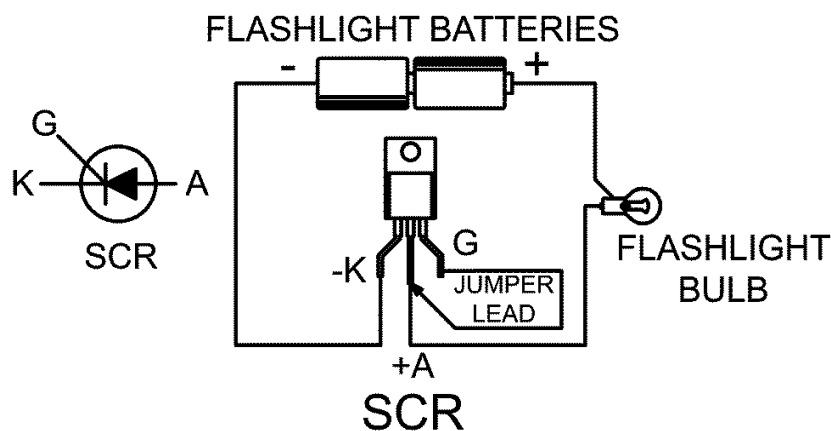


Figure 2.1

### 3.0 Trouble Shooting

No.	Problem	Possible Cause	Resolution	✓
1	Reduced Feed Rate	Build Up or Binding	Clear all build up between the trough and surrounding structure	
		Wide Air Gap	Refer to the Specific Data Section of this Manual and reset in accordance with the Detailed Static Air Gap Adjustment	
		Broken Springs	Consult Syntechtron and order replacement Springs.	
2	Hammering	Narrow Air Gap	Refer to the Specific Data Section of this Manual and reset in accordance with the Detailed Static Air Gap Adjustment	
		Broken Springs	Consult Syntechtron and order replacement Springs.	
3	High Current, Blown SCR.	Wide Air Gap	Refer to the Specific Data Section of this Manual and reset in accordance with the Detailed Procedure for Air Gap Adjustment	
		Build Up or Binding	Clear all build up between the trough and surrounding structure	
		Shorted Turn in the Coil	Consult Syntechtron and order replacement coil.	
4	Feeder Will Not Start	External Circuitry	Measure Supply Line Voltage. If there is no supply Ensure all external interlocks are removed	
		Blown Line Fuses	Measure the Continuity of the Line Fuse	

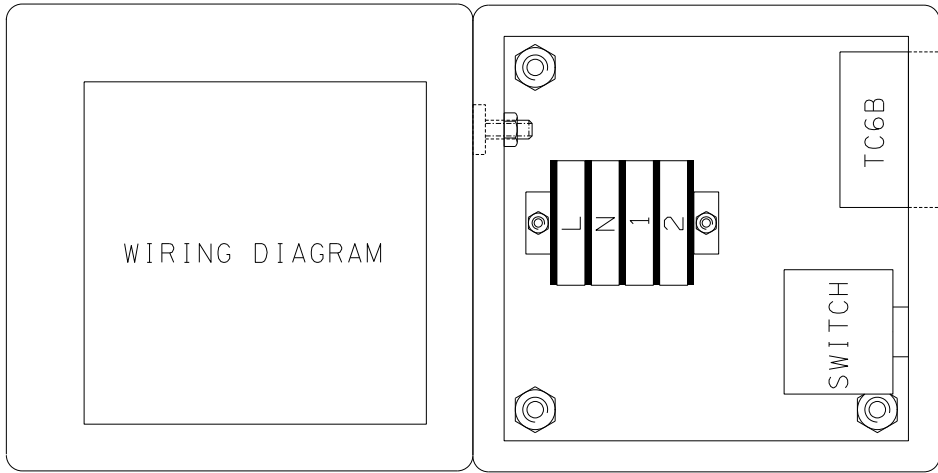


#### 4.0 Recommended Spare Parts List

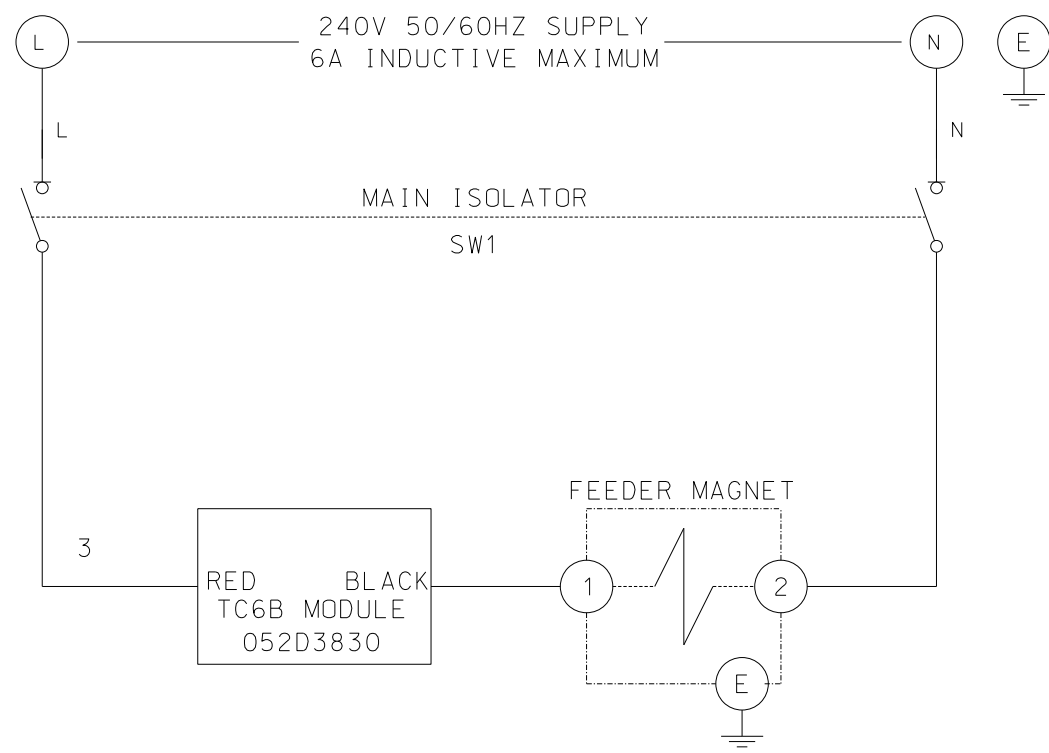
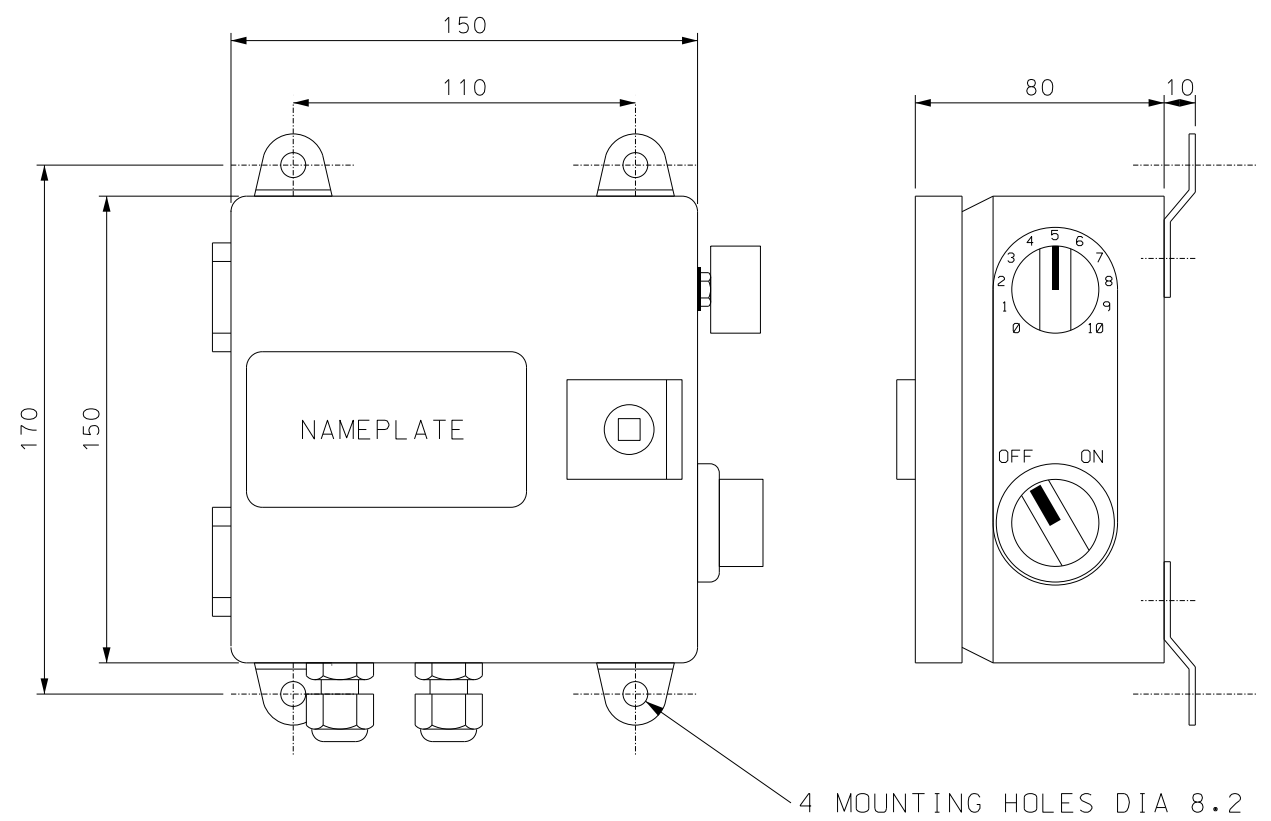
**Equipment:** TC6B Controller Assembly

<u>Part No</u>	<u>Description</u>	<u>Qty</u>
048E0710	Pot & Switch Label	1
048E0711	Connection Diagram Sticker	1
052D3830	TC6B 240 Volts Control Module	1
102E0257	Terminal Block	4
103E0058	Cable Gland	2
116E0189	500 $\Omega$ Control knob	1
118E0310	2 pole 20 Amps Isolator Switch	1

REVISION  
REV A 14.12.98  
DRAWING CHECKED  
AND FINALISED.



INSIDE VIEW



ITEM	PART No.	DESCRIPTION	CCT. REF.	QTY
12				
11	103E0058	CABLE GLAND		2
10	048D0711	CONNECTION DIAGRAM STICKER		1
9	048E0710	POT AND SWITCH LABEL		1
8	048D0709	CONTROLLER RATING PLATE		1
7	102E0258	TERMINAL END PLATE	TB	1
6	102E0257	TERMINAL BLOCK	TB	4
5	116E0189	POTENTIOMETER SHAFT SEAL (IP65)	TC6B	1
4	116E0180	KNOB	TC6B	1
3	052D3830	TC6B CONTROL MODULE 240V	TC6B	1
2	118E0310	ISOLATOR SWITCH ON/OFF 2POLE 20A (IP65)	SW1	1
1	174E0055	ENCLOSURE 150 X 150 X 80 (IP65)		1

EST. MASS: 1.6kg

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THE ADDRESSEE ON THE TRANSMITTAL IS RESPONSIBLE FOR THE WITHDRAWAL OF ALL PREVIOUS ISSUES.

MAIN SCALE 1:2.5  
DRAWN R.P.CARTER DATE 14.12.98  
CHECKED P.MURAS DATE 14.12.98  
DESIGN ENG. DATE  
TECH.SUP. A.MAHER DATE 14.12.98

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TITLE  
TC6B CONTROLLER ASSEMBLY & SCHEMATIC 240V 50/60Hz  
DRG. No. 052D3825  
REV. A

## 6.0 Commissioning Record Sheets

1. It is important that before Commissioning the Engineer should be familiar with all aspects of Feeder operation as contained in the Manual.
2. All items to be recorded.
3. Boxes are for checks and need only be ticked.

Model: \_\_\_\_\_ Plant No: \_\_\_\_\_  
 Serial No: \_\_\_\_\_ Current Rating: 6 Amps  
 Controller Model: TC6B Serial No: \_\_\_\_\_

### Workshop Test Report Details:

Natural Frequency: \_\_\_\_\_ **cpm** Static Air Gap: \_\_\_\_\_ **mm**  
 Maximum Stroke: \_\_\_\_\_ **mm**  
 Remarks: \_\_\_\_\_  
 Our Ref: \_\_\_\_\_

### Isolation Spring Heights: (each set of springs must be equally loaded i.e. Front LHS equals to Front RHS)

Front Springs Unloaded \_\_\_\_\_ mm Loaded \_\_\_\_\_ mm  
 Rear Springs Unloaded \_\_\_\_\_ mm Loaded \_\_\_\_\_ mm  
Trough Angles: Down slope \_\_\_\_\_ Deg Level Transversely

### Hopper Outlet Details:

Gate Height (H) \_\_\_\_\_ mm Between Skirts (W) \_\_\_\_\_ mm  
 Throat (T) \_\_\_\_\_ mm  
 Skirt Divergence  Skirt Clearance   
Natural Frequency:  Static Air Gap:

Cabling: Supply Cable size \_\_\_\_\_ mm<sup>2</sup> Approx run length \_\_\_\_\_ m  
 Drive Cable size \_\_\_\_\_ mm<sup>2</sup> Approx run length \_\_\_\_\_ m  
 Flexible Cable clearance from structure

Feeder: Suspension Slings  Safety Slings   
Transducer: Fitting  Wiring   
Controller: Supply Connections  Interlocks   
Wiring: Magnet Cable

Company:  
Our Ref:

Plant No. \_\_\_\_\_  
Serial No. \_\_\_\_\_

Setting Up No Load

Signal Loss	Trough Stroke	_____ mm		
Rate set at Max.	Trough Stroke	_____ mm	Base Stroke	_____ mm
	Coil Volts	_____ Volts	Coil Current	_____ Amps
Rate set at Min.	Trough Stroke	_____ mm	Base Stroke	_____ mm
	Coil Volts	_____ Volts	Coil Current	_____ Amps
Maximum Current		_____ Amps	@ Trough Stroke of	_____ mm

Dynamic Air Gap @ Maximum Stroke

Running Fully Loaded:

Rate set at Max.	Trough Stroke	_____ mm	Base Stroke	_____ mm
	Coil Volts	_____ Volts	Coil Current	_____ Amps
Rate set at Min.	Trough Stroke	_____ mm	Base Stroke	_____ mm
	Coil Volts	_____ Volts	Coil Current	_____ Amps
Maximum Current	_____ Amps	@ Trough Stroke of		_____ mm

Supply Voltage: Prior to Feeder running \_\_\_\_\_ Volts  
Running loaded at maximum current with maximum gate opening \_\_\_\_\_ Volts

Tonnes per Hour: Minimum \_\_\_\_\_ tph Maximum \_\_\_\_\_ tph

Commissioning Remarks:

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Commissioned by: \_\_\_\_\_ Date: \_\_\_\_\_

**NOTE:** All voltage and current measurements must be measured with a true R.M.S. meter