



fimotec - fischer
Montagetechnik

Operating Instructions

Thyristor controller for vibratory feeders

Type TRN 16

fimotec-fischer Montagetechnik
Friedhofstraße 13
78588 Denkingen
Telefon 07424 / 884-0
Telefax 07424 / 884-50
e-mail: post@fimotec.de

Technical Safety Information for the User

This description contains the necessary information for the correct application of the product described below. It is intended for use by technically qualified personal.

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)

Safety Instructions

The following instructions are provided for the personal safety of operators and also for the protection of the described product and connected equipment.



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**
- **The earth connection must be checked, for correct function, after installation.**

Specified Use

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

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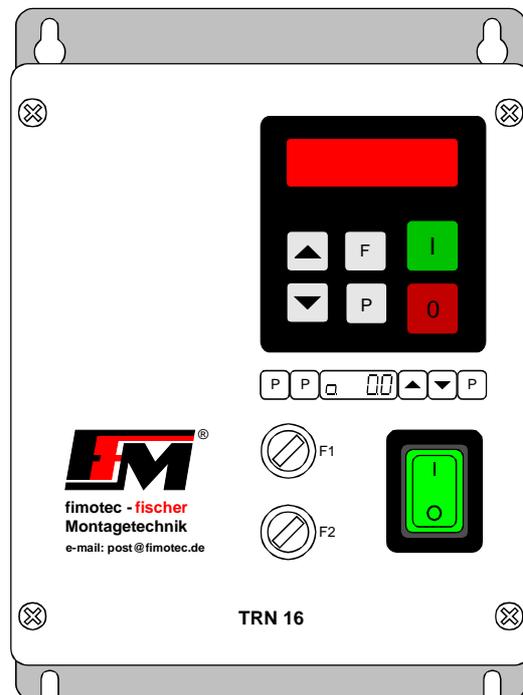
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1.0 General

The TR / TRN 16 include single and twin controllers that are used for infinite variable throughput control of vibratory feeders. The units are built into an IP54 aluminium housing that is suitable for mounting onto a vibration free part of the work station. The controller comprises a mains switch, fuses and output connectors. Input and output sockets are provided for sensors and controlling.

The feeder throughput setting and adjustment of all special parameters is made through the integrated touch panel and LED display in the front panel. In addition to the coloured ON/OFF buttons the unit can be quickly enabled/inhibited, through an input, without switching the supply.

The adjustment of the feeder amplitude is achieved by using phase angle control of the mains current. Depending on the frequency of the mains voltage, the units are suitable for vibratory feeders with a mechanical frequency of: 3000 cycles/min (50 Hz) or 6000 cycles/min (100 Hz) with a mains frequency of 50 Hz. 3600 cycles/min (60 Hz) or 7200 cycles/min (120 Hz) with a mains frequency of 60 Hz.



Model				TRL 16
Function range:				
2-channel control				•
Soft start	Each output, adjustable, 0...4 secs			•
Enable	Contact or 24V signal voltage			•
Mechanical frequency	switchable 3000/6000 cycles/min (50Hz supply)			•
Status output	Relais - unit status (Feeder ON/OFF)			•
Track control	Component track with one or two sensors. Adjustable on and off switching time delays			•
Channel 1				
Channel 2				
Sensor input	2 Sensors 24 V, PNP			•
Sensor Time-out	Relais, Sensor Time-out			•
Fault output				
Solenoid output	230 V, DC e.g. for air reject			•
Coarse / fine control	2 speed operation, switching from a sensor			•
Line 1				
Pulsed control	Pulsed output with adjustable times			•

2.0 Function

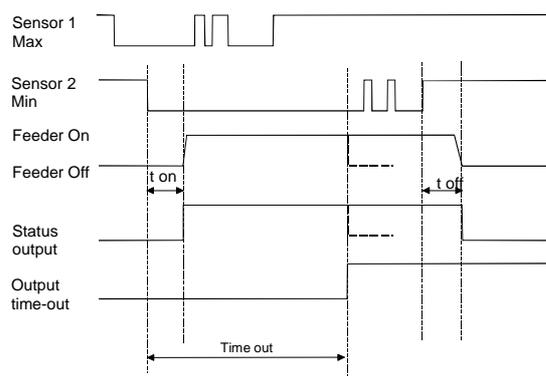
A microprocessor is used as the main control component and this is used to change all control functions. The throughput is adjusted by using phase angle control. An internal compensation circuit regulates the controller so that variations in the mains voltage have no effect on feeder throughput. All power outputs have an adjustable soft start.

2.1 Mechanical frequency

The mechanical frequency of the vibratory feeder is determined by the frequency of the mains supply and can also be changed by inhibiting a mains half-wave (3000 / 6000 cycles per minute, for 50 Hz mains). The adjustments can be made by the control display in the set menu C 020 / C 021, HA. = 0/1.

2.2 Track control

- Controlling a component track with a single sensor:
A single sensor can be used to regulate the store of material, on a linear feeder for example. When product has been detected by the sensor, the feeder switches off, after a preset delay time "t-off" has expired. The feeder switches back on again when there is no product detected, after a preset delay time "t-on" has expired. Every sensor signal resets the timer so that the delay always starts after the last component has been detected.
- Controlling a component track with two sensors:
One of the sensors is used to control the minimum product position and the other controls the maximum position. When product has been detected by the MAX-sensor, the feeder switches off, after a preset delay time "t-off" has expired. When the component level drops below the MIN-sensor, the feeder switches back on again, after a preset delay time "t-on" has expired.



Track Control (1 Sensor)

MIN / MAX Control (2 Sensors)

2.3 Sensor-time-out (Fault signal ST 6)

This function is used to monitor if components are being detected by the sensor. A contact switch to output ST6 occurs, when no product has been detected by the sensor for a selected time period. If even the power output (feeder) should be switched off, the sensor time-out function must be activated in the menu "C. 015 "E: En = 1. The time-out feature is adjustable from 30 to 240 seconds. When this feature is enabled, the display appears "ERROR SE" after the time-out. Reset the time-out in the activated feature by switching the key "p". When the feature is deactivated, the time-out feature can also be reset via the sensor. Also by switching the main power off and on the time-out feature can be reseted.

2.4 Interlocking Channel 1 / Channel 2

Output channels 1 and 2 can be interlocked so that:-

- Channel 1 can be active only when channel 2 is active
- Channel 2 can be active only when channel 1 is active

Set using menu "C 003".

2.5 Coarse/fine control

A coarse/fine function can be used in place of track control. This switches the power output 1 to a second set point level on a signal from sensor 1. This can be used in weighing applications, for example, in response to a coarse/fine contact (to prevent over filling).

2.6 Pulsed output

This is used to control a hopper feeder. The power output is pulsed according to ON and OFF time settings. A motor driven bunker hopper (1-phase) can also be operated in the manner but the set point for this channel must be set to 100%. This function must be selected in menu "C004".

3.0 Control input/output

3.1 Enable ST 5 / ST 5.1

There are inputs for channel **ST 5**, **ST5.1** which switch the controller ON/OFF internally (not the supply) from a supervisory system. A 24 V, DC signal or switch can be used. The input function is programmable. **By selecting the enable input (-En =1 Set using menu "C 003".) it is possible to run without an enable signal being present.**

3.2 Status output ST 1

Relais output **ST 1** for condition monitoring e.g. for integration with other control systems. The output is energised when power output 1 or 2 is active (internally selectable by sliding switch).

3.3 Solenoid output ST 2

A 230 V AC (110 V AC) solenoid valve output is provided for use with an air-jet, for example. This is factory set (Air. 0 in Menu 003) to de-energise when the feeder powers down and to energise when the feeder starts up again. It is possible to introduce time delays of 1 second between energising the solenoid output and powering up and 4 seconds between powering down and de-energising the solenoid output, by selecting Air. 1 in menu C003. (Fabr. Hirschmann STAKEI 200).

3.4 Current routing ST 7

About the ST 7 connector the input voltage will be passed; the output is internally secured at 6.3 A. (Fabr. Hirschmann STAKEI 2)

4.0 Operating displays

In normal operation the throughput setting for channel 1 is displayed.

 e.g. 90 %

Whilst setting up, the output channel is indicated by the first display segment.

 Channel 1 e.g. during set point adjustment

 Channel 2 e.g. during set point adjustment

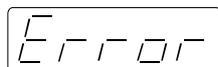
Output

 Switch off using the "0" button

 No enable signal. When an enable signal is not used then set parameter "-E. = I" in menu 020 or 021.

 Switch off under track control.

 Point flashes – time delay is active.





Sensor Time-out is exceeded (Menu "C 015")
 Reset with "P" button

5.0 Technical Data

Unit type			TRN 16	
Function selectable				
Mains supply	110V or 230V +/- 10 %, 50/60 Hz self-setting			
Power output 1	0...100 / 0...210 V, 6 A (max. 10 A total)			
Power output 2	0...100 / 0...210 V, 6 A (max. 10 A total)			
	The total current of both outputs must not exceed 10A !			
Umax	50...100% adjustable			
Unit fuses	2 x 10 A, M			
Construction	Aluminium housing IP 54			
Operator controls	Mains switch and display with programming buttons. Power adjustment to the feeders and all parameters can be set up, externally, using the display and buttons (the unit does not have to be opened).			
Soft start	Adjustable 0...4 sec., operates whenever the unit is switched on ie mains, enable and track control.			
Soft stop	Adjustable 0...4 sec., operates in conjunction with track control and enable.			
Enable	Contact			
Solenoid output	Relais, Changeover contact			
Sensor supply	24 V, DC, 100 mA (total)			
Sensor types	24 V, DC PNP			
Track control switch-on delay time	0...60 Sec.			
Track control switch-off delay time	0...60 Sec.			
Pulse control ON	0...60 Sec.			
Pulse control OFF	0...60 Sec.			
Fault time (Sensor-Timeout)	30...240 Sec.			
Status output	Relais, Changeover contact			
Operating temp.	0...+45 °C			
Storage temp.	-40...+80 °C			
Weight				
Dimensions WxHxD	150 x 205 x 105			
Standards	EN 61000-6-2, EN 61000-6-4			

6.0 Declaration of Conformity


We declare that these products, as stand-alone equipment, conform to the following standards or subsequent documents: EN 61000-6-2 and EN 61000-6-4 in accordance with 2004/108/EG regulations.

REO ELEKTRONIK GMBH, D-42657 Solingen

7.0 Adjustment Parameters

Parameter:		Display	Factory settings	Pass code:
• Feeder amplitude Channel 1 and Channel 2		o. A. l. A.	0 %	000 / 020 / 021
• 2. Feeder amplitude (fine)	0...100 %	2.	0 %	000 / 020
• Maximum control limit (U_{max}) Channel 1	50...100 %	o. P.	90 %	020
• Maximum control limit (U_{max}) Channel 2	50...100 %	l. P.	90 %	021
• Feeder mechanical frequency 3000/6000 cycles/min (50Hz supply) Channel 1	0 / 1	o. HA.	0	020
• Feeder mechanical frequency 3000/6000 cycles/min (50Hz supply) Channel 2	0 / 1	l. HA.	0	021
• Soft start Channel 1	0...10 sec.	o. /.	0,1 sec.	020
• Soft start Channel 2	0...10 sec.	l. /.	0,1 sec.	021
• Soft stop Channel 1	0...10 sec.	o. \.	0,1 sec.	020
• Soft stop Channel 2	0...10 sec.	l. \.	0,1 sec.	021
• Invert external enable Channel 1	0 / 1	o. -E.	l	020
• Invert external enable Channel 2	0 / 1	l. -E.	l	021
• Change Channel 1 Track control or coarse/fine control	0...60 sec.	o. l.	5 sec.	007
• Track control switch-on delay Channel 1	0...60 sec.	l. l.	5 sec.	006
• Track control switch-on delay Channel 2	0...60 sec.	o. O.	5 sec.	007
• Track control switch-off delay Channel 1	0...60 sec.	l. O.	5 sec.	006
• Track control switch-off delay Channel 2	0 / 1	o. -S.	0	007
• Invert sensor function PNP / PNP In-verse Channel 1	0 / 1	l. -S.	0	006
• Activate sensor time-out Channel 1	0 / 1	o. E.E.	0	015
• Activate sensor time-out Channel 2	0 / 1	l. E.E.	0	015
• Fault time (Sensor Time-out) Channel 1 and Channel 2	30...240 sec.	E.	180 sec.	015
• Sensor logic AND / OR	0 / 1 0 / 1	SLA. SLE.	0 0	014
• Pulse control Channel 1	0 / 1	o. HP.	0	004
• Pulse control Channel 2	0 / 1	l. HP.	0	004
• Cycle time On	0...60 sec.	H.	2 sec.	004
• Cycle time Off	0...60 sec.	h.	2 sec.	004
• Switching channel 1 Track Coarse/fine control	0 / 1	S.P.2.	0	003
• Link: Channel 1 blocks channel 2	0 / 1	l.-o.	0	003
• Link: Channel 2 blocks channel 1	0 / 1	o.-l.	0	003
• Air valve function on/off	0 / 1	A.i.r	0	003
• Save user settings		PUSH.		143
• Restore factory settings		FAC.		210
• Restore user settings		US.PA.		210
• Hide program menus	0 / 1	Hd.C.	0	117

The user-specific settings can be saved with "C 143" and if necessary with "C 210" back-loaded.

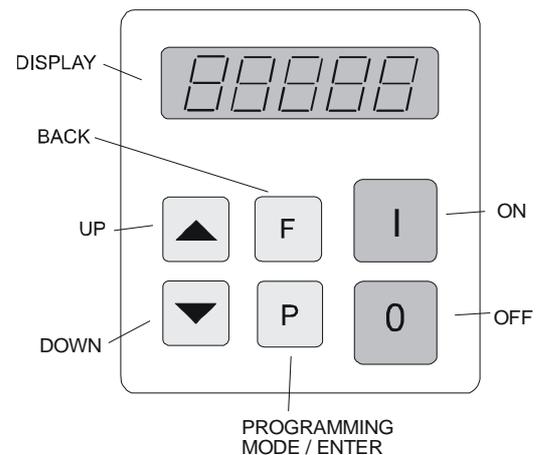
8.0 Settings

The six buttons and a LED display found in the front panel, are used for operating and setting up the unit. All operating methods and adjustable parameters can be set up through this panel.

The "I" and "O" buttons are used for switching the unit ON and OFF, however, **these do not provide mains isolation**, they simply inhibit the power semiconductors

The "P", "F" and "Cursor Buttons" are used for parameter adjustment. Parameters are set by using menu controls which are called up by entering operator codes. A capital letter is used to indicate the selected function.

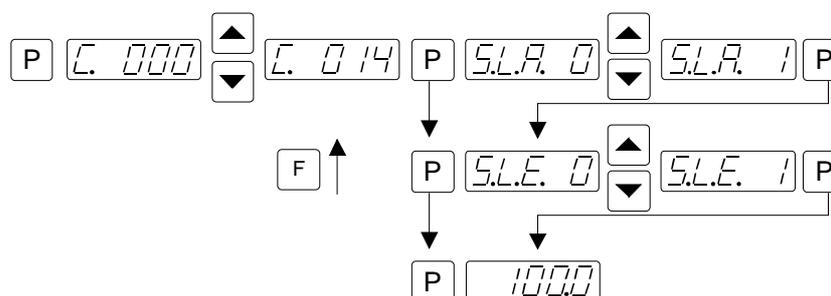
The display value can be increased or decreased by units, or tenths of units, by a short press of the cursor buttons. Holding the buttons down will cause the display to change in units of ten.



To prevent accidental or unauthorized adjustment the adjustment parameters, in the user menus, are protected. A code must be entered to open the user menus. There are different pass codes for each function group.

Setting adjustments are automatically saved upon leaving the programming mode or if no button is pressed for a period of 100 seconds.

All setting routines are commenced by pressing the programming button "P". The following diagram should clarify the sequence in which keys are pressed:



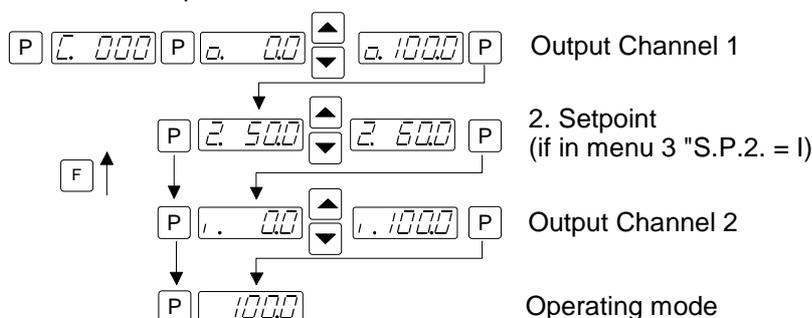
1. Press the "P" key.
2. Select the code number with the cursor keys.
3. Press the "P" key. This displays the first menu point. The required menu point can be found by repeatedly pressing the "P" key (scrolling).
4. The value in the menu point can be changed with the cursor keys..
5. Scroll to the next menu point or to the end of the menu, which returns the display to the set point value, by pressing the "P" key. To exit the menu and return back to the normal display, quickly, depress the "P" key for 5 seconds.
6. To return back to the previous position in the menu, press the "F" key.

8.1 Set point for feeder throughput

The set point can be changed in several menus.

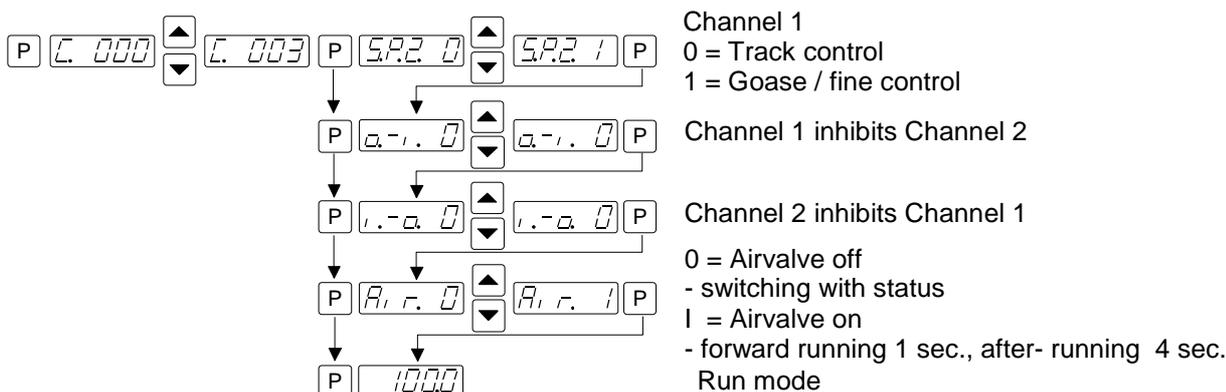
The machine operator can change the set point, without knowing the menu codes, by pressing the "P" key twice.

Code 000 Setpoint



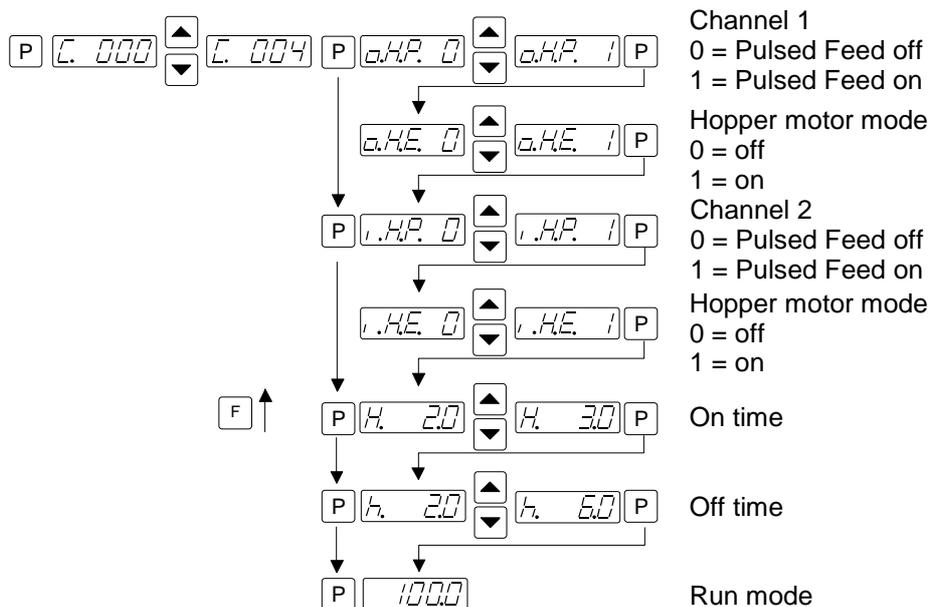
8.2 Function selection

Code 003 Selection



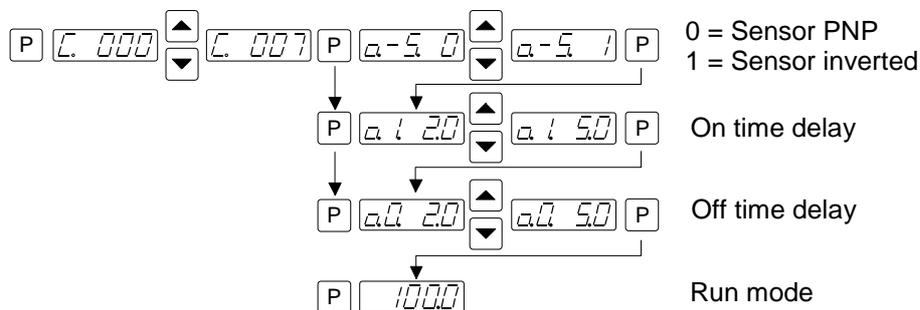
8.3 Enable Pulse Feed Function

Code 004 Pulsed Feed



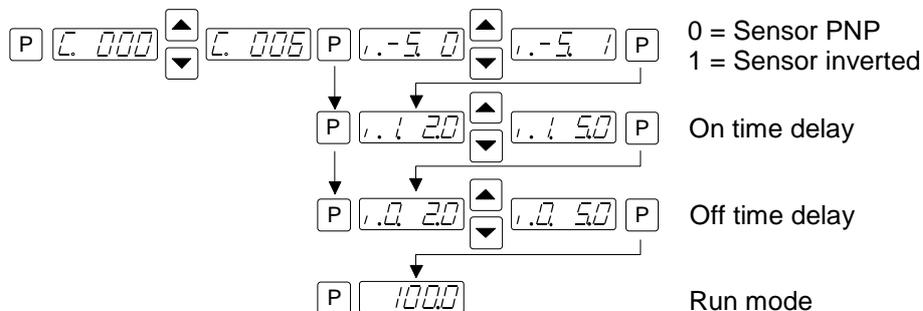
8.4 Track Control Channel 1

Code 007 Track control channel 1



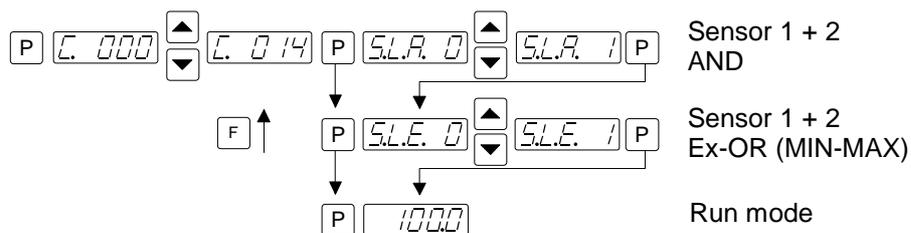
8.5 Track Control Channel 2

Code 006 Track control channel 2



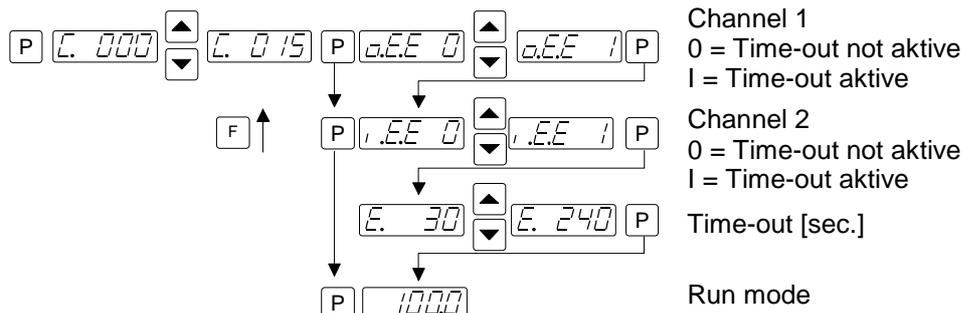
8.6 Sensor logic

Code 014 Sensor logic



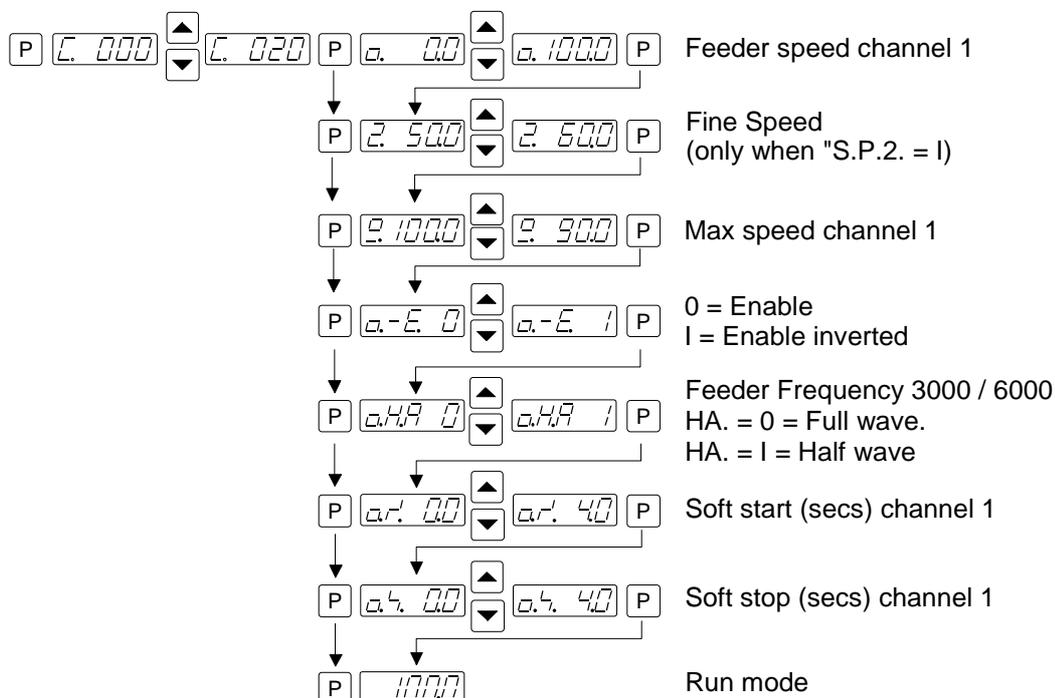
8.7 Sensor time-out

Code 015 Sensor time-out



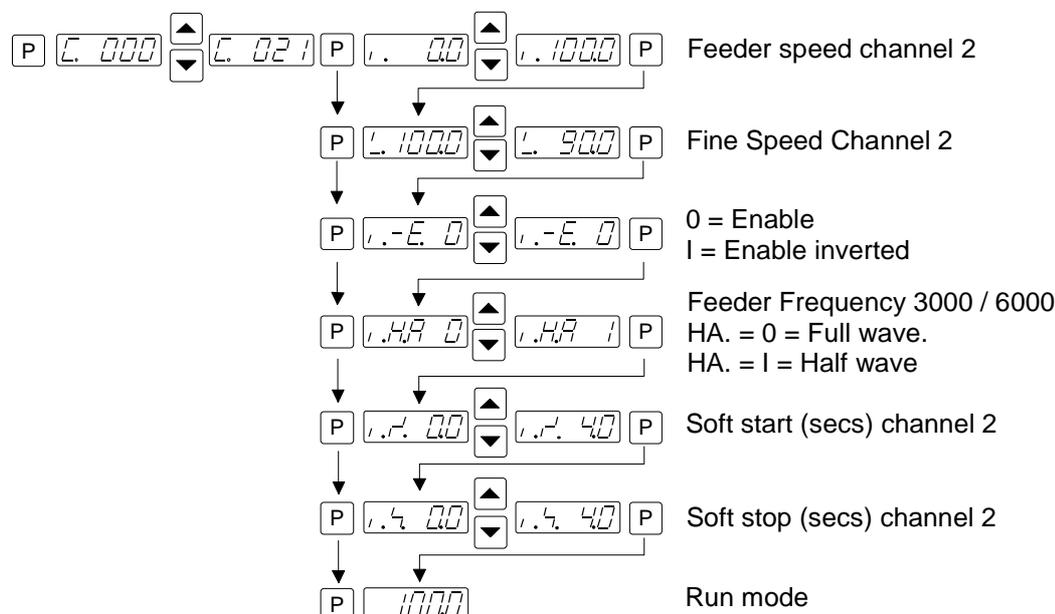
8.8 Feeder Channel 1

Code 020 Feeder Channel 1



8.9 Feeder Channel 2

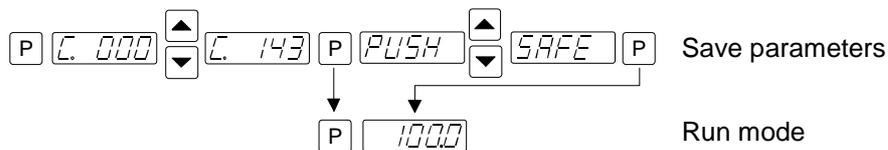
Code 021 Feeder Channel 2



8.10 Save user settings

Store current parameter settings

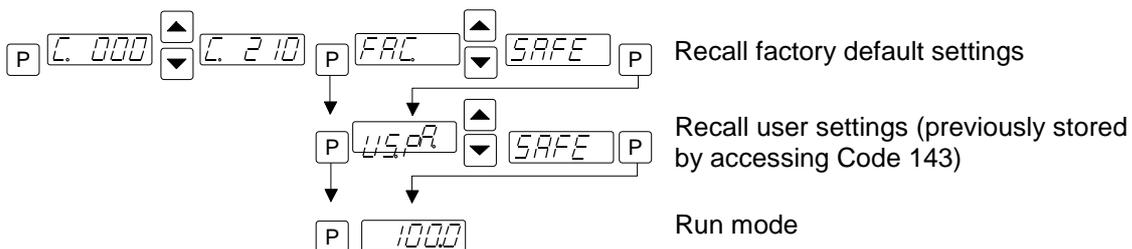
Code 143



8.11 Re-instating settings

Recalling factory and user settings

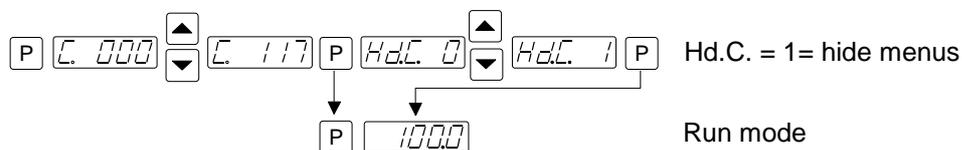
Code 210



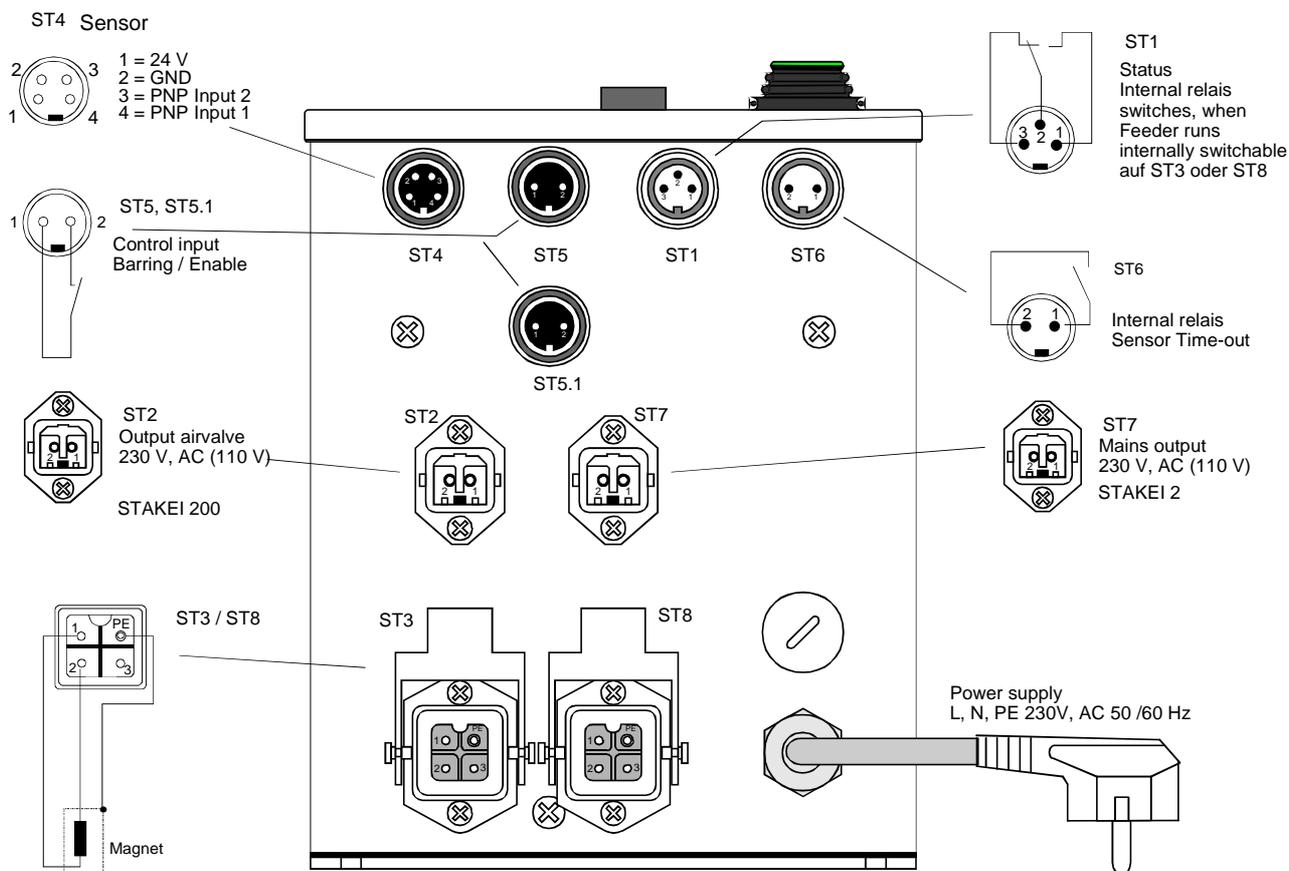
8.12 Protect unauthorised adjustment of settings

This disables all passcodes so that they cannot be accessed, except feeder speed

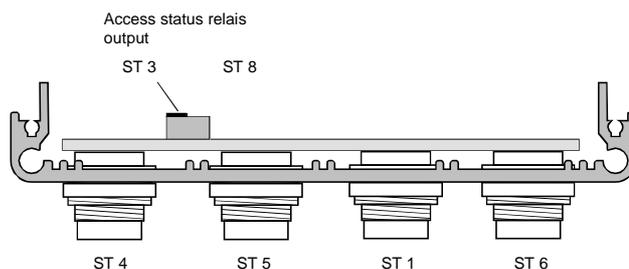
Code 117



9.0 Controller Connections



Internal switch for the assignment of the status relays.



To set the switch, the front panel must be removed before.

10.0 Setting up instructions

- Check that the controller is correctly rated for the feeder.
- Establish the mechanical frequency of the feeder.
- Wire the controller according to the connection diagram (see 8.0).



Important!

It is extremely important that the mechanical frequency is correctly set for the feeder, otherwise an incorrect setting could cause loss of feeder power or overheating of the drive coils (magnet). The settings for the mechanical frequency of the feeder can be found in the menu for each feed channel i.e. "C020" and "C021", using parameter "HA".

For half wave (3000 cycles/minute) HA must be set to 1!

- Switch the controller on.
- Adjust the frequency.

The feeder(s) can now be put into operation.

Adjust the feed settings and optimise if necessary.
Set the timers, sensor logic and unit interlocks.
Save settings (Menu "C 143").

10.1 Fault finding

Controller does not power up:

- Check mains supply and fuse (change if necessary).
- Check input fuse in the controller (change if necessary).

Feeder does not run:

- Is the control input (enable/inhibit) correctly set? (If the enable is not used then $-E = 1$ must be set in the corresponding Menu ("C 020" or "C 021").

The feeder lacks power:

- Check that the correct frequency has been set and if necessary adjust.
- Check the mains frequency (50/60 Hz). The mains and mechanical frequencies must be the same.
- The maximum limit has been set too low (Menu "C 020" / "C 021").

The feeder amplitude is too high (hammers):

- Wrongly adjusted mechanical frequency. BEWARE the coils could be damaged through overheating.
- Maximum limit is set too high (Menu "C 020" / "C 021").

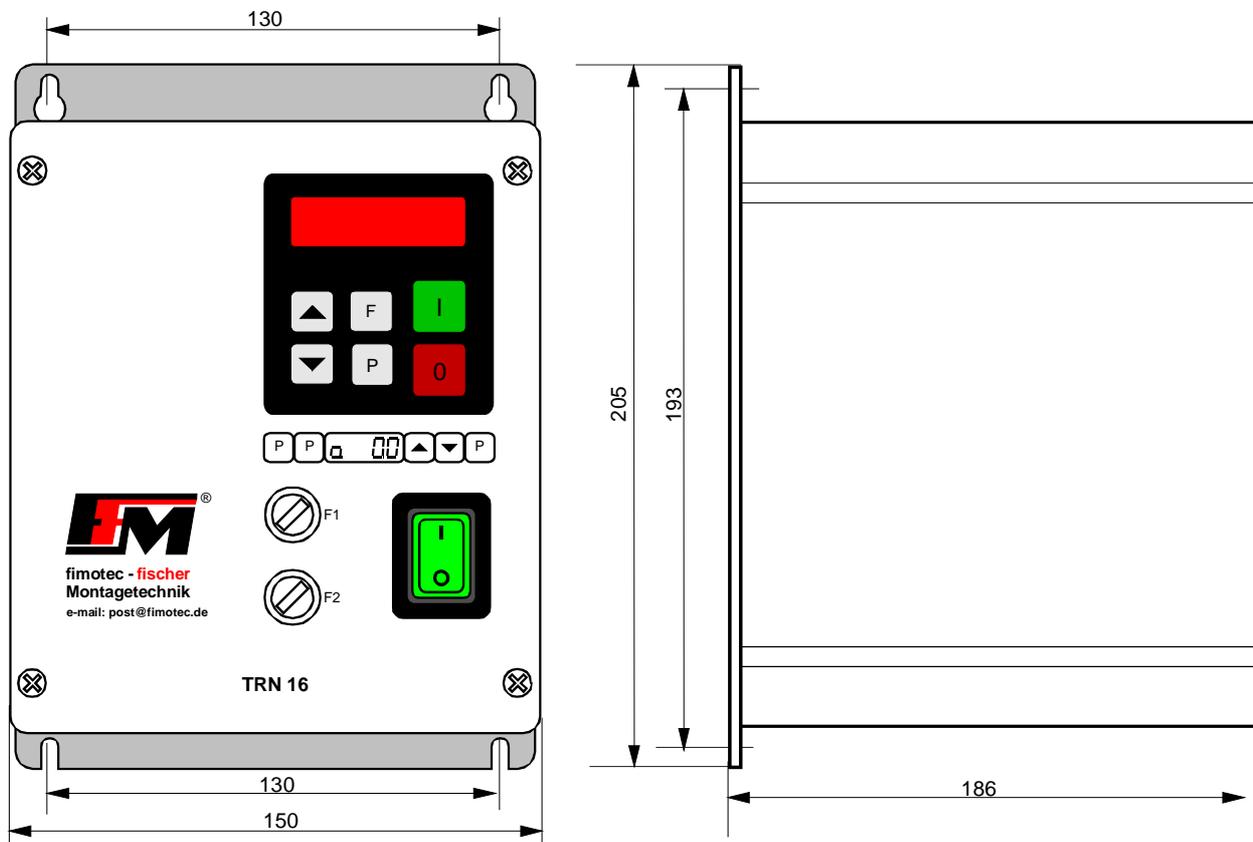
Coil gets hot:

- Coil is designed for incorrect supply voltage.
- Incorrectly adjusted mechanical frequency (adjust if necessary).

Track control does not work:

- Check sensor polarity.

11.0 Dimensions



Dimensions in mm