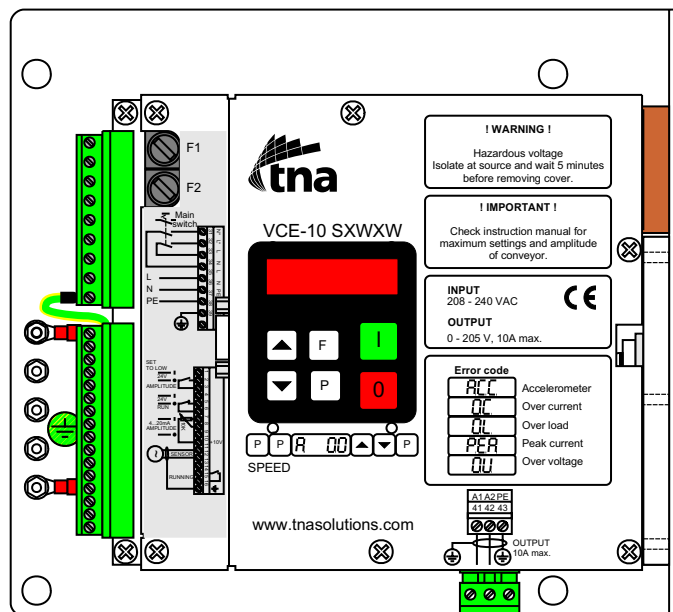


Operating Instructions VCE 10 SXWXW



Features:

Output frequency does not depend on supply frequency
 Constant amplitude irrespective of supply variations or loading
 Coarse/fine feed switching
 Automatic regulation and resonant frequency search
 ON/OFF Status relay
 Master/Slave option
 PC parameter setup option

The controller is available in chassis form for panel mounting or can be supplied in a steel housing with a stainless IP65 (Nema 4x) or white, powder-coated IP54 (Nema 12) finish, and fitted with a lockable door and mains isolator.

General

This microprocessor controlled drive unit is used for adjusting the amplitude and frequency of electro-magnetic vibratory feeders. The unit is normally operated in closed-loop control using a feedback signal from a sensor that is built into the conveyor. The closed-loop is used to automatically find the natural frequency of the mechanical system so that it runs at optimum efficiency and also maintains the same amplitude regardless of loading.

All settings are made by using the touch-panel and display which are incorporated in the front-panel. There are also various terminal connections provided that are available for external control; such as analogue signals for set-points, status contacts and a remote enable.

Technical Data

VCE 10 SXWXW

Supply voltage	:	115/230, +/- 15%, 50/60 Hz
Output voltage	:	0..100/205 V
Output current	:	10 A max.
Output power	:	2 kVA at 230 V, 1 kVA at 115 V
Output frequency	:	15..30 Hz (5..300Hz)
Set point	:	Display / Potentiometer 10 kOhm / 0..10 V / 0(4)..20mA
Soft start time	:	0..10 sec.
Enable input	:	Contact / 24 V, DC
Enable 2 setpoint	:	Contact / 24 V, DC
Status relay	:	Change-over contacts (max 250 V, 2 A)
Fuse	:	10 A, Type B
Losses	:	25 W
Operating temperature	:	0..45 °C
Storage temperature	:	-20..70 °C
Rel. humidity	:	93 % without dew or surface condensation
Altitude	:	1000 m, 0,5 % rating reduction for each additional 100m
Contact protection	:	VBG 4
Ingress protection rating	:	IP 00
Standards	:	EN 61000-6-2, EN 61000-6-4

Safety instructions

This description contains the necessary information for the correct application of the product described below. It is intended for use by technically qualified personnel. Qualified personnel are persons who, because of their training, experience and position, as well as their knowledge of appropriate standards, regulations, health and safety requirements and working conditions, are authorised to be responsible for the safety of the equipment, at all times, whilst carrying out their normal duties and are therefore aware of, and can report possible hazards (definition of qualified employees according to IEC 364).



WARNING!

Hazardous voltage!

Failure to observe can kill, cause serious injury or damage.

Isolate from mains before installation or dismantling work, as well as for fuse changes or post installation modifications.

Observe the prescribed accident prevention and safety rules for the specific application.

Before putting into operation, check if the rated voltage for the unit conforms with the local supply voltage.

Emergency stop devices must be provided for all applications. Operation of the emergency stop must inhibit any further uncontrolled operation.

Electrical connections must be covered.

Earth connections must be checked for correct function, after installation.



Installation



Check !

Do supply voltage, operating voltage of the conveyor and controller input voltage match ?
Is the controller adequately rated for the rated power of the feeder ?
What is the vibrating frequency of the feeder ?



Connect the unit in accordance with the wiring instructions and ensure that earthing is correct !



Caution !

Incorrect setting of the vibrating frequency can lead to damage of the connected magnets!
Carefully check that the correct vibrating frequency has been selected for the magnets used.

Specified use

The units described herein are electrical controllers for installation in industrial plants. They are designed for power adjustment on vibratory feed equipment.

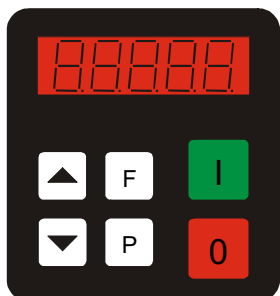
Declaration of Conformity

We confirm that these products conform with the following standards and regulations:
EN 61000-6-2 and EN 61000-6-4 in accordance with Directive 2004/108/EG



Subject to technical modifications without prior notice.

Settings and Displays



- Increases value
- Decreases value
- Back
- Programming mode or confirmation

Settings:

Adjustments are made through menu settings. The different parameters are called up by entering user codes. All settings are entered by firstly pressing the P key followed by choosing the menu number with the arrow keys.

Setting characteristics

Pressing for a short time on the arrow keys increases/decreases the display by one unit. Pressing for a longer time increases/decreases the value in units of ten. Changes are saved on leaving the menu or if a key is not pressed for 60 seconds.

Operating Displays

- Normal running
Set point in %
- Enable OFF
- Stop using "0" button
- Switch on phase

Fault warnings

- | | | |
|--|--|---|
| | | Sensor fault (only in closed loop) e.g. sensor defect or signal lost |
| | | Over current fault, short-circuit (e.g. shorted turns in drive magnet) |
| | | Overload fault (e.g. too much product on feeder) |
| | | Over voltage fault (e.g. supply voltage too high; greater than 240V + 10%, or feedback from magnet) |
| | | Peak current limit exceeded (e.g. magnet air-gap too wide or a rapid frequency change) |
| | | External temperature monitor (e.g. open temperature switch in magnet or no link between terminals 51, 52) |
| | | Internal program fault (not resettable - control unit must be returned to supplier) |

Fault reset (Code 009 or green button)

- Reset fault
- Reset fault and set point to 0

Factory settings

Setting	Range	Code	Factory Setting	Menu code
Display actual current	n/a	i.	n/a	038,040*
Maximum current	0...100%	I.	60%	038
Feeder amplitude	0...100%	A.	0%	000, 038
Maximum voltage limit	5...100%	P.	100%	038
Output frequency	15...30Hz	F.	23Hz	038, 040
External set point	0 / I	E.S.P.	0	038
0...10Vdc / 0(4)....20mA				
Second set point	0...100%	2	0.0	038
Select regulation mode	0 / I	ACC.	1	038
P Characteristic	0...100	P.A.	100	038
I Characteristic	0...100	I.A.	100	038
Auto frequency control	0 / I	A.F.C.	1	038
Start auto frequency search		A.F.S.		038
* Service Interface Off/On	0 / I	S.I.F.	0	040
* Low frequency limit	5 - 150 Hz	FL	15Hz	040
* High frequency limit	5 - 150 Hz	FH	30Hz	040
* AFC Threshold	0...100	A.S.	25	040
* Soft Start	0.0...60.00	┐.	0.0	040
* Soft Stop	0.0...60.00	└.	0.0	040
* Invert enable	0 / I	-En.	0	040
* Current regulation On/Off	0 / I	E.Fu.	0	040
* P Characteristic - current	1...100	P.I.	20	040
* I Characteristic - current	1...100	I.I.	40	040
* Status / Ready relay	0 / I	r.b.	0	040
Master - slave mode	0 / I	Chr.	0	028
Slave designation		P.L.L.	0	028
Recall factory settings		FAC.		210
Save user settings		PUSH		143
Hide menus	0 / I	Hd.C.	0	117
Hide service menus	0/1	En.S.	0	
Recall user settings		US.PA		210
Display software version number				001

(* denotes accessible only when En.s.= 1 in Enable Service Menu)

Code 038 Function settings

<p> </p> <p>Displays actual current</p>	<p> </p> <p>Display shows the actual drive coil current as a % of the controller rated current (I_{nom})</p> <p> Calculation $\frac{\text{Display} \times I_{nom}}{100} = \frac{38,5 \times 10}{100} = 3,85 \text{ A}$ </p>	<p>For monitoring the output current</p> <p>Actual current</p>
<p> </p> <p>Current limit I-max 0...100 %</p>	<p> </p> <p>Adjustment of the current limit as a % of the controller rated current (I_{nom})</p> <p> Calculation e.g. 4,8 A Magnet: $\frac{I - \text{Limit} \times 100}{I_{nom}} = \frac{4,8 \times 100}{10} = 48 \%$ </p>	<p>Setting the output current limit to protect the drive coil</p> <p>Current limit</p>
<p> </p> <p>Amplitude set point 0...100 %</p> <p> </p>	<p> </p>	<p>Limits the maximum feeder deflection when A (amplitude) is at 100% The internal limit of the set point range is adjusted (0...100%) so that maximum deflection is achieved when A = 100%</p> <p>Maximum Feeder deflection</p>
<p> </p> <p>Maximum limit 100...5 %</p>		
<p> </p> <p>Vibrating frequency 15...30 Hz</p>	<p> </p>	<p>Setting vibrating frequency depending on feeder type Warning ! Incorrect frequency setting can cause damage to magnet</p> <p>Vibrating frequency</p>
<p> </p> <p>0 = Set point adjustment using display I = External set point adjustment</p> <p> </p> <p>0 = external set point 0...+10 V I = external set point 4...20 mA</p>	<p> Display </p> <p> 0...+10 V </p> <p> 0(4)...20mA </p> <p> Potentiometer </p>	<p>Set point adjustment using touch panel or external signal</p> <p>Set point</p>
<p> </p> <p>Second set point (Coarse / Fine) 0...100 %</p>	<p> </p>	<p>Switch to second set point</p> <p>Second set point</p>

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Code 038 Function settings

<div><div><div><div></div><div>P</div></div><div>ACC 0</div><div><div></div><div></div></div><div>ACC 1</div><div><div></div><div>P</div></div></div><div>0 = Open loop control (sensor not used) 1 = Closed loop control (sensor used)</div></div>	<div><div><div><div></div><div>+</div></div><div><div></div><div>-</div></div></div><div>ACC 1</div><div><div></div><div>VCE</div><div><div></div><div></div></div></div></div>	Activates closed-loop control so that feeder amplitude is held constant irrespective of load changes. A feedback sensor must be used	Closed-loop control
<div><div><div><div></div><div>P</div></div><div>PR 10</div><div><div></div><div></div></div><div>PR 10</div><div><div></div><div>P</div></div></div><div>Proportional characteristic (gain) 0...100</div></div>	<div><div><div><div></div><div>a [mm]</div></div><div><div></div><div>t</div></div></div><div><div><div></div><div>P</div></div><div><div></div><div>I</div></div></div><div>10= → 100= ↑</div></div>	Adjustment of amount of correction and speed of response under closed-loop control	Closed-loop settings
<div><div><div><div></div><div>P</div></div><div>IR 10</div><div><div></div><div></div></div><div>IR 10</div><div><div></div><div>P</div></div></div><div>Integral characteristic (damping) 0...100</div></div>			
<div><div><div><div></div><div>P</div></div><div>AFC 0</div><div><div></div><div></div></div><div>AFC 1</div><div><div></div><div>P</div></div></div><div>0 = Automatic frequency search OFF 1 = Automatic frequency search ON</div></div>	<div><div><div><div></div><div>AFC 0</div></div><div>f = fixed</div></div><div><div><div><div></div><div>AFC 1</div></div><div>f = f resonance</div></div></div></div>	Automatic search for resonant frequency	Resonance
<div><div><div><div></div><div>P</div></div><div>A.F.S.</div><div><div></div><div></div></div></div><div>Start frequency search</div></div>			
<div><div><div><div></div><div>P</div></div><div>1000</div></div><div>Run mode</div></div>	<div><div><div></div><div>▲</div></div><div>Pressing key starts resonant frequency search</div></div>	Start automatic search for resonant frequency	Frequency search

The sensor that is built into the conveyor is used for frequency and amplitude control.

Manual adjustment of the vibrating frequency:

Ensure that frequency adjustment is made with a low set point setting (e.g. 30%) because even with a low output voltage it is possible to produce a high amplitude when resonance is found (causing the magnet to "hammer"). An analogue, moving-iron, true RMS ammeter should be connected in the output circuit for establishing resonant frequency. At resonance the maximum amplitude will be achieved with the minimum output current.

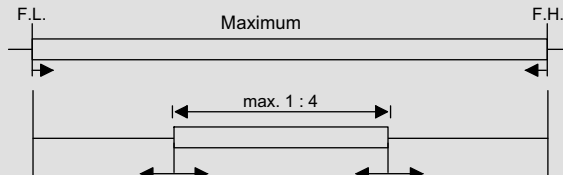
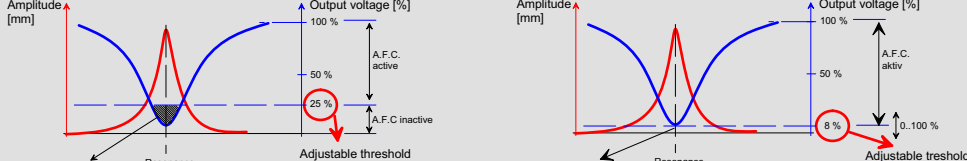
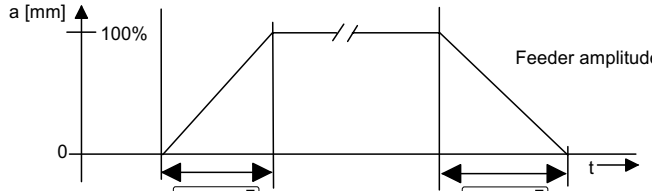
Automatic frequency search (only when the feedback sensor is connected).

- * Adjust set point to zero.
- * Select closed-loop mode (Menu C 038, set Parameter ACC = 1).
- * Start the frequency search (Menu C 038, select Parameter "A.F.S." and press an arrow key to start) and the controller will find the optimum frequency setting. The controller will revert to normal run mode when the resonant frequency has been found..

Caution:

If the magnet begins to "hammer" during frequency search then Parameter "P." in Menu C 038 must be reduced.

Code 040 **Service** (only if C 127 "En.S. = 1")

<p>P C. 000 C. 040 P</p>	
<p>P S.I.F. 0 S.I.F. 1 P</p>	<p>0 = Interface OFF 1 = Interface ON</p>
<p>I. 00 P</p>	<p>Actual current</p> <p>Display shows the actual drive coil current as a % of the controller rated current (I_{nom})</p> <p>Calculation</p> $\frac{\text{Display} \times I_{nom}}{100} = \frac{38,5 \times 10}{100} = 3,85 \text{ A}$ <p>Controlling the output current</p> <p>Effective current value</p>
<p>I. 1000 I. 800 P</p>	<p>Current limit 0...100 %</p> <p>Current limit setting in % of rated controller current (I_{nom})</p> <p>Calculation e.g. 5.0 A Magnet:</p> $\frac{I \text{ Limit} \times 100}{I_{nom}} = \frac{5.0 \times 100}{10} = 50 \%$ <p>Setting the output current limit to match the magnet rating</p> <p>Current limit</p>
<p>FL 5 FL 20 P</p> <p>FH 6 FH 90 P</p>	<p>Lower frequency limit 5...300 Hz</p> <p>Upper frequency limit 5...300 Hz</p> <p>Accessible frequency range Parameters "F.L." and "F.H." Menu "C 040"</p> <p>Usable frequency range Parameter "F" Menu "C 038"</p>  <p>Limits for the frequency range adjustment available to the user. A narrow frequency range is better for frequency search.</p> <p>Frequency limits</p>
<p>F. 200 P</p>	<p>Actual frequency</p> <p>Display shows the actual output frequency</p> <p>Checking the frequency</p> <p>Freq'cy</p>
<p>RS 25 RS 10 P</p>	<p>A.F.C. threshold</p>  <p>A.F.C. Threshold</p>
<p>P. 0.1 P. 300 P</p> <p>t. 0.1 t. 200 P</p>	<p>Soft Start/Stop</p>  <p>Adjusts the ramp up and down time for when the feeder is switched on/off or when set point changes e.g fast/slow</p> <p>Soft Start/Stop</p>

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Code 040 Service

<div><div><div><div>-En 0</div><div><div>▲</div><div>▼</div></div><div>-En 1</div><div>P</div></div><div>Invert enable</div></div></div>	<div><div><div><div>+24 V</div><div>0</div></div><div><div>Enable</div><div>t</div></div></div><div><div><div>a [mm]</div><div>0</div></div><div><div>Feeder amplitude</div><div>t</div></div></div></div> <div><div><div>-En 0</div><div><div>▲</div><div>▼</div></div><div>-En 1</div><div>P</div></div><div>0 = Current regulation On I = Current regulation Off</div></div> <div><div><div><div><div>+</div></div><div><div>-</div></div></div><div><div>VCE</div></div><div><div>I</div></div><div><div></div></div></div></div>	<div><div><div><div>+24 V</div><div>0</div></div><div><div>Enable</div><div>t</div></div></div><div><div><div>a [mm]</div><div>0</div></div><div><div>Feeder amplitude</div><div>t</div></div></div></div> <div><div><div>-En 1</div><div><div>▲</div><div>▼</div></div><div>-En 0</div><div>P</div></div><div>Switch off current regulation</div></div> <div><div><div><div><div>+</div></div><div><div>-</div></div></div><div><div>VCE</div></div><div><div>I</div></div><div><div></div></div></div></div>	<div>+24 V Signal or closed contacts enables the output</div> <div>+24 V Signal or closed contacts inhibits output</div>	<div>Enable input</div>
<div><div><div><div>EFu 0</div><div><div>▲</div><div>▼</div></div><div>EFu 1</div><div>P</div></div><div>0 = Current regulation On I = Current regulation Off</div></div></div>	<div><div><div><div><div>+</div></div><div><div>-</div></div></div><div><div>VCE</div></div><div><div>I</div></div><div><div></div></div></div></div>	<div><div><div><div><div>+</div></div><div><div>-</div></div></div><div><div>VCE</div></div><div><div>I</div></div><div><div></div></div></div></div>	<div>Switch off current regulation</div>	<div>Current regulation</div>
<div><div><div><div>P</div><div>PI 15</div><div><div>▲</div><div>▼</div></div><div>PI 100</div><div>P</div></div><div>Proportional characteristic-current regulation</div></div><div><div><div><div>P</div><div>II 67</div><div><div>▲</div><div>▼</div></div><div>II 50</div><div>P</div></div><div>Integral charcteristic-current regulation</div></div></div></div>	<div><div><div><div>a [mm]</div><div>0</div></div><div><div>U, I, P</div><div>t</div></div></div></div>	<div><div><div><div>P</div><div>10=</div></div><div><div>I</div><div>100=</div></div></div></div>	<div>Amount of adjustment made by regulation loop.</div> <div>Response time of regulation loop.</div>	<div>Regulation characteristics</div>
<div><div><div><div>rb 0</div><div><div>▲</div><div>▼</div></div><div>rb 1</div><div>P</div></div><div>0 = Status relay I = Ready relay</div></div><div><div><div>rb 0</div><div>Status relay switches if output power is present</div></div><div><div>rb 1</div><div>Ready relay switches if there is mains power and there are no error messages displayed</div></div></div></div>		<div>Switching of ready relay</div>	<div>Relays</div>	
<div><div><div><div>SPE 1</div><div><div>▲</div><div>▼</div></div><div>SPE 0</div><div>P</div></div><div>0 = Speed sensor OFF I = Speed sensor ON</div></div></div>		<div>Choose sensor</div>	<div>Sensor</div>	
<div><div><div><div>PPS 0</div><div><div>▲</div><div>▼</div></div><div>PPS 1</div><div>P</div></div><div>0 = Sine wave output current I = Semi-Block pulse output current</div></div></div>		<div>Choose output wave form for magnet impedance</div>	<div>Output</div>	
<div><div><div><div>P</div><div>1000</div></div><div>Run mode</div></div></div>				

Code 210 Restore Parameters

P P

<input type="text" value="FAC"/> <input type="button" value="SAFE"/> P	Restore factory settings	<input type="button" value="▲"/> Restore factory settings	Restore all parameter settings to original factory settings	Factory
<input type="text" value="USPR"/> <input type="button" value="SAFE"/> P	Restore user settings	<input type="button" value="▲"/> Restore user settings	Recall saved user settings	User

P

Run mode

Code 143 Save settings

P P

<input type="text" value="PUSH"/> <input type="button" value="SAFE"/> P	Save user settings	<input type="button" value="▲"/> Save user settings	Save user settings	User
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P

Run mode

Code 117 Hide menus

P P

<input type="text" value="Hd.C. 0"/> <input type="button" value="▲"/> <input type="text" value="Hd.C. 1"/> <input type="button" value="▼"/> P	Hd.C.= 1 = Hide menus	<input type="text" value="Hd.C. 1"/> <input type="text" value="Hd.C. 0"/>	Parameter menus not accessible, only set point can be changed Parameter menus accessible	Hide parameter settings	Protect
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P

Run mode

Code 127 Hide Service-menu

P P

<input type="text" value="EnS. 0"/> <input type="button" value="▲"/> <input type="text" value="EnS. 1"/> <input type="button" value="▼"/> P	Hd.C.= 1 = Hide Service menu	<input type="text" value="EnS. 0"/> <input type="text" value="EnS. 1"/>	Service menu C 040 not accessible, only actual current and Frequency Service menu accessible	Hide service menu	Protect
---	------------------------------	--	---	-------------------	---------

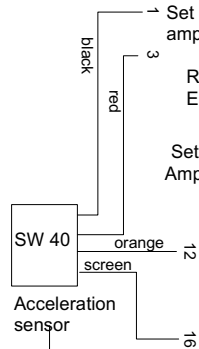
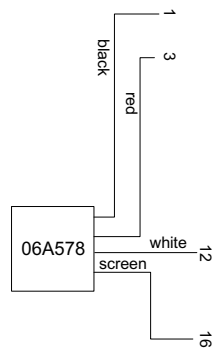
P

Run mode

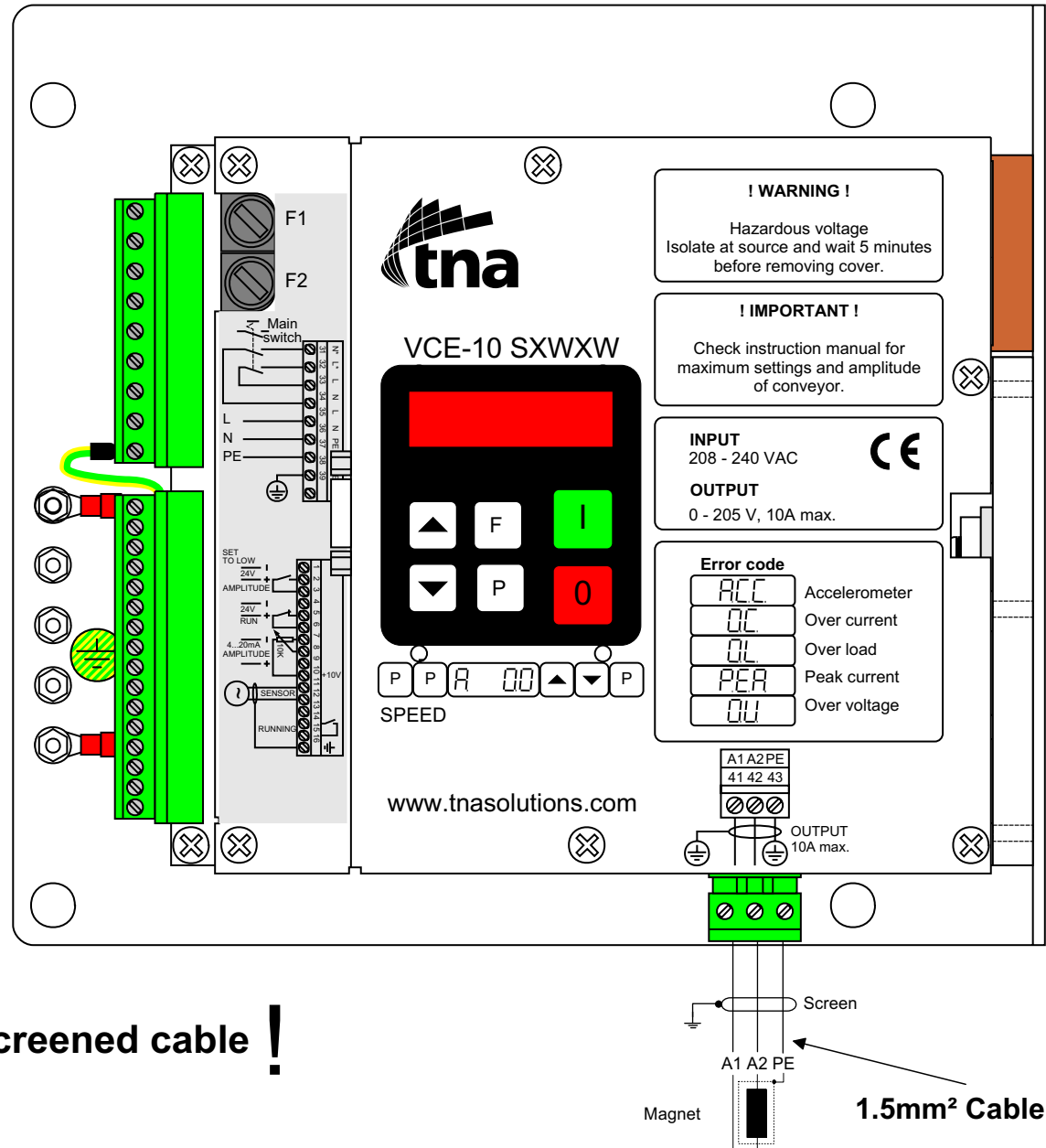
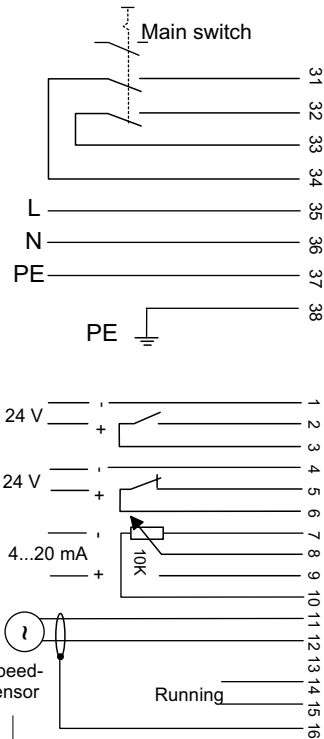
Connections

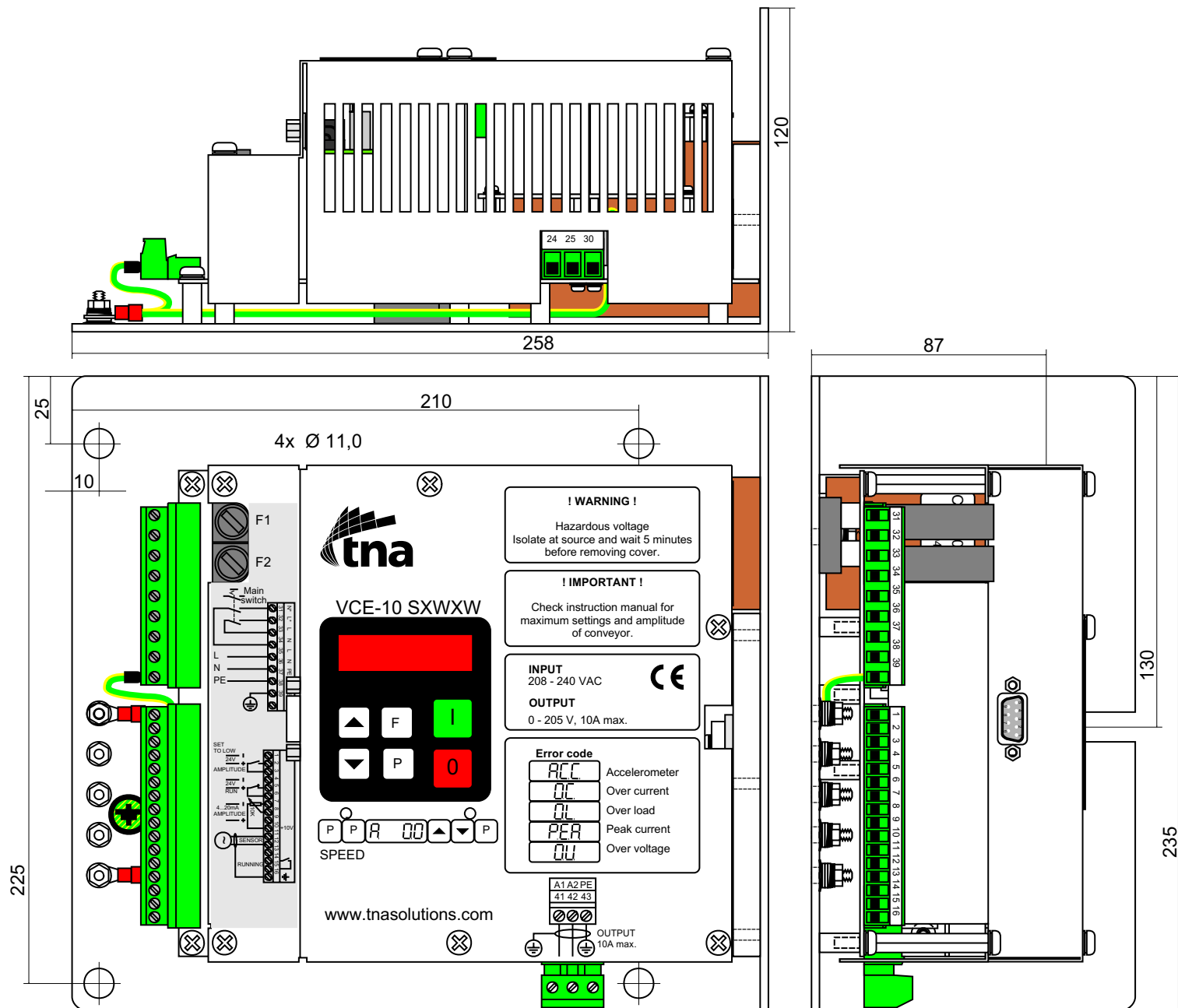
Menu C 040
set S.P.E. = 0
set A.P.S. = 1

Select Menu C 051
and: adjust
sensor 06A578
till = 25 is displayed



Set up menu C 040





Troubleshooting

Problem	Possible Cause	Remedy	Procedure
Feeder does not vibrate	Amplitude is set to zero Incorrect frequency setting	Increase amplitude by pressing [P] key twice in Menu C 000 and using arrow keys Carry out resonant frequency search	Frequency search.... For controller with a feedback sensor connected Empty feeder tray Switch controller on Adjust set point (A) to zero Select code C038 Enable Parameter ACC (set to 1) Select Parameter AFS and press the top arrow key to start frequency search For controller without a feedback sensor Empty feeder tray Switch controller on Set output frequency F in Code 038 to 100Hz Adjust set point to a low value (approx. 30%) Carefully increase or decrease F under Code 038 (direction depends on the feeder) Resonance is reached when the amplitude is at maximum for a constant set point.
Feeder will not "settle" at resonance in AFS	Feedback signal is too weak Sensor air-gap is too wide	Reduce power limit [P] in Menu 38 Check sensor air-gap setting	
Feeder "hammers" when set point is high	Feeder is operating too close to the resonant frequency Coil air-gap is too small	Adjust frequency Reduce power limit [P] in Menu 38 Check air-gap. (Caution - too wide an air-gap will increase current draw)	Check that the air-gap setting is correct for the feeder - if necessary ask the manufacturer
Coil gets hot	Frequency is set too low for the coil type Air-gap is too wide	Increase the frequency or use a different coil Reduce the coil air-gap	Adjust setting F under Code 038

Troubleshooting

Problem		Possible Cause	Remedy	Procedure
"OFF" is displayed, Feeder does not run		No enable signal Coil thermal sensor "open circuit"	Switch contacts or provide 24V enable signal Check that link is fitted between terminals 5 & 6 Check that link is fitted between terminals 51 & 52	If the enable is not used then a link must be fitted between terminals 5 & 6 If a 24V DC signal is used then the link must be removed
Feeder starts up slowly when enable is switched on, even though the soft start time is set to 0 (Occurs only in regulation mode)		Maximum power limit [P] in Menu C 038 has not been set correctly Circuit gain is set too low	Adjust the maximum amplitude limit [P] in Menu C038 Set PA (proportional characteristic or circuit gain)	Check the set point value under Code 038. If it is 20% for example then the limit P can be reduced to 30%. After adjustment the set point range should then be 0 to 100% In regulation mode the regulation gain of the electronic circuit must be tuned to the mechanical system. This is achieved by adjusting parameter PA under Code 038. If the feeder responds too slowly then the value must be increased to a level just below where the feeder oscillates ("hunts"). If the feeder "hunts" then the PA value must be reduced
Maximum amplitude is achieved with a very low set point value		Maximum power limit [P] in Menu C 038 has not been set correctly	Adjust the maximum amplitude limit [P] in Menu C038	Increase the value of [P] in Menu C 038
ERROR - OL	Output power too high	Coil power is too high	Use a controller with a higher current rating	
		Frequency is set too low	Increase frequency	Use parameter F under Code 038 Depending on the feeder characteristics the frequency can be set higher
		Coil air-gap is too large	Reduce air-gap	
		Short-circuit	Check wiring and coil	To establish if a wiring short-circuit has occurred first remove connector for terminals 41, 42 & 43

Troubleshooting

Problem		Possible Cause	Remedy	Procedure
ERROR - OC	Current too high	Short-circuit on output Coil faulty	Check coil and wiring	To establish if a wiring short-circuit has occurred first remove connector for terminals 41, 42 & 43
ERROR - OU	DC link voltage too high	Mains voltage too high	Check mains supply	
		Back emf from coil (more likely at lower frequencies)	Contact supplier	
ERROR - ACC	Sensor fault	Sensor has failed	Check sensor	If the sensor is not used the parameter ACC must be set to 0 in Menu C 038
ERROR - EEP	Memory fault	Component problem	Refer to supplier	Unit cannot be repaired on site (exchange and send back to manufacturer)
ERROR - PLL ERROR - IOA	µPC fault warning	High EMC interference	Check the integrity of the earth bonding of the controller and connections to the feeder	Feeder, sensor and enable input must be connected with screened cables Sensor and enable input cables should not be routed in the same trunking as power cables If this code is displayed it may be possible to reset the system by switching the mains supply off and then back on again If the fault reoccurs refer to supplier
Original Controller settings have been lost		On-site adjustment	Recall conveyor settings	ISet USPR to SAFE in Menu 210

If the above procedures do not solve the problem and it appears that the unit is faulty then please use the check sheet provided before returning the controller to your supplier.