SECTION 5
CD30 CONVEYOR DRIVE

5.0 CONTENTS

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5.0 CONTENTS (Cont'd)

5.1 DESCRIPTION

The drive is used to control the Wright Machinery range of LT vibratory conveyors. It switches current to the electromagnet to cause the conveyor to vibrate at the required amplitude and frequency. The drive monitors a sensor integral with the electromagnet so that the conveyor operates at natural frequency and the vibration amplitude remains constant regardless of loading.

There are two types of drive;

- The 10 amp version for small and medium conveyors (CD30, CD32)
- The 15 amp version for large conveyors (CD35, CD37).

The drive is microprocessor controlled and it has an operator interface with a keyboard and a display. Various external connections can be made to control operation of the drive. It has been designed to withstand harsh industrial environments.

5.2 SPECIFICATION

Power requirement:

Single phase supply:	110 – 240VAC, ±10%, 50hz or 60hz
Maximum inrush current (MCB rating):	10A
Absolute maximum running current:	3A
Average running current:	1A

Maximum output current: **CD30, CD32: 10A**
CD35, CD37: 15A

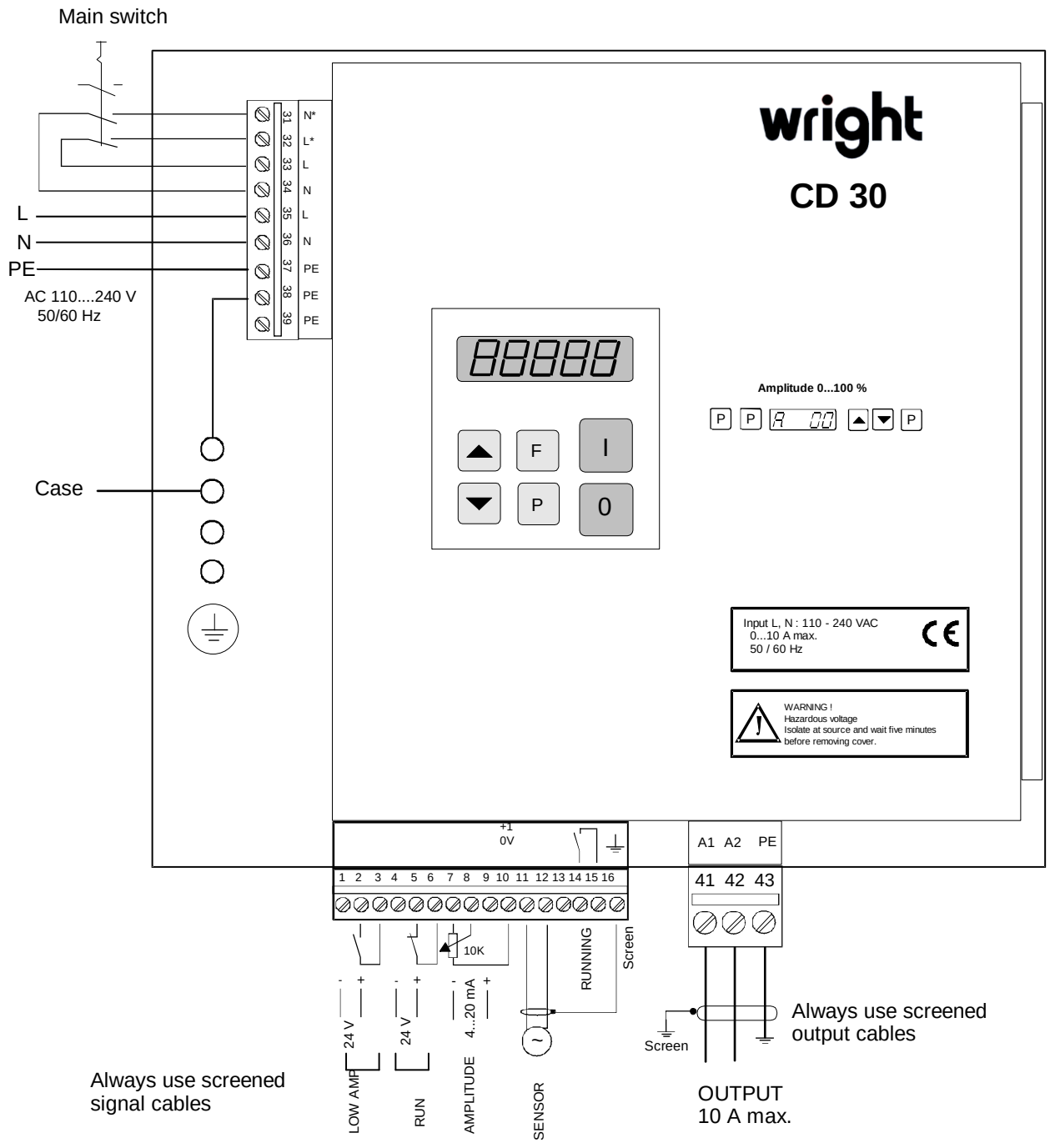
Output frequency range:	5Hz - 120Hz (set by mechanical design of conveyor)
Electromagnets:	220V 3.3A, 6A or 12A
Enclosures:	CD32, CD37: Stainless steel: IP65, Nema 4x

Operating temperature range:	0ºC to 50ºC
Maximum relative humidity:	93% Non-condensing
Standards:	EN61000-6-2, EN61000-6-4

Rated to IP20 if enclosure door open
Complies with IEE Regulations, current edition
Output short circuit protected. Output earth fault protected
Lockable mains isolator
Terminal torque: maximum 8 lb-ins.

5.3 PART NUMBERS

CD30:	10A drive chassis:	58345
CD32:	10A drive in stainless steel enclosure:	58343
CD35:	15A Drive chassis:	95020200
CD37:	15A Drive in stainless steel enclosure:	95020302


Main switch
L
N
PE
AC 110....240 V
50/60 Hz
Case
31 32 33 34 35 36 37 38 39
N*
L*
L
N
L
N
PE
PE
PE
wright
CD 30
F
P
I
0
Amplitude 0...100 %
Input L, N : 110 - 240 VAC
0...10 A max.
50 / 60 Hz
WARNING !
Hazardous voltage
Isolate at source and wait five minutes
before removing cover.
+1
0V
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
10K
24 V
24 V
4...20 mA
RUNNING
Screen
LOW AMP
RUN
AMPLITUDE
SENSOR
A1 A2 PE
41 42 43
Screen
Always use screened
output cables
Always use screened
signal cables
OUTPUT
10 A max.

5.4 CONNECTIONS

5.4.1 Power

L, N: Power in
PE: Earth
41, 42: Output to electromagnets
43: Earth and screen for electromagnets
L, N: Isolator in
L*, N*: Isolator out

In applications without a separate isolator, connect L to L* and N to N*.

5.4.2 Signals

Connections to the 16 way terminal strip are:

1 Low amplitude signal 0V
2 Low amplitude signal 24VDC or volt free
3 Low amplitude signal volt free
4 Run signal 0V
5 Run signal 24VDC or volt free
6 Run signal volt free
7 Amplitude 4-20mA or potentiometer 0V
8 Potentiometer input reference
9 Amplitude 4-20mA+
10 Potentiometer 10VDC
11 Sensor
12 Sensor
13 Not used
14 Running volt free output
15 Running volt free output
16 Earth

5.5 SIGNAL FUNCTIONS

5.5.1 Standard

Run signal input:	Either 24VDC to terminals 5, 4 (24V present to run) or volt free to terminals 5, 6 (closed to run)
Sensor input:	Two core screened cable to terminals 11, 12

5.5.2 Options

Low amplitude:	Either 24VDC to terminals 2,1(24V present for low amplitude) or volt free to terminals 2, 3 (closed for low amplitude)
Analogue amplitude input:	4-20mA signal to terminals 9, 7
Potentiometer amplitude input:	Terminals 10, 8, 7
Running output:	Volt free contact closes if runs: terminals 14, 15
Healthy output:	Auxiliary contact on isolator

5.6 DRIVE SET UP

5.6.1 Modes

There are three modes:

The running mode: This is the normal operating condition. The amplitude is displayed.

Code selection: A code is selected so that a parameter change can be made.

Programming mode: This mode permits a parameter change to be made.

5.6.2 Touch Panel

5.6.2.1 The Keys

The drive is controlled from the touch panel (keypad and display). All adjustments can be made at this panel.

The functions of the keys are:

P: In the running mode: Enter the program mode
In the programming mode: Select the next parameter or return

F: In the programming mode: Select the previous parameter

▲ ▼ In code selection: Move to the required code
In the programming mode: Increase or reduce the parameter value

O I: These keys can be used to stop and run the conveyor locally, as long as a 24VDC or volt free run signal is present.

Whenever a run signal is applied, the conveyor will run regardless of previous pressings of these keys.

Operation of these keys does not provide isolation from the mains supply.

5.6.2.2 Displays

80.0 Typical display of the amplitude in the running mode
- 80.0 Operating at current limit
OFF No run signal is present
STOP Stopped using the O key

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5.6 DRIVE SETUP (cont'd)

5.6.3 Programming

There are a number of parameters which can be modified to suit requirements. A letter is used to indicate the selected parameter.

When changing a parameter, if ▲ or ▼ is pressed for a short length of time, then the value of the parameter is increased or reduced by units or tenths of units. Holding the key down causes the parameter to change in steps of ten.

Settings are automatically stored on leaving the programming mode or after 100 seconds if no key is pressed.

To leave the programming mode and return to the normal display, either move to the end of the set of parameters by repeatedly pressing the P key, or press the P key continuously for five seconds.

5.6.4 Codes

The codes are:

C117: Parameter change protection
C038: Parameter change
C040: Parameter change (frequency limits)
C143: Save the user settings
C210: Recall factory or user settings
C001: Display software revision number

5.6.5 Parameter Change Protection

There is protection to prevent change of any parameters, except the amplitude. A drive is normally supplied tuned to the conveyor, with its parameters locked.

Parameter Hdc in C117 is the protection parameter:

O: Parameter change unlocked
1: Parameter change locked

To change the parameter lock status:

Press P
Use ▲ and ▼ to display C117
Press P to select Hdc
Use ▲ or ▼ to change Hdc between 0 and 1
Press P to leave C117 and return to the normal display

CONTINUED....

5.6.6 Parameters

The parameters stored in C038 are:

i	Actual current	%
I	Maximum current	%
A	Amplitude	%
P	Power	%
F	Frequency	Hz
	Soft start	seconds
E.S.P.	Amplitude set point source	
4.20	External set point type	
2	Second amplitude	%
ACC	Sensor enable	
PA	Start up proportional (gain)	%
IA	Start up integral (damping)	%
AFS	Frequency search	

The parameters stored in C040 are:		**Scarf feeder**	**LT**
I	Maximum current	%	%
LF	Frequency LOW	35Hz	15Hz
HF	Frequency HIGH	55Hz	30Hz

Note: Scarf feeders may have HF (on C040) set to 60Hz

Actual current
The percentage of full load current: This is a display only, and cannot be set.

Maximum current
The maximum current limit is set according to the size of the electromagnet. If the current limit is set to high then there is a risk of overheating and permanent damage to the electromagnet.

Amplitude
Adjustment of the conveyor vibration amplitude.

Power
The percentage of full power. This is adjusted so 100% amplitude gives the required maximum stroke. For LT conveyors this maximum amplitude is normally 4mm. In some applications 5mm is used. 6mm amplitude should never be exceeded. For scarf feeders, the maximum amplitude is 2mm, and this value should never be exceeded.

Frequency
Normally only for display purposes, as long as the sensor is connected. Shows the natural frequency of the conveyor.

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5.6 DRIVE SETUP (Cont'd)

Soft start
Controls how quickly the conveyor achieves its required amplitude at start up. This should always be set to 0 seconds.

Amplitude Set Point Source
0: Amplitude set at touch panel
1: Amplitude from a 4-20mA signal or potentiometer

Set point type
0: Potentiometer
1: 4-20mA signal

Second amplitude
Percent of the main amplitude for the second amplitude in twin amplitude applications.

Sensor enable
0: Sensor disabled: no natural frequency control, so the frequency is set manually.
1: Sensor monitored: conveyor operates at natural frequency.

Start up proportional value
Proportional gain defining the conveyor's response at start up. Generally set to 100 to give a rapid response.

Start up integral value
Integral damping defining the conveyor's response at start up. Generally set to 100 to give a rapid response.

Frequency search
Facility used at commissioning to tune the drive to the conveyor's natural frequency. This is described in the section on drive installation.

5.6.7 Changing a Parameter

The sequence is:
Select C038
Select the parameter
Increase or reduce the parameter value
Return to the normal display

For example, to change the maximum current:
Press P
Use ▲ and ▼ to display C038
Press P
Press P
I and a number are displayed
Use ▲ and ▼ to change I between 0 and 100
Press P repeatedly or once for five seconds to leave C038 and return to the normal display

CONTINUED....

5.6.8 Quick Amplitude Change

There is a short cut to change the amplitude. From the normal display:
Press P
Press P
Use ▲ and ▼ to change the displayed amplitude between 0 and 100
Press P
(Use ▲ and ▼ to change the second displayed amplitude, if required)
Press P to return to the normal display.

5.6.9 Manual Frequency Control

As a test, there is facility to adjust the drive's frequency manually, although it cannot then be run as a natural frequency conveyor:

Disable the sensor by setting ACC to 0. It may be necessary to reduce the amplitude (A) to reduce the conveyor's vibration.
Select parameter F, the frequency.
Adjust the frequency using ▲ and ▼.
The conveyor will continue to run if the sensor is re-enabled by setting ACC to 1. However, the drive will not track the conveyor's natural frequency, although amplitude control will be available. This is not a recommended mode of operation, since it may be difficult to obtain consistent performance.

When returning to normal operation (ACC set to 1), it may be necessary to set the natural frequency again, using AFS. If the manually set frequency is close to the natural dfrequency then the drive will automatically track in to the natural frequency.

5.7 USER AND FACTORY SETTINGS

5.7 USER AND FACTORY SETTINGS

5.7.1 Operation

The main parameters are saved so they remain operational if the drive is switched off and on again. Another set of user parameters can also be stored separately. Also the factory settings are available. The parameters used to set up the conveyor are stored as the user parameters before shipment.

5.7.2 Saving the User Settings

Select C143	
Press P	(PUSH is displayed)
Press P to exit or press ▲ or ▼ to save	(SAFE is displayed)
Press P to return to the normal display	

5.7.3 Recalling User Settings

Select C210	
Press P	(FAC is displayed)
Press P	(USPA is displayed)
Press P to exit or press ▲ or ▼ to recall user settings	(SAFE is displayed)
Press P either once or twice to return to normal display	

5.7.4 Recalling Factory Settings

Select C210	
Press P	(FAC is displayed)
Press P to exit or press ▲ or ▼ to recall factory settings	(SAFE is displayed)
Press P either once or twice to return to the normal display	

5.7.5 The Factory Settings

The factory set values are:

I	Maximum current	60
A	Amplitude	0
P	Power	100
F	Frequency	23
	Soft start	0
E.S.P.	Amplitude set point source	0
(4.20	External set point type	0)
2	Second amplitude	0
ACC	Sensor enable	1
PA	Start up proportional (gain)	100
IA	Start up integral (damping)	100
AFC	Auto frequency set-up	1

5.7.6 Software Revision Number

To display the software revision number, select C001.

5.8 INSTALLATION

5.8.1 Connections

a) Connect the electromagnet.
b) Connect the sensor. The polarity is unimportant.
c) Connect the mains supply and switch on the drive.

5.8.2 Setting the Natural Frequency

The drive will already have been set to the conveyor‘s natural frequency if the drive and conveyor were supplied together.

To set to the natural frequency, proceed as follows:

Ensure a run signal is present and the drive is not stopped with the O key.

Set the following parameters (x: not important):

I	50% for a single electromagnet or 100% for two or three electromagnets
A	50%
P	100%
F	x
Soft start	0
E.S.P	0
2	x
ACC	1
PA	100 for LT conveyors, 20 for scarf feeders
IA	25
AFC	1

Then display AFS and press ▲.

The frequency is displayed, with a number of horizontal lines and a flashing dot.
The drive is now searching for the natural frequency.
After a while, the lines and dot disappear and the natural frequency is displayed. This is stored as the frequency parameter.
The drive is now set to the conveyor‘s natural frequency.
To stop the frequency search, switch the drive off and on.

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5.8 INSTALLATION (Cont'd)

5.8.3 Parameter Settings

For standard operation, with amplitude control from the keypad, use the following settings:

I	50% for a single electromagnet or 100% for two or three electromagnets
A	100%
P	For LT conveyors, adjust to give 4mm amplitude (or 5mm in some applications) when A is 100%. For scarf feeders, adjust to give 2mm amplitude when A is 100%
F	x
Soft start	0
E.S.P	0
2	x
ACC	1
PA	100
IA	100
AFC	1

Set the drive for standard operation before proceeding further.

5.8.4 Remote Analogue Amplitude Control

a) Set: E.S.P.: 1
4.20: 1
b) Connect a 4-20mA signal to terminals 9 and 7.
c) Set A to zero so the conveyor stops vibrating when the signal reference is 4mA.
d) For LT conveyors, adjust P as necessary so the amplitude is 4mm when the signal is 20mA (or 5mm in some applications). For scarf feeders, adjust P to give an amplitude of 2mm when the signal is 20mA.

5.8.5 Remote Switched Amplitude Control

a) Set P to give a maximum amplitude of 5mm for LT conveyors, and 2mm for scarf feeders when A is 100%.
b) Connect a 24VDC signal to terminals 2 and 1 or connect a relay contact between terminals 2 and 3 so the conveyor runs at low amplitude.
c) Set the second amplitude to the percentage required for the low amplitude. For example if the high amplitude is 5mm, a setting of 60% on the second amplitude gives a low amplitude of 3mm.

5.8.6 Amplitude Control From a Potentiometer

a) Set A to zero.
b) Set: E.S.P.: 1
4.20: 0
c) Connect the potentiometer to terminals 10, 8 and 7 (wiper to 8).
d) For LT conveyors, adjust P if necessary so the amplitude is 4mm when the potentiometer is set to maximum. For scarf feeders, adjust P to give an amplitude of 2mm with the potentiometer set to maximum.

5.8.7 Electromagnet Replacement

When an electromagnet is replaced, the electromagnet and the sensor need to be reconnected to the drive. The polarity of the connections is unimportant.

5.9 FAULTS

5.9.1 Displayed Faults

To reset a displayed fault, switch off the drive, wait for the display to go out and turn the power on again.

Error Acc Sensor fault
Check: Sensor is not faulty
Good sensor connections
Neither of sensor connections is earthed

Error OL Long term output overload

Error PEA Short term output overload

Error OC Output short circuit or earth fault

Error OU Input voltage too high

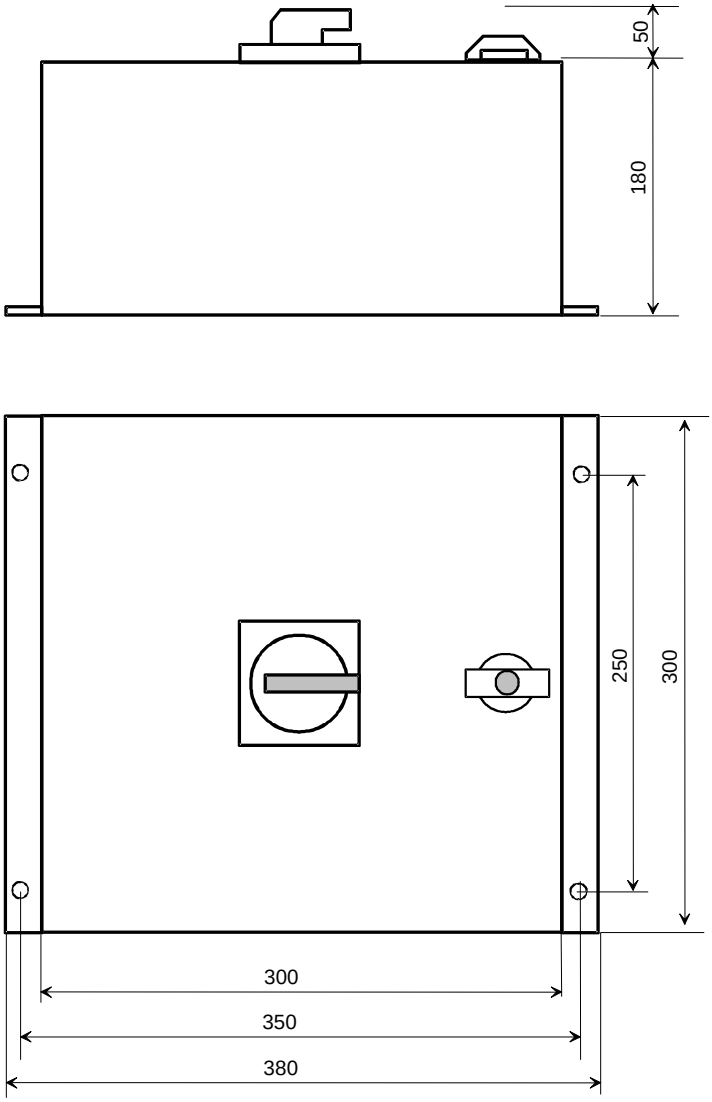
LoPo Low supply voltage (displayed for a short time when the drive is switched on or off)

Error 222 Microprocessor fault: return the drive to Wright Machinery

5.9.2 Other Faults

Insufficient amplitude	Amplitude reference too low Faulty electromagnet connection Armature gap incorrectly set
Drive does not run	No amplitude reference No run signal No power
Frequency search unsuccessful	IA set too low for larger conveyors IA set too high for smaller conveyors and scarf feeders Faulty sensor Conveyor‘s natural frequency outside the set range (C040)

5.10 DIMENSIONS



5.11 PNEUMATIC CONTROL CABINET (OPTIONAL)

5.11 PNEUMATIC CONTROL CABINET (OPTIONAL)

5.11.1 Description

Each conveyor fitted with a gate has pneumatic equipment to control operation of the gate's actuator, which is an air cylinder. Depending on the application, there may only be a local solenoid with regulation and filtering elsewhere, or there may be a self contained unit in an enclosure as shown below.

5.11.2 Self Contained Unit

With the self contained unit in its own enclosure there are:

A filter: Separates the moisture from the incoming air (to automatic drain)

A regulator: Sets and regulates the air pressure to the actuator for the gate. The pressure is normally set to 3.5 bar (50 psi).