



Gas Fired Railway Switch Heater

2020 HELLFIRE 905

Soft-starter Operation and Parameters

**TECO Westinghouse Sinus M 001 2S/T BA2K2
Parameters for ABB/Baldor-Reliance ECP3663T motor**

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A. IMPORTANT NOTICES AND WARNING SYMBOLS

Keep this manual with the machine at all times. The purpose of this manual is to provide owners, operators, and installers with the precautions and procedures essential for the safe and proper operation for its intended purpose.



DANGER. Read and adhere to the following. FAILURE TO DO SO MAY RESULT IN SEVERE OR FATAL INJURY. Warranty will be void.






CAUTION. This symbol indicates a potentially hazardous situation, which, if not avoided, may result in personal injury or damage to the equipment.










WARNING. This symbol indicates an imminently hazardous situation, which, if not avoided, can result in serious injury or damage to the equipment.

NOTE: “NOTE:” indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Table 1 – Operation Warning/Avertissements (Intended for Signal Maintainers)

Symbol	Description	
	English	French
	Risk of electrical shock or electrocution. Disconnect electrical power prior to servicing.	Risque de choc électrique ou d'électrocution. Couper le courant avant d'entreprendre l'entretien.
	The heater is designed and approved for use as a commercial heater (gas) – railway switch, class 2902 05 in accordance with ANSI Z83.7 / CSA 2.14. Check with local authority, if you have questions about applications.	Cet appareil a été conçu et approuvé pour être utilisé comme radiateur commercial (gaz) - aiguillage de voie ferrée de classe 2902 05, conformément à la norme ANSI Z83.7 / CSA 2.14. Communiquez avec les autorités locales pour plus de renseignements sur le lieu d'utilisation de cet appareil.
	General hazard warning failure to comply with the precautions and instructions provided with this heater, can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and / or electrical shock. Only persons who can understand and follow the instructions should use or service this heater. If you need assistance or heater information such as an instructions manual label, etc. Contact the manufacturer.	Mises en garde générales le non-respect des mises en garde et des instructions fournies avec ce radiateur peut entraîner la mort, des graves blessures et des pertes matérielles ou des dommages à la propriété résultant d'un incendie, d'une explosion, de brûlures, d'asphyxie, d'empoisonnement au monoxyde de carbone et/ou d'un choc électrique. Seules les personnes aptes à comprendre et à suivre les instructions devraient se servir de ce radiateur ou le réparer. Si vous avez besoin d'aide ou d'informations concernant ce radiateur, soit une notice d'instructions, une étiquette, etc., Prière de communiquer avec le fabricant.
	Fire, burn, inhalation, and explosion hazard. Keep solid combustibles, such as building materials, paper, or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles or unknown chemicals.	Risque d'incendie, de brûlures, d'inhalation et d'explosion. Garder les combustibles solides, tels les matériaux de construction, le papier et le carton, à bonne distance de ce radiateur, comme il est recommandé dans les instructions. Ne jamais utiliser cet appareil dans des endroits qui contiennent ou pourraient contenir des combustibles volatiles ou en suspension dans l'air tels l'essence, les solvants, les diluants pour peinture, les particules de poussières ou des produits chimiques inconnus.
	Not for home or recreational vehicle use.	Ne pas utiliser dans une maison ou un véhicule de camping.
	All persons employed in handling propane or natural gas shall be trained in proper handling and operating procedures, as required by local authorities having jurisdiction.	Toute personne qui manipule le propane ou le gaz naturel doit avoir suivi une formation sur les bonnes procédures de manipulation et d'utilisation qui est conforme aux exigences des autorités locales compétentes.

Symbol	Description	
	English	French
	If you smell gas; immediately extinguish all sources of ignition and turn off gas source. Call qualified service technician to repair leak.	S'il y a une odeur de gaz : fermer immédiatement toute source d'allumage et de gaz. Faire réparer la fuite par un technicien qualifié.
	Do not attempt to manually light burner. Heater equipped with an automatic electronic ignition system.	Ne pas allumer le brûleur manuellement. Radiateur équipé d'un système d'allumage électronique.
	Risk of cutting fingers or hand. Disconnect fan power prior to removing combustion chamber access panel or air intake.	Risque d'amputation des doigts ou de la main. Couper le courant au ventilateur avant d'enlever le panneau d'accès à la chambre de combustion ou l'entrée d'air.
	Heater can start automatically. Exercise caution when in close proximity.	Attention : le radiateur peut démarrer automatiquement. Faire preuve de prudence près du radiateur.
	Burn hazard / hot surfaces. Do not touch track ducts, nozzles or any non-insulated duct connected downstream of heater during operation.	Surface chaude; risque de brûlure. Ne pas toucher les conduits latéraux à la voie ferrée, les buses ni aucun conduit non isolé branchés en aval d'un radiateur en marche.
	Sheet metal edges can be sharp. Wear protective clothing when handling track duct, insulated ducts and any other sheet metal components.	Risque de coupure. Les rebords de la tôle sont coupants. Porter des vêtements protecteurs lors de la manipulation des conduits isolés et tout autre composant en tôle.
	For use with ductwork only.	Pour utilisation avec réseau de gaines seulement.
	Retain manual for future reference.	Conserver le manuel pour consultation ultérieure.

B. SOFT-STARTER DESCRIPTION

1. The Sinus M 001 2S/T BA2K2 VFD (Variable Frequency Drive) is an optional component included in the Hellfire 905 design to reduce inrush and start-up amperage.
2. The soft starter is configured to reduce start-up amperage to not exceed the motor full load amperage under most start-up conditions.
3. The soft starter is coupled to a 240VAC 3 phase motor. It converts the 240 VAC 1 phase supply to 240 VAC 3 phase to reduce motor start up acceleration.
4. The soft starter also serves as the motor overload protection.
5. The soft starter also provides additional protection features such as: Over voltage, Under voltage and Phase loss.



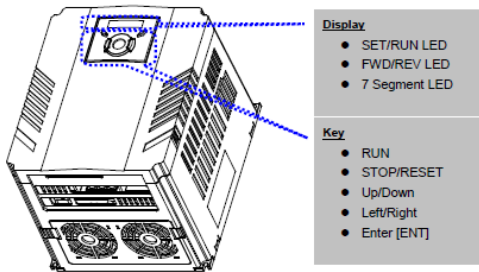
CAUTION. The soft starter's purpose is to reduce inrush and start up currents, it should not be used to adjust the blower speed. Changing or modulating the blower speed may create a safety hazard and/or damage the the equipment.

TECO Westinghouse SINUS M 001 2S/T BA2K2 VFD



C. DISPLAY

C.1 Operations and Display Format



! Alpha-numeric view on the LED keypad

0	0	A	A	K	U	U
1	1	b	B	L	L	V
2	2	c	C	n	M	W
3	3	d	D	n	N	X
4	4	E	E	O	O	Y
5	5	F	F	P	P	Z
6	6	G	G	Q	Q	
7	7	H	H	R	R	
8	8	I	I	S	S	
9	9	J	J	T	T	

Display		
FWD	Lit during forward run	Blinks when a fault occurs
REV	Lit during reverse run	
RUN	Lit during Operation	
SET	Lit during parameter setting	
7 segment	Displays operation status and parameter information	

Keys		
RUN	Run command	
STOP/RESET	STOP: Stop command during operation, RESET: Reset command when fault occurs.	
▲ UP	Used to scroll through codes or increase parameter value	
▼ Down	Used to scroll through codes or decrease parameter value	
◀ Left	Used to jump to other parameter groups or move a cursor to the left to change the parameter value	
▶ Right	Used to jump to other parameter groups or move cursor to the right to change the parameter value	
● ENT	Used to set the parameter value or save the changed parameter value	

C.2 Navigation

The default display parameter on the soft starter is the output frequency. When the heater is off, this will read "0.00". When the heater is operational, this will read "60.0".

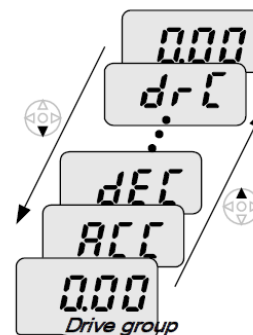
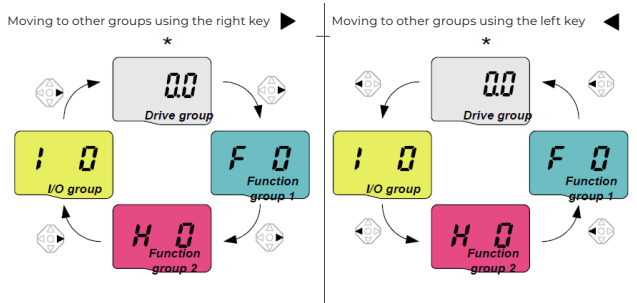
There are four (4) parameter groups:

1. "0.00" Drive Group (If the display does not show an "F", "H", or "I"; the soft starter is in function group "0.00"),
2. "F" Function Group 1,
3. "H" Function Group 2,
4. "I" I/O Group.

Function Group Navigation (Left and Right Buttons)



Parameter Navigation (Up and Down Buttons)



D. PARAMETER LIST



CAUTION. The below section is to be used for troubleshooting purposes ONLY. Adjusting the preset parameters may cause a safety hazard and/or damage the unit.

The parameters are password protected and will require unlocking to be changed.

To perform this, see "Table 1 – Parameter List" below, and look for parameter # 27.

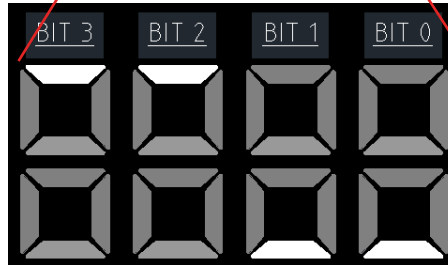
Table 2 – Parameter List

#	Parameter	Description	Setting
1	F2	Sets the acceleration curve.	1 for "S-curve"
2	F4	Sets the soft starter braking operation.	2 for no braking
3	F21	Sets the maximum frequency limit (Hz).	60.00
4	F39	Sets the soft starter output voltage to the motor (40-110%).	110 percent of input voltage
5	F50	Sets secondary thermal protection.	0 for no secondary thermal protection
6	F56	Enables the overload protection	1 for overload protection enabled
7	F57	Sets the overload trip percentage. This parameter is a percentage of the FLA set up in parameter "H33".	130 percent of FLA
8	F58	Sets the overload trip time. This value sets the time it takes for the soft starter to disable the motor if it is running beyond parameter "F57".	10 seconds
9	0.00	Sets the motor running frequency (Hz).	60.00
10	ACC	Sets the motor acceleration time of the soft starter.	20 seconds
11	I55	Sets the soft starter internal relay function.	12 for during motor run
12	H6	Reset Fault History. Clears the fault history saved in H1-H5	1 to reset fault history
13	H19	Input and output phase loss protection (see below)	Set Bit 1 to low and set Bit 2 to high to protect output phase loss
14	BIT LOGIC SETTING INSTRUCTION FOR H19		
15	H20	Power failure restart.	1 to restart after power failure
16	H21	Restart after fault.	1 to restart after fault
17	H22	Speed Search Select. This parameter activates speed recovery if soft starter is requested while the motor is still rotating.	BIT 2 and BIT 3 to HIGH for After fault and After power loss condition

18 BIT LOGIC SETTING
INSTRUCTION FOR H22
(see above)



BIT 3 AND BIT 2 set to "HIGH"
BIT 1 AND BIT 0 set to "LOW"



19	H23	Allowable over current during speed search (80-200%).	200 percent of FLA
20	H26	Sets number of allowable restart attempts after a fault.	5 restart attempts
21	H27	Sets the time between restart attempts.	15 seconds
22	H31	Sets the number of motor poles.	2 poles
23	H33	Sets the motor Full-Load-Amps (FLA).	11.40 amperes
24	H36	Sets the motor operational efficiency.	90 percent
25	H77	Sets the soft starter fan activation trigger.	1 for during operation
26	H93	Sets factory defaults for the soft starter. *CAUTION* Setting this can result in improper heater operation, damage to the equipment, and/or potential safety hazard.	1 to set factory defaults

How to Lock the device to prevent the parameters from being changed (H95)




Step	Note	Keypad Display
1	Move to H95 code.	H95
2	Press Enter (●)	UL
3	Parameter value can be changed to UL (Unlock) status.	UL
4	Press Enter Key (●)	0
5	Enter the password created in H94 (eg.: 123)	123
6	Press Enter Key (●)	L
7	Parameter value cannot be changed in L (Lock) status.	L
8	Press Enter Key (●)	H95

How to Unlock the device to change parameters from being changed (H95)

Step	Note	Keypad Display
1	Move to H95 code.	H95
2	Press Enter (●)	UL
3	Parameter value cannot be changed in L (Lock) status.	UL
4	Press Enter Key (●)	0
5	Enter the password created in H94 (eg.: 123)	123
6	Press Enter Key (●)	L
7	Parameter value can be changed to UL (Unlock) status.	L
8	Press Enter Key (●)	H95

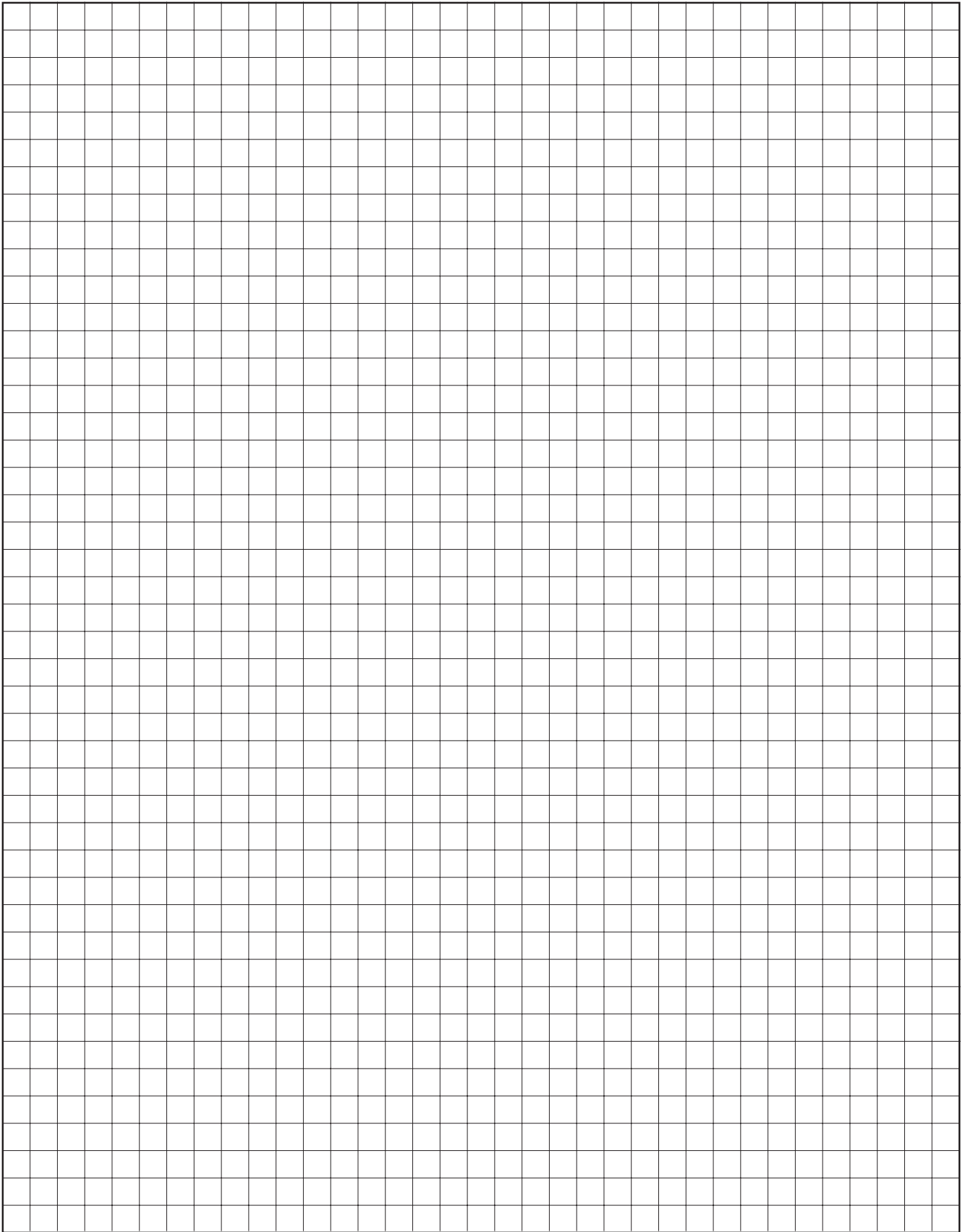
E. TROUBLESHOOTING

Table 3 – Cause and Remedy

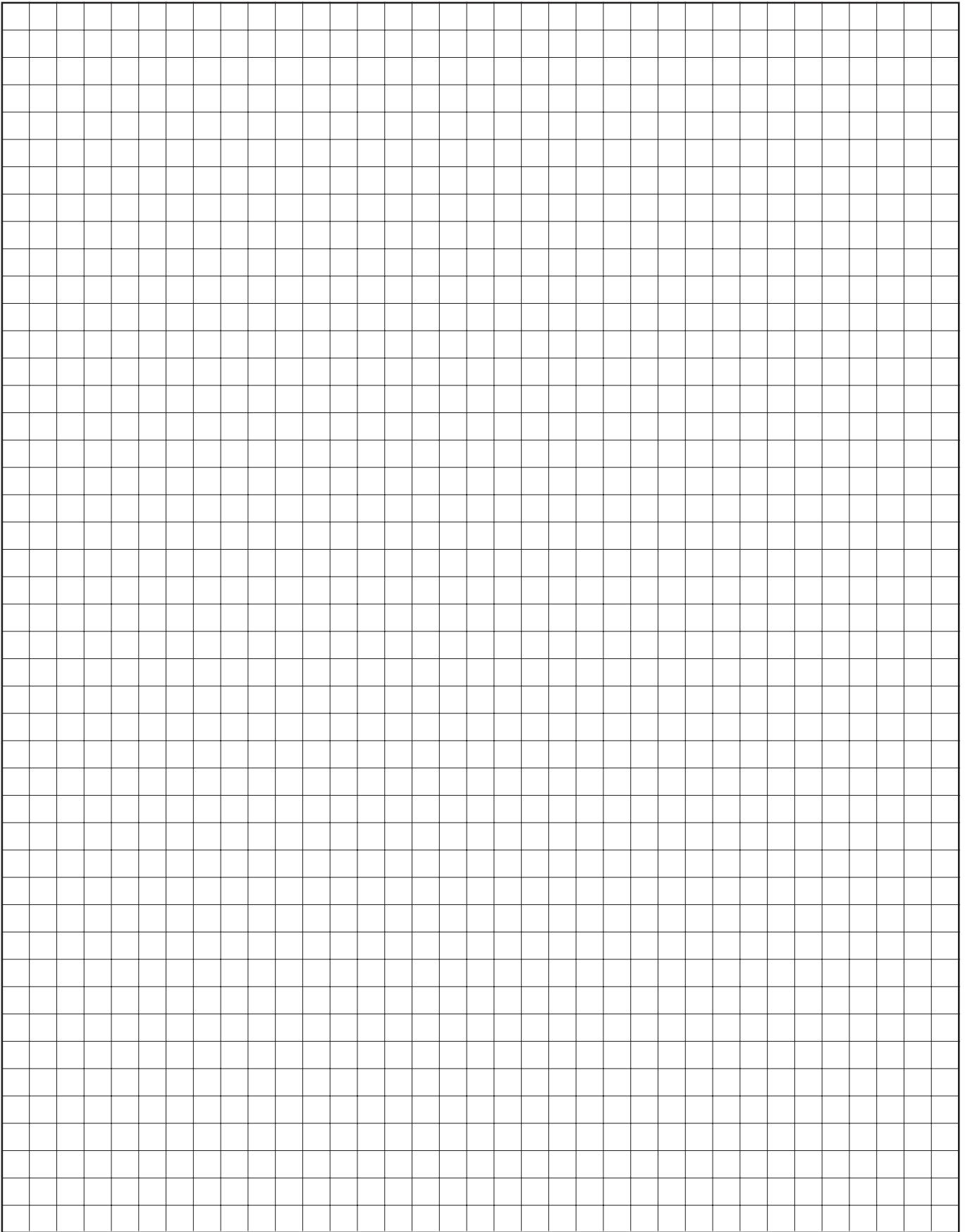
Fault Code	Cause	Remedy
 <p>Overload Trip</p>	Incorrect overload setting.	Check the F57 parameter and ensure that the FLA current is set appropriately. Press "Stop/Reset" to clear fault
	Start-up supply voltage sag resulting in high motor current.	To decrease the likelihood of this reoccurring adjust the heater "Delay Start" potentiometer to eliminate synchronous starting with other appliances. Press "Stop/Reset" to clear fault.
	Continuous low supply voltage resulting in high motor current.	Electrical Distribution installation on site may be undersized and needs to be reviewed. Press "Stop/Reset" to clear fault.
	Motor malfunction.	Conductor sizing too small.
 <p>Low Voltage Trip</p>	Start-up supply voltage sag resulting in high motor current.	To decrease the likelihood of this reoccurring adjust the heater "Delay Start" potentiometer to eliminate synchronous starting with other appliances. Fault clears automatically once voltage increases above threshold (approximately 180V).
	Continuous low supply voltage resulting in high motor current.	Electrical Distribution installation on site may be undersized and needs to be reviewed. Fault clears automatically once voltage increases above threshold (approximately 180V). Conductor sizing too small
 <p>Output Phase Loss Fault</p>	Phase loss on soft starter output.	Verify wiring between soft starter and motor. Fault clears automatically once lost phase is restored.
	Motor malfunction.	Inspect motor and replace if necessary.

NOTE: Consult the TECO Westinghouse Sinus M Control Installation and Programming Manual for more operational and troubleshooting information.

NOTES



NOTES





PLEASE ADHERE TO INSTRUCTIONS IN THIS MANUAL

Failure to do so may be dangerous and may void certain provisions of your warranty.

For further assistance, please call 1.855.244.3128

WARRANTY: Under normal use the Company warrants to the purchaser that defects in material or workmanship will be repaired or replaced without charge (from date of shipment) for a period of:

- 84 months - SwitchBlade® Heaters
- 60 months - DC Heaters
- 36 months - DC Control Panels
- 36 months - HELLFIRE Heaters, FEB Heaters
- 12 months - All other Fastrax® Products

Any claim for warranty must be reported to the sales office where the product was purchased for authorized repair or replacement within the contract terms.

Subject to State or Provincial law to the contrary, the Company will not be responsible for any expense for installation, removal from service, transportation, or damages of any type whatsoever, including damages arising from lack of use, business interruptions, or incidental or consequential damages.

The Company cannot anticipate or control the conditions of product usage and therefore accepts no responsibility for the safe application and suitability of its products when used alone or in combination with other products. Tests for the safe application and suitability of the products are the sole responsibility of the user.

This warranty will be void if, in the judgment of the Company, the damage, failure or defect is the result of:

- Vibration, radiation, erosion, corrosion, process contamination, abnormal process conditions, temperature and pressures, unusual surges or pulsation, fouling, ordinary wear and tear, lack of maintenance, incorrectly applied utilities such as voltage, air, gas, water, and others or any combination of the aforementioned causes not specifically allowed for in the design conditions
- Or, any act or omission by the Purchaser, its agents, servants or independent contractors which for greater certainty, but not so as to limit the generality of the foregoing, includes physical, chemical or mechanical abuse, accident, improper installation of the product, improper storage and handling of the product, improper application or the misalignment of parts.

No warranty applies to paint finishes except for manufacturing defects apparent within 30 days from the date of installation.

The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the product(s).

The Purchaser agrees that all warranty work required after the initial commissioning of the product will be provided only if the Company has been paid by the Purchaser in full accordance with the terms and conditions of the contract.

The Purchaser agrees that the Company makes no warranty or guarantee, express, implied or statutory, (including any warranty of merchantability or warranty of fitness for a particular purpose) written or oral, of the Article or incidental labour, except as is expressed or contained in the agreement herein.

LIABILITY: Technical data contained in the catalog or on the website is subject to change without notice. The Company reserves the right to make dimensional and other design changes as required. The Purchaser acknowledges the Company shall not be obligated to modify those articles manufactured before the formulation of the changes in design or improvements of the products by the Company.

The Company shall not be liable to compensate or indemnify the Purchaser, end user or any other party against any actions, claims, liabilities, injury, loss, loss of use, loss of business, damages, indirect or consequential damages, demands, penalties, fines, expenses (including legal expenses), costs, obligations and causes of action of any kind arising wholly or partly from negligence or omission of the user or the misuse, incorrect application, unsafe application, incorrect storage and handling, incorrect installation, lack of maintenance, improper maintenance or improper operation of products furnished by the Company.