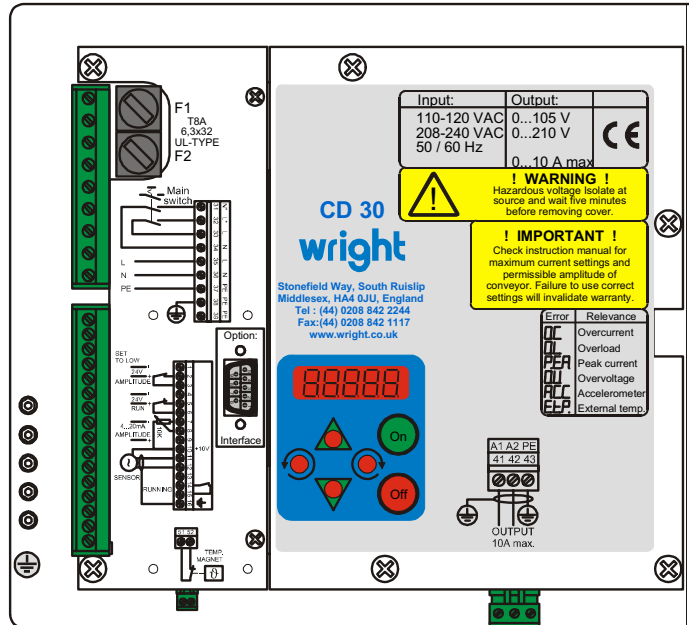


## Operating Instructions

### 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 drive magnet. 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 and a remote enable.



### 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.

### Technical Data

### CD 30

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 50081-2, EN 50082-2

## 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

<b>!</b>	<b>Check !</b>	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 ?
	<b>Connect the unit in accordance with the wiring instructions and ensure that earthing is correct !</b>	
	<b>Caution !</b>	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.

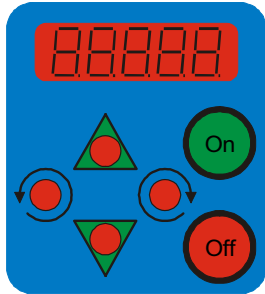
### Specified use

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 89/336/EWG



**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 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%	l.	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...10Vdc / 0(4)...20mA	0 / l	E.S.P.	0	038
Second set point	0...100%	2	0.0	038
Select regulation mode	0 / l	ACC.	1	038
P Characteristic	0...100	P.A.	100	038
I Characteristic	0...100	I.A.	100	038
Auto frequency control	0 / l	A.F.C.	1	038
Start auto frequency search		A.F.S.		038
* Service Interface Off/On	0 / l	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 / l	-En.	0	040
* Current regulation On/Off	0 / l	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 / l	r.b.	0	040
Speed sensor	0 / l	S.P.E	0	040
Sine wave / Semi-Block pulse output current	0 / l	A.P.S	0	040
Master - slave mode	0 / l	Chr.	0	028
Slave designation		P.L.L.	0	028
Recall factory settings		FAC.		210
Save user settings		PUSH		143
Hide menus	0 / l	Hd.C.	0	117
Hide service menus	0 / l	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>Displays actual current</p>	<p>Display shows the actual drive coil current as a % of the controller rated current (<math>I_{nom}</math>)</p> <p>Calculation  <math display="block">\frac{\text{Display} \times I_{nom}}{100} = \frac{38,5 \times 10}{100} = 3,85 \text{ A}</math></p>	<p>For monitoring the output current</p> <p>Actual current</p>
<p>Current limit I-max 0...100 %</p>	<p>Adjustment of the current limit as a % of the controller rated current (<math>I_{nom}</math>)</p> <p>Calculation e.g. 4,8 A Magnet:  <math display="block">\frac{I - \text{Limit} \times 100}{I_{nom}} = \frac{4,8 \times 100}{10} = 48 \%</math></p>	<p>Setting the output current limit to protect the drive coil</p> <p>Current limit</p>
<p>Amplitude set point 0...100 %</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>Maximum limit 100...5 %</p>		<p>Setting vibrating frequency depending on feeder type  <b>Warning!</b>  <b>Incorrect frequency setting can cause damage to magnet</b></p> <p>Vibrating frequency</p>
<p>0 = Set point adjustment using display          I = External set point adjustment</p> <p>0 = external set point 0...+10 V          I = external set point 4...20 mA</p>		<p>Set point adjustment using touch panel or external signal</p> <p>Set point</p>
<p>Second set point (Coarse / Fine) 0...100 %</p>		<p>Switch to second set point</p> <p>Second set point</p>

...continued on next page...

**Code 038 Function settings**

	0 = Open loop control (sensor not used) 1 = Closed loop control (sensor used)		Activates closed-loop control so that feeder amplitude is held constant irrespective of load changes. A feedback sensor must be used	Closed-loop control
	Proportional characteristic (gain) 0...100		Adjustment of amount of correction and speed of response under closed-loop control	
	Integral characteristic (damping) 0...100			
	0 = Automatic frequency search OFF 1 = Automatic frequency search ON		Automatic search for resonant frequency	
	Start frequency search			f = fixed      f = f resonance
	Run mode	Pressing key starts resonant frequency search	Start automatic search for resonant frequency	Frequency search

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

**Manual adjustment of the vibrating frequency:**

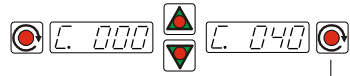
Ensure that frequency adjustment is made with a low set point setting (e.g. 30%) because even with a low output voltage it is possible to produce a high amplitude when resonance is found (causing the magnet to "hammer"). An analogue, moving-iron, true RMS ammeter should be connected in the output circuit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

 0 = Interface OFF  
 1 = Interface ON

<p>Actual current</p>	<p>Display shows the actual drive coil current as a % of the controller rated current (<math>I_{nom}</math>)</p>	<p>Calculation</p> $\frac{\text{Display} \times I_{nom}}{100} = \frac{38,5 \times 10}{100} = 3,85 \text{ A}$	Controlling the output current	Effective current value
<p>Current limit 0...100 %</p>	<p>Current limit setting in % of rated controller current (<math>I_{nom}</math>)</p>	<p>Calculation e.g. 5.0 A Magnet:</p> $\frac{I \text{ Limit} \times 100}{I_{nom}} = \frac{5.0 \times 100}{10} = 50 \%$	Setting the output current limit to match the magnet rating	Current limit
<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>		Limits for the frequency range adjustment available to the user. A narrow frequency range is better for frequency search.	Frequency limits
<p>Actual frequency</p>	<p>Display shows the actual output frequency</p>		Checking the frequency	Freq'cy
<p>A.F.C. threshold</p>			A.F.C. Threshold	A.F.C. Threshold
<p>Soft Start/Stop</p>	<p>Feeder amplitude</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>		Soft Start/Stop	Soft Start/Stop

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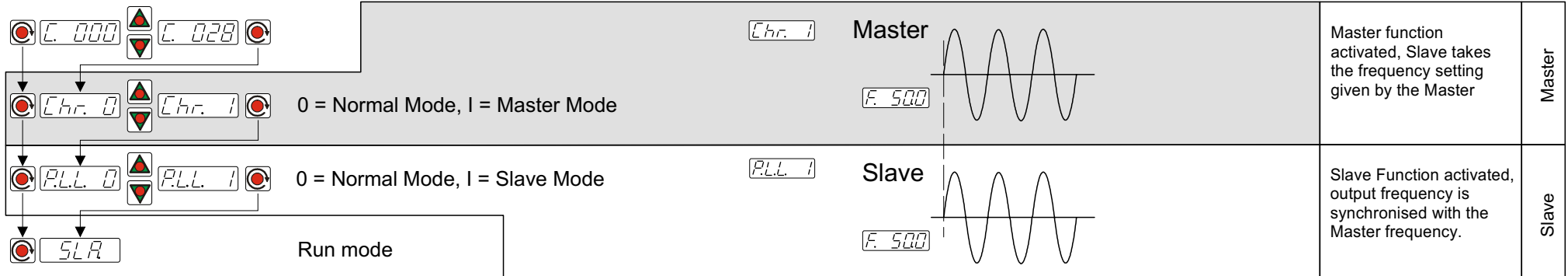
**Code 040 Service**

<p>Invert enable</p>			+24 V Signal or closed contacts enables the output  +24 V Signal or closed contacts inhibits output	Enable input
<p>0 = Current regulation On 1 = Current regulation Off</p>			Switch off current regulation	Current regulation
<p>Proportional characteristic-current regulation                   Integral characteristic-current regulation</p>			Amount of adjustment made by regulation loop.  Response time of regulation loop.	Regulation characteristics
<p>0 = Status relay 1 = Ready relay</p>			Status relay switches if output power is present Ready relay switches if there is mains power and there are no error messages displayed	Relays
<p>0 = Speed sensor OFF 1 = Speed sensor ON</p>	*		Choose sensor	Sensor
<p>0 = Sine wave output current 1 = Semi-Block pulse output current</p>	*		Choose output wave form for magnet impedance	Output
<p>Run mode</p>				

\* For PPM conveyor:

Set S.P.E. to 0  
Set A.P.S. to 1



**Code 028 Master / Slave**


**Code 210 Restore Parameters**

<b>FAC</b> <b>SAFE</b>	Restore factory settings	Restore factory settings	Restore all parameter settings to original factory settings	Factory
<b>USPR</b> <b>SAFE</b>	Restore user settings	Restore user settings	Recall saved user settings	User
<b>1000</b>	Run mode			

**Code 143 Save settings**

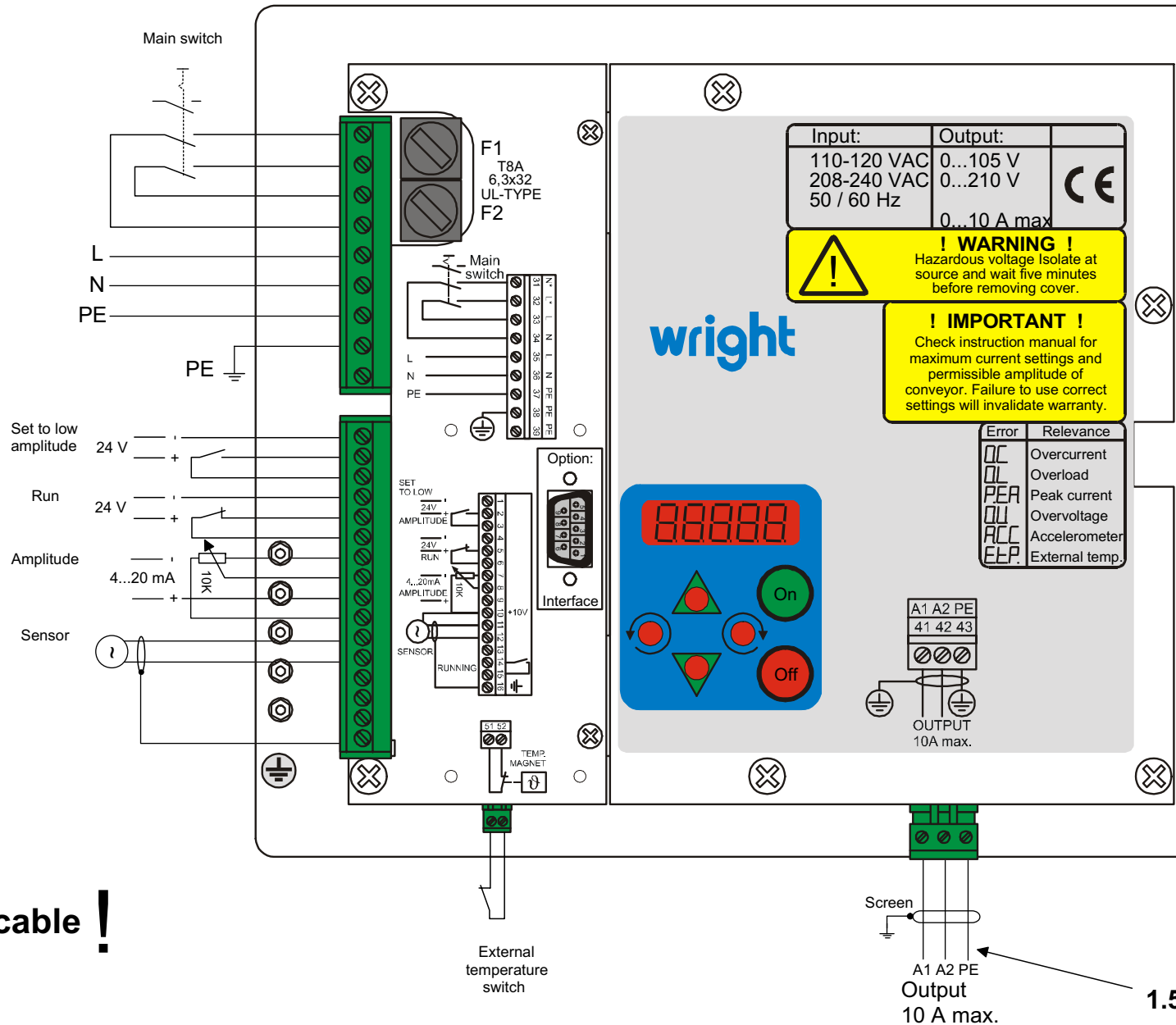
<b>PUSH</b> <b>SAFE</b>	Save user settings	Save user settings	Save user settings	User
<b>1000</b>	Run mode			

**Code 117 Hide menus**

<b>Hd.C. 0</b> <b>Hd.C. 1</b>	Hd.C.= 1 = Hide menus	<b>Hd.C. 1</b> Parameter menus not accessible, only set point can be changed <b>Hd.C. 0</b> Parameter menus accessible	Hide parameter settings	Protect
<b>1000</b>	Run mode			

**Code 127 Hide Service-menu**

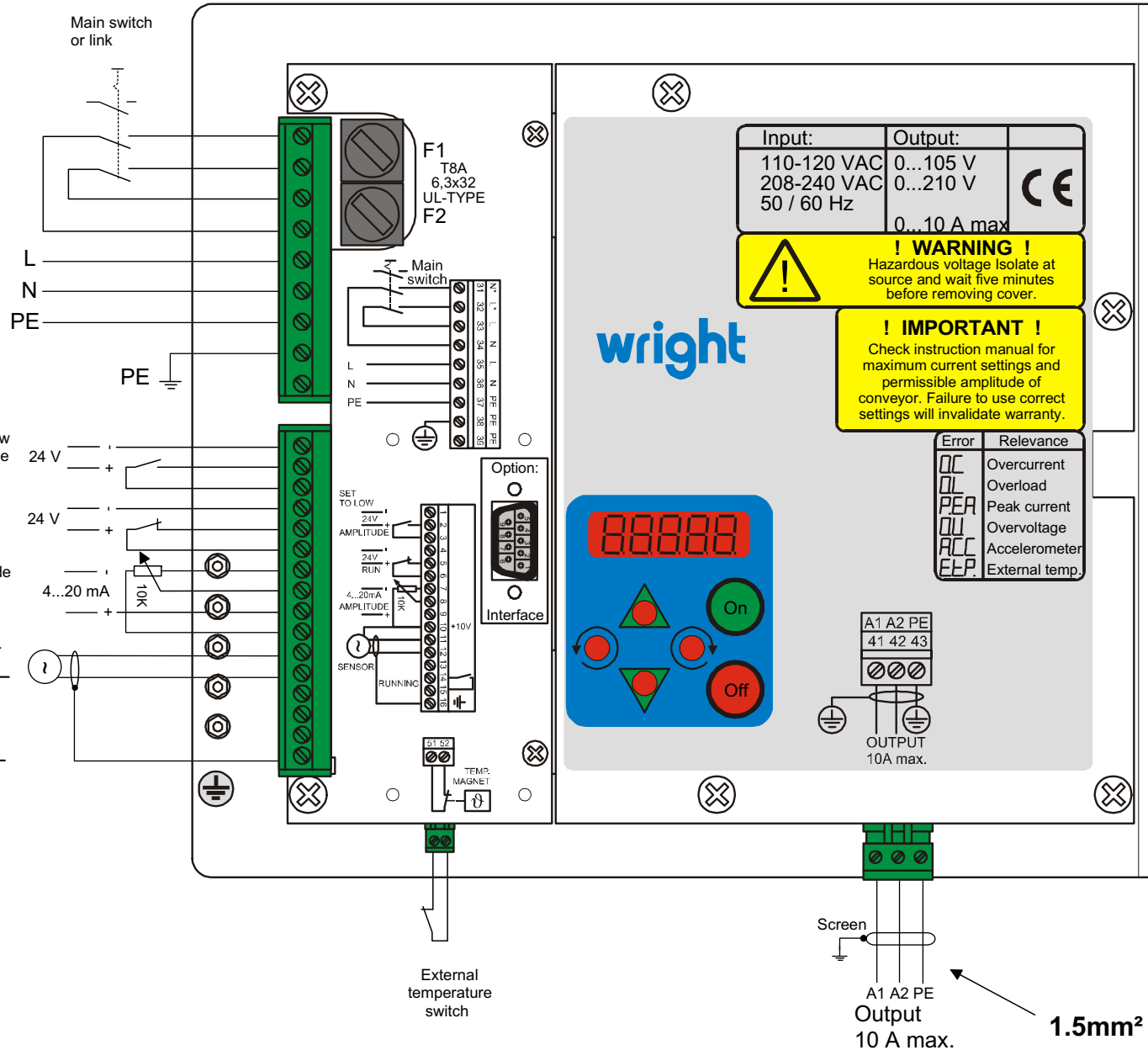
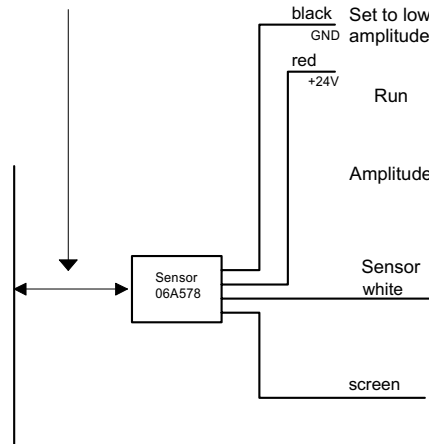
<b>En.S. 0</b> <b>En.S. 1</b>	Hd.C.= 1 = Hide Service menu	<b>En.S. 0</b> Service menu C 040 not accessible, only actual current and Frequency <b>En.S. 1</b> Service menu accessible	Hide service menu	Protect
<b>1000</b>	Run mode			

**Connections**


**Connections ! Important for using with PPM conveyor**

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

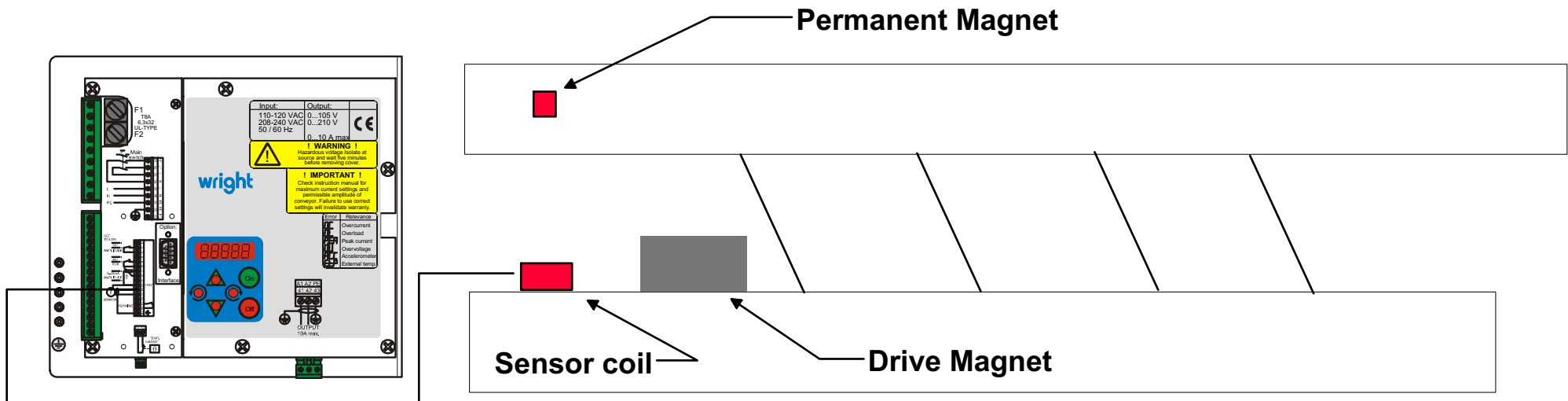
select Menu C 051 and:  
adjust sensor 06A578  
till = 25 is displayed



**! Use screened cable !**

**1.5mm<sup>2</sup> Cable**

### Closed loop control - using separate sensor



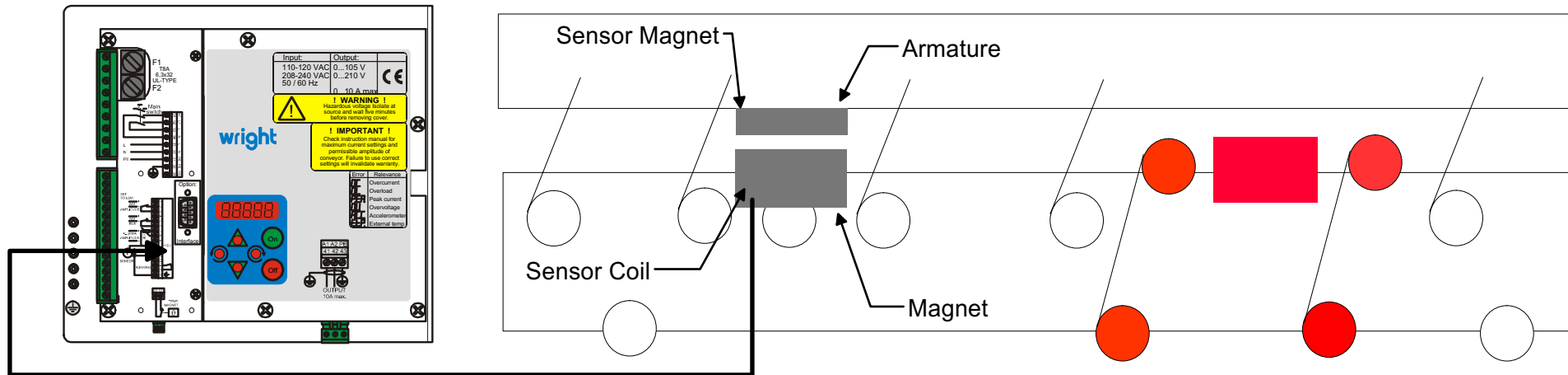
Closed loop control can be used for two purposes:-

- 1) To provide constant amplitude control irrespective of the load changes (depth of material) on the feeder. Refer to page 4 for setting up automatic amplitude control (ACC).
- 2) To automatically tune the feeder so that it always vibrates at its resonant or natural frequency.

Feedback for the closed loop is provided from a sensor coil fitted to the base and a permanent magnet fitted to the tray. The relative movement between the sensor coil and the permanent magnet produces a signal voltage which is proportional to speed, which is a function of deflection when the vibrating frequency is constant.

It is important to adjust the output signal so that an amplitude setting of 100% corresponds to the required maximum amplitude of the feeder. To do this set the P value in menu C 038 down to 20% and the A value to 100% (see page 4). Enable the controller so that the feeder vibrates and gradually increase the value of P until the required deflection of the feeder tray is reached. A "V" sticker on the side of the feeder tray can be used to give a visual guide if a measuring system is not available.

This procedure provides an optimum level of feedback signal which is essential for a frequency search. Also if the signal is not correctly scaled there is a danger that the drive coil could be damaged by excessive deflection.

**Closed loop control - using a drive magnet with a built-in sensor**


Closed loop control can be used for two purposes:-

- 1) To provide constant amplitude control irrespective of the load changes (depth of material) on the feeder. Refer to page 4 for setting up automatic amplitude control (ACC).
- 2) To automatically tune the feeder so that it always vibrates at its resonant or natural frequency.

Feedback for the closed loop is provided from a sensor coil located in the drive magnet and a permanent magnet located in the armature. The relative movement between the sensor coil and the permanent magnet produces a signal voltage which is proportional to speed, which is a function of deflection when the vibrating frequency is constant.

It is important to adjust the output signal so that an amplitude setting of 100% corresponds to the required maximum amplitude of the feeder. To do this set the P value in menu C 038 down to 20% and the A value to 100% (see page 4). Enable the controller so that the feeder vibrates and gradually increase the value of P until the required deflection of the feeder tray is reached. A "V" sticker on the side of the feeder tray can be used to give a visual guide if a measuring system is not available.

This procedure provides an optimum level of feedback signal which is essential for a frequency search. Also if the signal is not correctly scaled there is a danger that the drive coil could be damaged by excessive deflection.

## Overload protection

The controller has several levels of built-in protection to prevent overloading the magnet.

### Current limit

The current limit I-max can be set in menu 038. This is displayed as a percentage of the controller rating, which is 10A in the case of the CD30 drive unit. Therefore if the rating of the magnet is 5A then I-max should be set at 50%.

### Maximum voltage

The maximum voltage can also be set by using parameter P in menu 038. This should be adjusted so that when the amplitude is set at 100% the feeder will vibrate at its maximum amplitude.. It is important to set P because otherwise if the amplitude is set too high there is a danger that the coil will "hammer" and this may cause serious mechanical damage , especially if this is allowed to continue for prolonged periods.

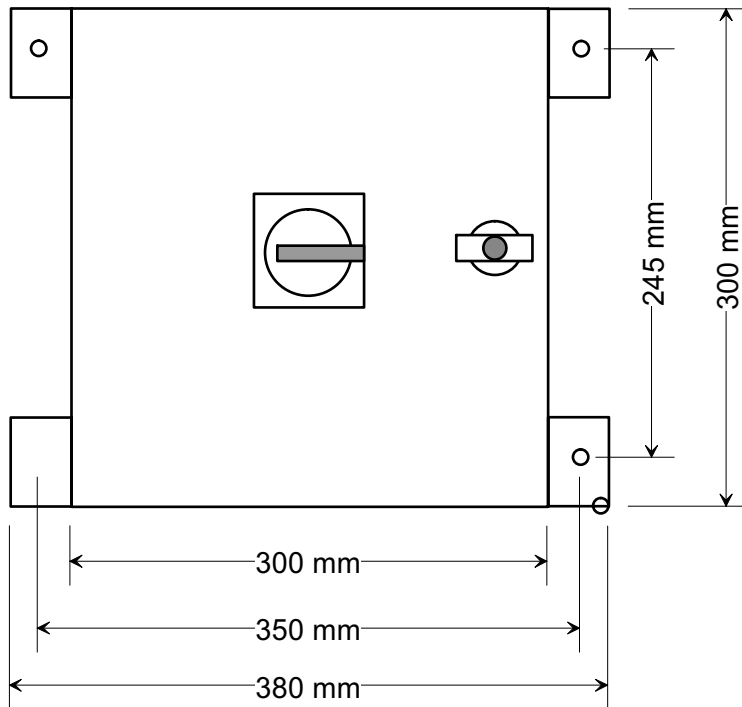
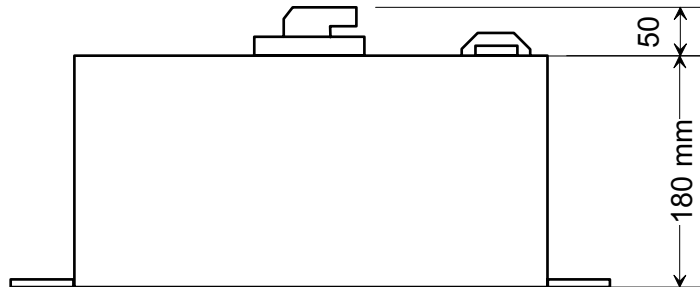
### Frequency

Equally as important is the frequency setting. This should be adjusted as close as possible to resonance (the natural frequency of the vibrating system). Failure to do this will cause the feeder to run inefficiently and to draw more current. The resonant frequency can be found automatically by using AFS in menu 038. This setting can only be accessed if ACC is switched on (=1). By enabling AFC the controller will continue to track and adjust the frequency to maintain resonance, if for example the loading on the feeder changes.

### Current regulation

In service menu 040 it is possible to choose whether current regulation is on or off. When it is on the output current is monitored and if a rapid current increase occurs the controller will reduce the output voltage, in order to protect the controller and magnet. This function is designated EFu because it operates like an electronic fuse. With current regulation on it is possible to adjust the amount of correction and response time made by the control system in the event of a current rise. In certain applications it may be found that the feeder starts up too slowly (e.g. start/stop operations) in which case the current regulation can be switched off completely but this solution should only be used when it is absolutely necessary because it removes level of protection and the current rise could be unbounded.

## Configurations



**CD31 Enclosure**  
**IP54 Mild steel white powder coated (Nema 12)**  
**IP65 Stainless steel (Nema 4x)**

### Controller versions

CD30  
 Wright Machinery 10A Drive Unit  
 Chassis version 110-240VAC

CD31  
 Wright Machinery 10A MS Drive Unit  
 Mounted in a painted enclosure

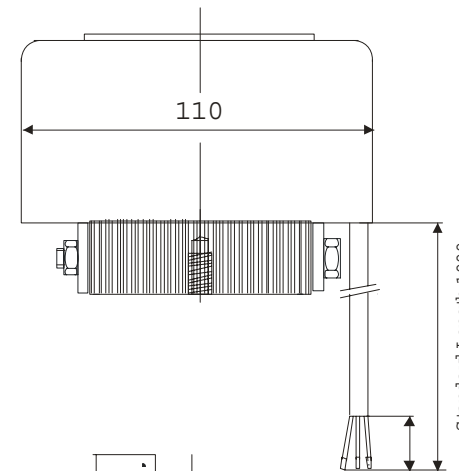
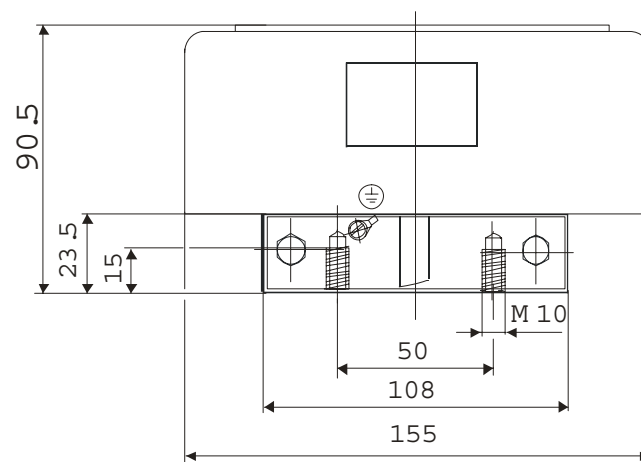
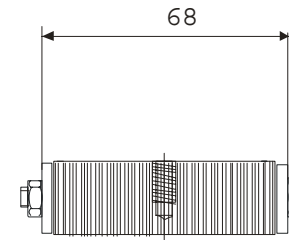
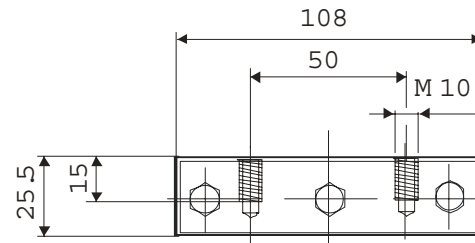
CD32  
 Wright Machinery 10A SS Drive Unit  
 Mounted in a stainless steel enclosure

CD33  
 Wright Machinery 10A BP Drive Unit  
 Mounted on a back panel with transformer  
 Suitable for two-phase 480/415/380V input

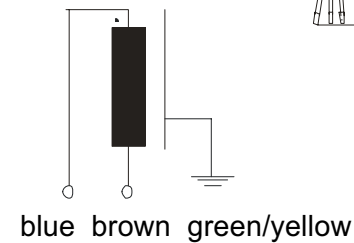
CD35  
 Wright Machinery 15A Drive Unit  
 Chassis version 110-240VAC

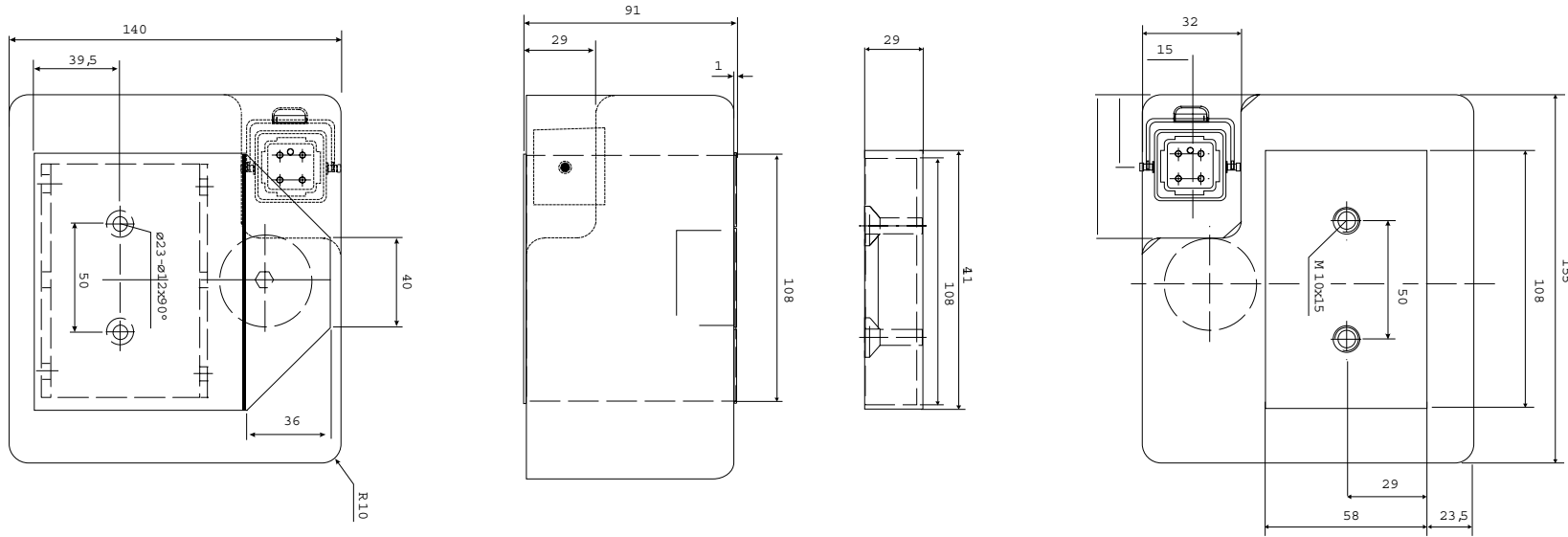
CD37  
 Wright Machinery 15A SS Drive Unit  
 Mounted in a stainless steel enclosure



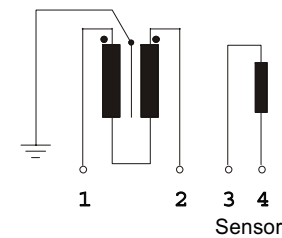
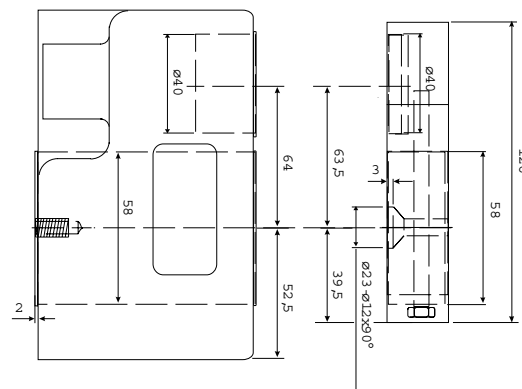


Magnet Weight: approx 12 kg  
 Armature Weight: approx 3.5 kg  
 Supply Voltage: 200V  
 Rated Current: 5.3A  
 Frequency: 50Hz  
 Power: 1220 VA  
 Air Gap: 3.0mm  
 Duty Cycle: 100%



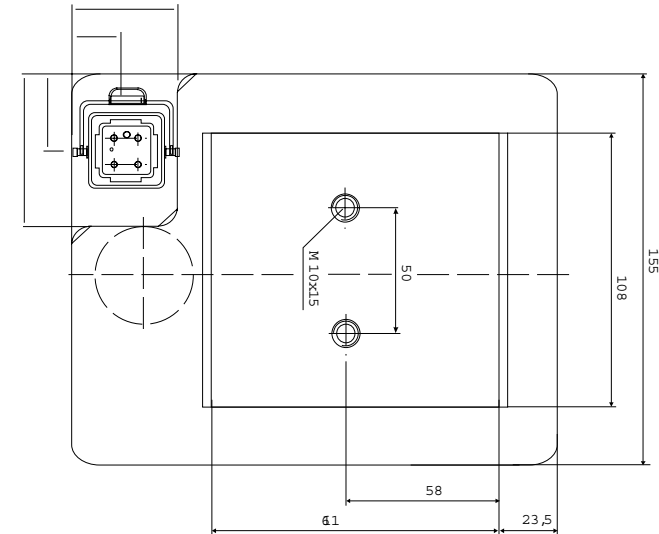
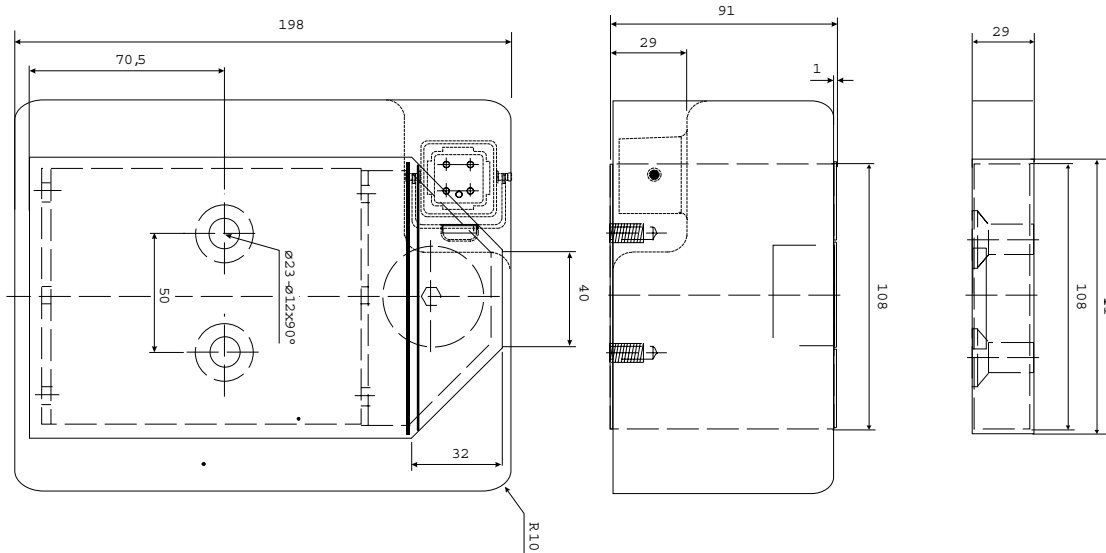


Magnet Weight: approx 7.5 kg  
Armature Weight: approx 1.9 kg  
Supply Voltage: 200V  
Rated Current: 3.3A  
Frequency: 25Hz  
Power: 660 VA  
Air Gap: 2.0mm  
Duty Cycle: 100%

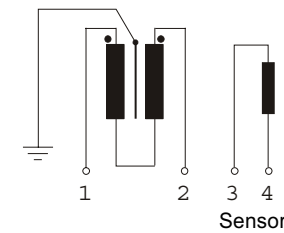
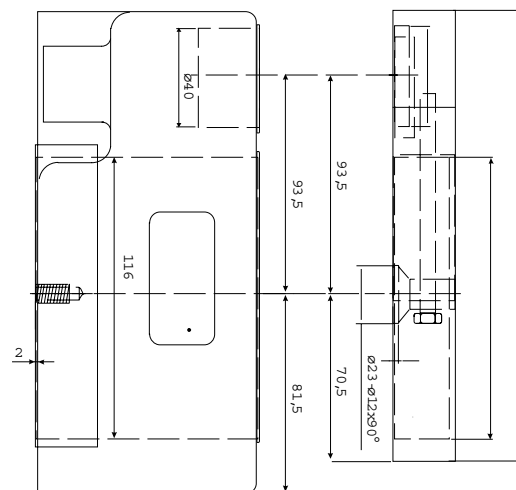


Connection Diagram

Use Harting Han A 10A 4P + E Female Insert with suitable hood and gland on supply cable.

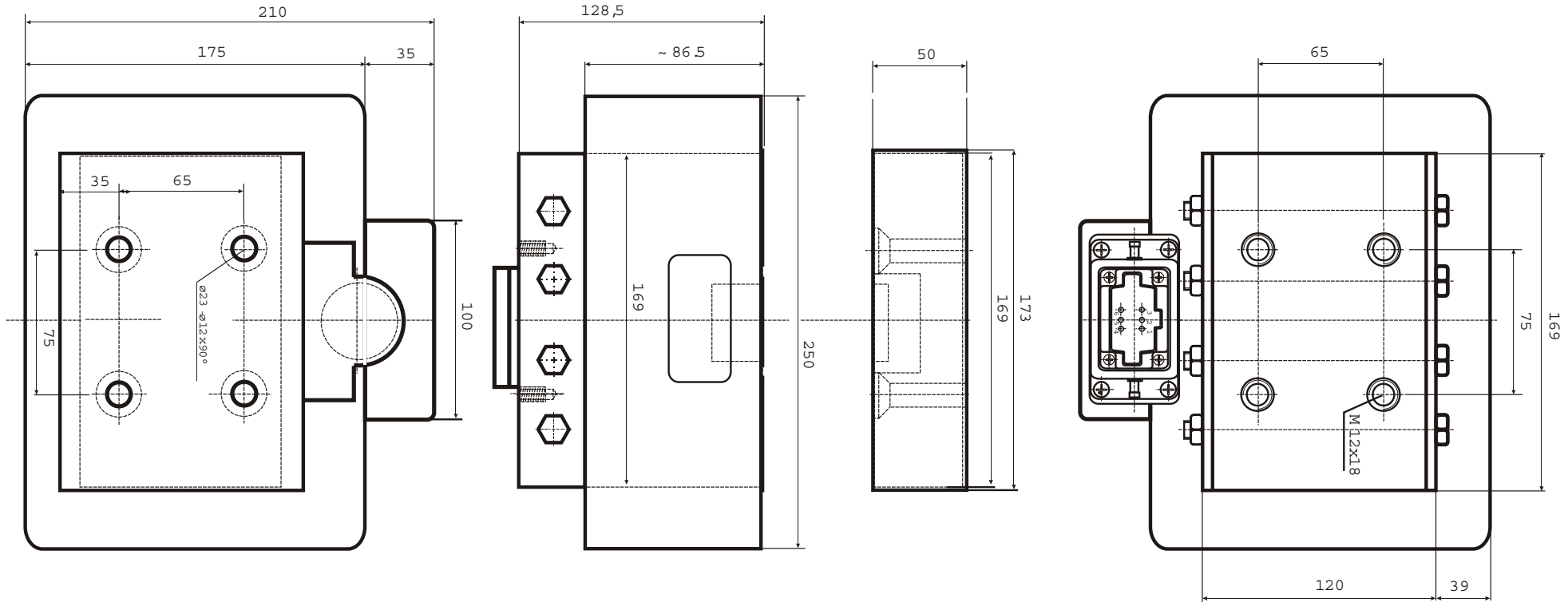


**Magnet Weight:** approx 12 kg  
**Armature Weight:** approx 3.5 kg  
**Supply Voltage:** 200V  
**Rated Current:** 5.3A  
**Frequency:** 25Hz  
**Power:** 1050 VA  
**Air Gap:** 3.0mm  
**Duty Cycle:** 100%

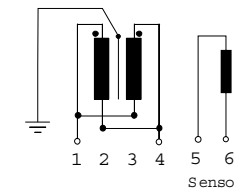
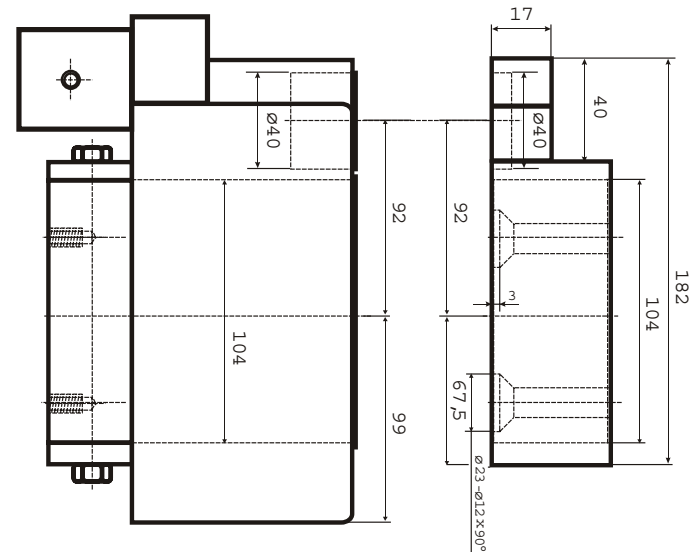


Connection Diagram

Use Harting Han A 10A 4P + E Female Insert with suitable hood and gland on supply cable.



Magnet Weight: approx 29 kg  
 Armature Weight: approx 7 kg  
 Supply Voltage: 200V  
 Rated Current: 10.5A  
 Frequency: 25Hz  
 Power: 2100 VA  
 Air Gap: 3.0mm  
 Duty Cycle: 100%



Use Harting Han E 10A 6P + E Female Insert with suitable hood and gland on supply cable.

**Design changes**

	Revision	Date first introduced	Serial Number Range		Modifications		
			Lowest	Highest	Hardware	Software	
CD3x			10001	10286	First Release		
CD3x	A	20 Apr 01	10292A	10463A		Menu C040 added to streamline AFS function Automatic frequency tracking Automatic fault reset on power up Second set point removed from C038 Soft-start function removed	
CD3x	B	25 Jul 01	10464B	10844B			
		27 Dec 01			Confirmation of UL approval		
CD3x	C	16 Jan 02	10845C	11200C	Dual voltage 11- - 240V introduced		
CD3x	D	15 Apr 02	11201D	11825D	Input fuse UL - Type, Slow 8A (0034.5244 Schurter) Spare fuses fitted to cover		
CD3x	E	22 Oct 02	11826E	11835E	Higher rated rectifier and top switch fitted		
CD3x	F	26 Nov 02	11914F	12598F	Surge protection module fitted		
CD3x	G	21 Jan 04	12560G	13350G	New board layout to incorporate surge protection and give improved semiconductor cooling Seal material changed to give better performance		
		10 May 04				Master/slave software added	
CD3x	H	16 Nov 04	13274H	Current	Angled terminal connectors introduced Thermal switch terminals added Fixing holes made more accessible Smaller keypad D connector for master/slave New front panel		
		May 06					
CD3x	J	28 Sept 06				Invert enable added (En) Ready/status relay setting option (r.b.) Current regulation added (Efu)	

**Design changes**

	Revision	Date first introduced	Serial Number Range		Modifications	
			Lowest	Highest	Hardware	Software
CD3x	J	01 Dec 06	15331J	18517J		Parameter A.S. and soft-start/stop added, Parameter P.I. and I.I. adjustable over interface Parameter En.S. added UL Mark added
CD3x	K	20 Jan 09	18518K	18644K		compatibility to PPM conveyor
CD3x	L	25 Feb 09	18645L		increment of the error peak level	increment of the error peak level

## Troubleshooting

Problem	Possible Cause	Remedy	Procedure
Feeder does not vibrate	<ul style="list-style-type: none"> <li>• Amplitude is set to zero</li> <li>• Incorrect frequency setting</li> </ul>	<ul style="list-style-type: none"> <li>• Increase amplitude by pressing [P] key twice in Menu C 000 and using arrow keys</li> <li>• Carry out resonant frequency search</li> </ul>	Frequency search.... For controller with a feedback sensor connected <ul style="list-style-type: none"> <li>• Empty feeder tray</li> <li>• Switch controller on</li> <li>• Adjust set point (A) to zero</li> <li>• Select code C038</li> <li>• Enable Parameter ACC (set to 1)</li> <li>• Select Parameter AFS and press the top arrow key to start frequency search</li> </ul> For controller without a feedback sensor <ul style="list-style-type: none"> <li>• Empty feeder tray</li> <li>• Switch controller on</li> <li>• Set output frequency F in Code 038 to 100Hz</li> <li>• Adjust set point to a low value ( approx. 30% )</li> <li>• Carefully increase or decrease F under Code 038 (direction depends on the feeder)</li> <li>• Resonance is reached when the amplitude is at maximum for a constant set point.</li> </ul>
Feeder will not “settle” at resonance in AFS	<ul style="list-style-type: none"> <li>• Feedback signal is too weak</li> <li>• Sensor air-gap is too wide</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce power limit [P] in Menu 38</li> <li>• Check sensor air-gap setting</li> </ul>	
Feeder “hammers” when set point is high	<ul style="list-style-type: none"> <li>• Feeder is operating too close to the resonant frequency</li> <li>• Coil air-gap is too small</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust frequency</li> <li>• Reduce power limit [P] in Menu 38</li> <li>• Check air-gap. (Caution - too wide an air-gap will increase current draw)</li> </ul>	<ul style="list-style-type: none"> <li>• Check that the air-gap setting is correct for the feeder - if necessary ask the manufacturer</li> </ul>
Coil gets hot	<ul style="list-style-type: none"> <li>• Frequency is set too low for the coil type</li> <li>• Air-gap is too wide</li> </ul>	<ul style="list-style-type: none"> <li>• Increase the frequency or use a different coil</li> <li>• Reduce the coil air-gap</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust setting F under Code 038</li> </ul>

**Troubleshooting**

Problem		Possible Cause	Remedy	Procedure
"OFF" is displayed, Feeder does not run		<ul style="list-style-type: none"> <li>No enable signal</li> <li>Coil thermal sensor "open circuit"</li> </ul>	<ul style="list-style-type: none"> <li>Switch contacts or provide 24V enable signal</li> <li>Check that link is fitted between terminals 5 &amp; 6</li> <li>Check that link is fitted between terminals 51 &amp; 52</li> </ul>	<ul style="list-style-type: none"> <li>If the enable is not used then a link must be fitted between terminals 5 &amp; 6</li> <li>If a 24V DC signal is used then the link must be removed</li> </ul>
Feeder starts up slowly when enable is switched on, even though the soft start time is set to 0 (Occurs only in regulation mode)		<ul style="list-style-type: none"> <li>Maximum power limit [P] in Menu C 038 has not been set correctly</li> <li>Circuit gain is set too low</li> </ul>	<ul style="list-style-type: none"> <li>Adjust the maximum amplitude limit [P] in Menu C038</li> <li>Set PA (proportional characteristic or circuit gain)</li> </ul>	<ul style="list-style-type: none"> <li>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%</li> <li>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</li> </ul>
Maximum amplitude is achieved with a very low set point value		<ul style="list-style-type: none"> <li>Maximum power limit [P] in Menu C 038 has not been set correctly</li> </ul>	<ul style="list-style-type: none"> <li>Adjust the maximum amplitude limit [P] in Menu C038</li> </ul>	<ul style="list-style-type: none"> <li>Increase the value of [P] in Menu C 038</li> </ul>
ERROR - OL	Output power too high	<ul style="list-style-type: none"> <li>Coil power is too high</li> </ul>	<ul style="list-style-type: none"> <li>Use a controller with a higher current rating</li> </ul>	
		<ul style="list-style-type: none"> <li>Frequency is set too low</li> </ul>	<ul style="list-style-type: none"> <li>Increase frequency</li> </ul>	<ul style="list-style-type: none"> <li>Use parameter F under Code 038 Depending on the feeder characteristics the frequency can be set higher</li> </ul>
		<ul style="list-style-type: none"> <li>Coil air-gap is too large</li> </ul>	<ul style="list-style-type: none"> <li>Reduce air-gap</li> </ul>	
		<ul style="list-style-type: none"> <li>Short-circuit</li> </ul>	<ul style="list-style-type: none"> <li>Check wiring and coil</li> </ul>	<ul style="list-style-type: none"> <li>To establish if a wiring short-circuit has occurred first remove connector for terminals 41, 42 &amp; 43</li> </ul>

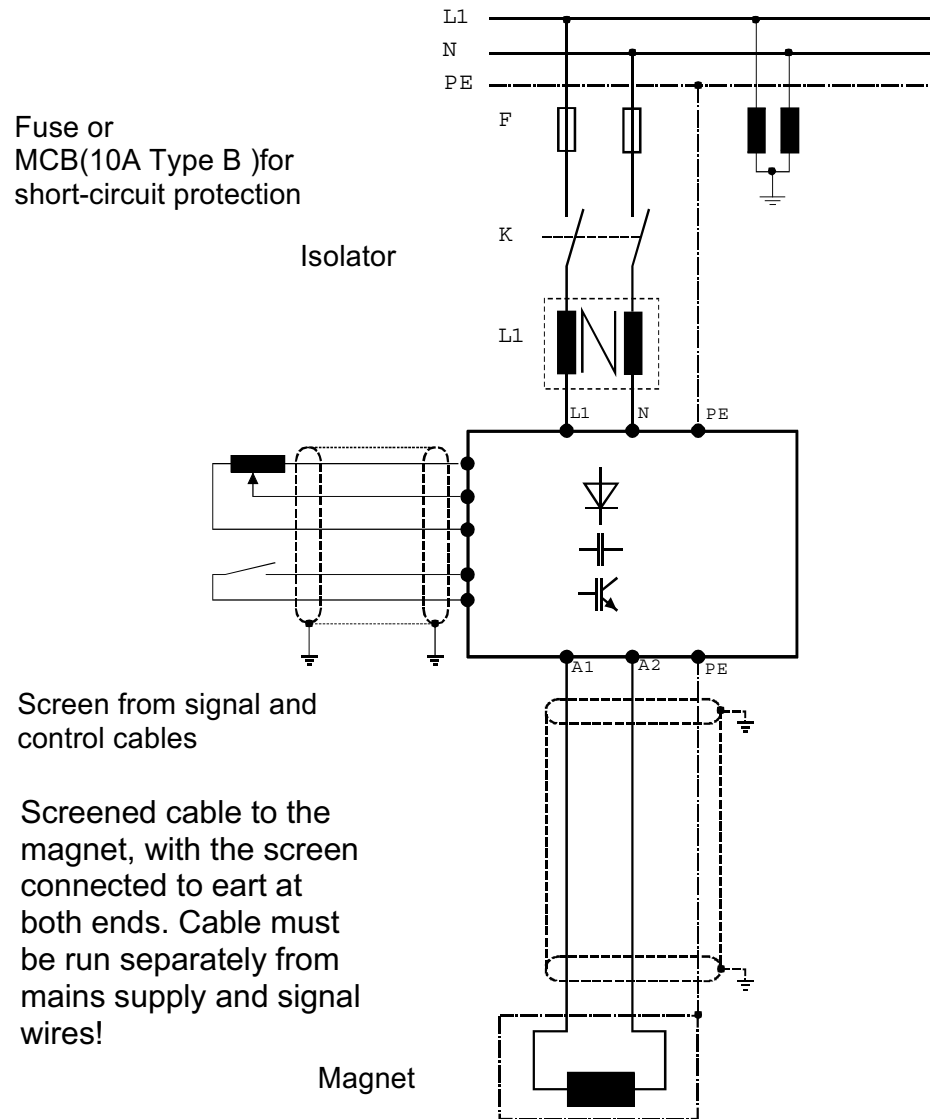


## Troubleshooting

Problem		Possible Cause	Remedy	Procedure
ERROR - OC	Current too high	<ul style="list-style-type: none"> <li>• Short-circuit on output</li> <li>• Coil faulty</li> </ul>	<ul style="list-style-type: none"> <li>• Check coil and wiring</li> </ul>	<ul style="list-style-type: none"> <li>• To establish if a wiring short-circuit has occurred first remove connector for terminals 41, 42 &amp; 43</li> </ul>
ERROR - OU	DC link voltage too high	<ul style="list-style-type: none"> <li>• Mains voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>• Check mains supply</li> </ul>	
		<ul style="list-style-type: none"> <li>• Back emf from coil (more likely at lower frequencies)</li> </ul>	<ul style="list-style-type: none"> <li>• Contact supplier</li> </ul>	
ERROR - ACC	Sensor fault	<ul style="list-style-type: none"> <li>• Sensor has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Check sensor</li> </ul>	<ul style="list-style-type: none"> <li>• If the sensor is not used the parameter ACC must be set to 0 in Menu C 038</li> </ul>
ERROR - EEP	Memory fault	<ul style="list-style-type: none"> <li>• Component problem</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to supplier</li> </ul>	<ul style="list-style-type: none"> <li>• Unit cannot be repaired on site (exchange and send back to manufacturer)</li> </ul>
ERROR - PLL ERROR - IOA	µPC fault warning	<ul style="list-style-type: none"> <li>• High EMC interference</li> </ul>	<ul style="list-style-type: none"> <li>• Check the integrity of the earth bonding of the controller and connections to the feeder</li> </ul>	<ul style="list-style-type: none"> <li>• Feeder, sensor and enable input must be connected with screened cables</li> <li>• Sensor and enable input cables should not be routed in the same trunking as power cables</li> <li>• If this code is displayed it may be possible to reset the system by switching the mains supply off and then back on again</li> <li>• If the fault reoccurs refer to supplier</li> </ul>
Original Controller settings have been lost		<ul style="list-style-type: none"> <li>• On-site adjustment</li> </ul>	<ul style="list-style-type: none"> <li>• Recall conveyor settings</li> </ul>	<ul style="list-style-type: none"> <li>• ISet USPR to SAFE in Menu 210</li> </ul>

**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.**

**Recommended method for installing a frequency controller**



Fuse or MCB(10A Type B) for short-circuit protection

Isolator

Screen from signal and control cables

Screened cable to the magnet, with the screen connected to earth at both ends. Cable must be run separately from mains supply and signal wires!

Magnet

**Transient suppression device**

Recommended in industrial situations where there are frequently-switching heavy loads or there is a high predominance of thunderstorms.

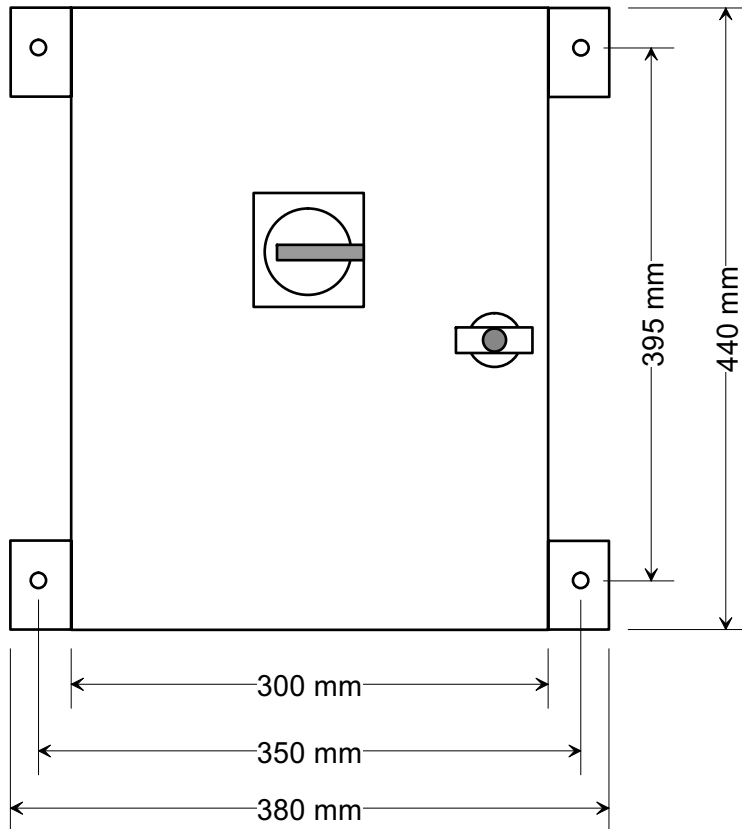
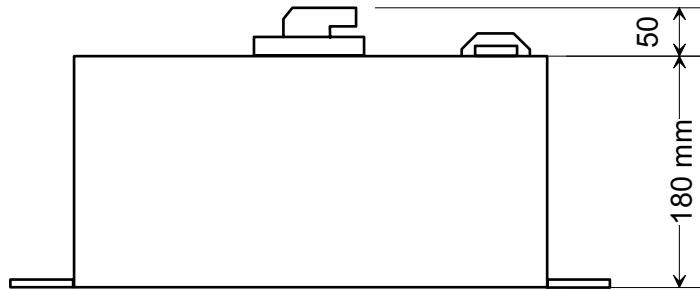
**Line reactor**

Recommended for reducing mains distortion (PFC) and protecting the drive unit under harsh operating conditions. Reduces down-time and increases operating life.

CD30 Frequency converter drive  
Power rating 2kVA

1.5 mm<sup>2</sup> power cables are recommended. These are rated for 21A providing that cables are not bunched.

**Special Applications - CD35 for higher current**

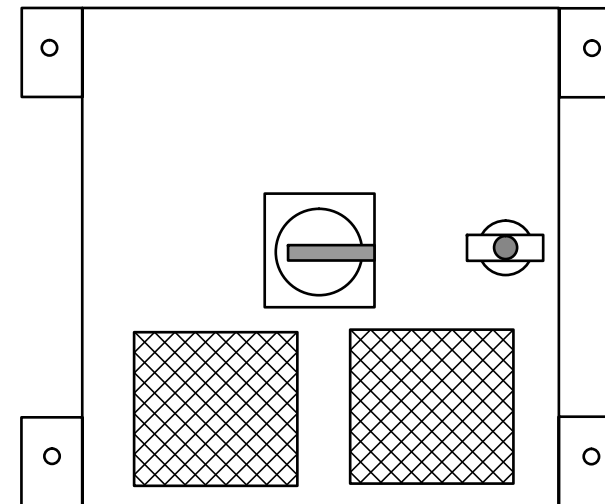


The CD35 drive unit has been designed for large vibratory feeders that can draw a current of up to 15A. This is achieved by fitting the standard CD30 chassis into a larger enclosure and using a double chassis plate for extra cooling.

The controller will operate at an ambient temperature of up to 40°C at the rated current of 15A. If the ambient temperature is exceeded then the controller will automatically close down due to a heat sensor which is inherent within the microprocessor power supply circuit.

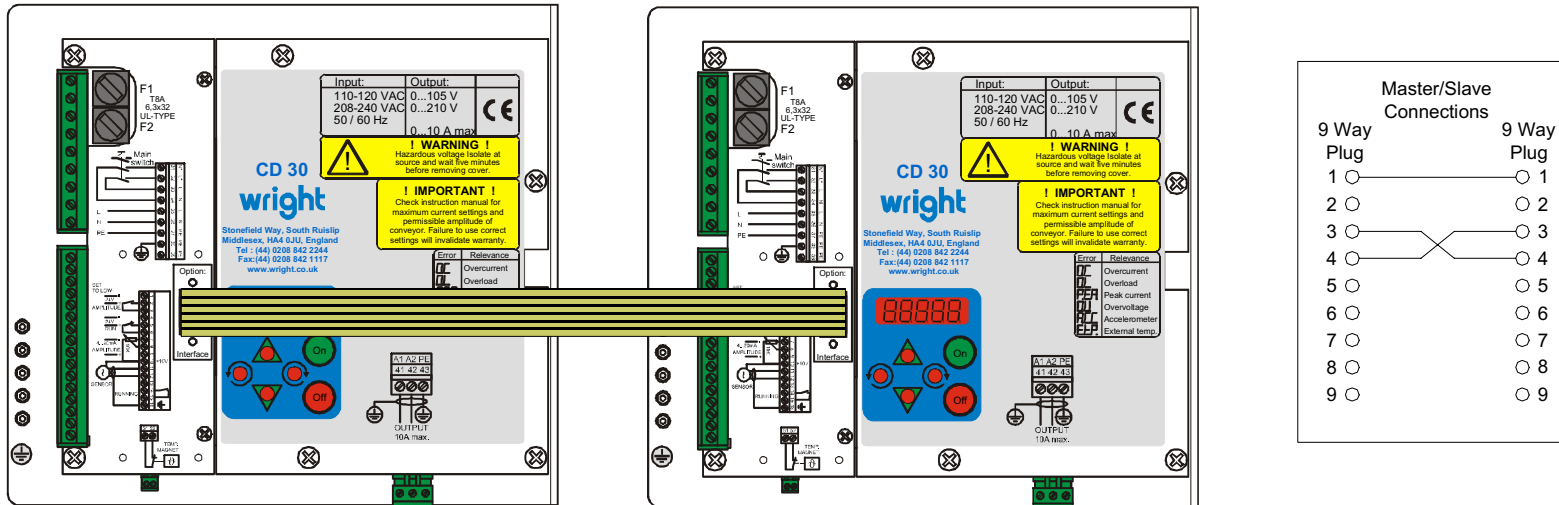
The controller can be restarted once the temperature has fallen back below the safety limit.

**Alternative cooling method**



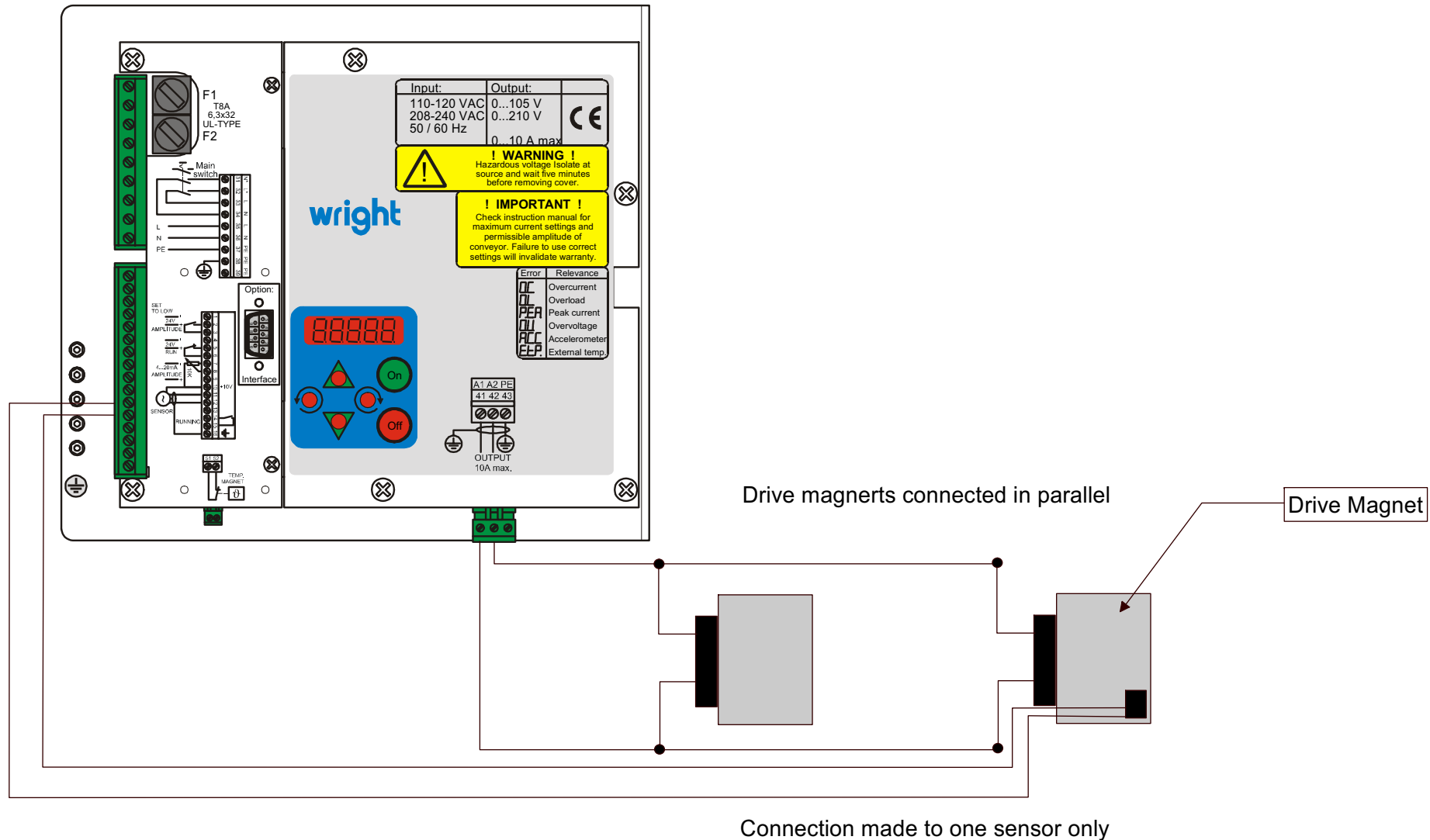
In areas where the use of fans with filters is permitted then extra cooling for elevated ambient temperatures can be achieved with forced air.

### Special Applications - Master/slave control for very large vibratory feeders with multiple magnets



Master/slave control can be used for larger feeders, which draw higher currents. Several slaves can be run with one master and the settings are made in the master.

**Please note: each controller must have a separate load (magnet).**

**Special Applications - Circuit for connecting two drive magnets to a single controller**


**Document changes**

Date	Comments
<b>14 Sep 2006</b>	<b>Document originated</b>
<b>5 Oct 2006</b>	Details of 2100 VA Magnet changed on page 18 (Connection details)
<b>1 Dec 2006</b>	Parameter A.S., soft start/stop, En.S. added on page 7
<b>13 Dec 2006</b>	Menu 127 - Hide Service Menu added on page 9
<b>13 Dec 2006</b>	Maximum Voltage Limit changed to 5...100% on page 4
<b>13 Dec 2006</b>	Page 27 added - Two magnets connected in parallel
<b>13 Dec 2006</b>	Design changes recorded on page 20
<b>17 Jan 2007</b>	Factory setting page added - Page 4 and new magnet drawings included on pages 16, 17 and 18
<b>14 May 2009</b>	Parameter S.P.E and A.P.S added on page 8, connections for PPM conveyer included on page 12