

The Nidec logo is displayed in white, italicized, sans-serif font. It is centered within a green parallelogram that has a slight 3D effect with a darker green shadow on its right side.

Nidec

Drives

**Linear Motor - M700 長所と使い方
– NIDEC Korea**

リニアモーターアプリケーションに対する NIDEC CT drivesだけのメリット



MCI210 – 追加 Motion CPU
(顧客モーションプログラム 搭載, 高速制御等)

長所

1. 指令値に対する応答速度がPanasonicより速い
=> **High dynamic application**
2. 互換性優秀 (エンコーダ組合等)
3. **5年無償保証**の高信頼性、耐久性



Motor 仕様 : Samick THK、CDM40-1600C

Encoder 仕様 : ENDAT 2.2
(絶対値エンコーダ)

■ 定格仕様

項目	CDM40-1600C
定格推力*	N 1,600
最大推力*	N 4,000
連続電流	Arms 16.5
最大電流*	Arms 45.8
推力定数	N/Arms 97.0
自己吸入力	N 10,446
ドライバー	Panasonic MFDL□ A3△△ (3.0kW)
	Servotronix CDHD2-0202A(3.0kW)

http://www.samicksdt.co.kr/linearmotor/pro02_10.html

リニアモーターアプリケーションに対する NIDEC CT drivesだけのメリット

Linear motor launcher



Fatigue testing machines



電気力学試験システム
リニアモーターベースの電気力学試験機
は、高ダイナミック機械試験のために
設計されています。

High Dynamic 精密加工機



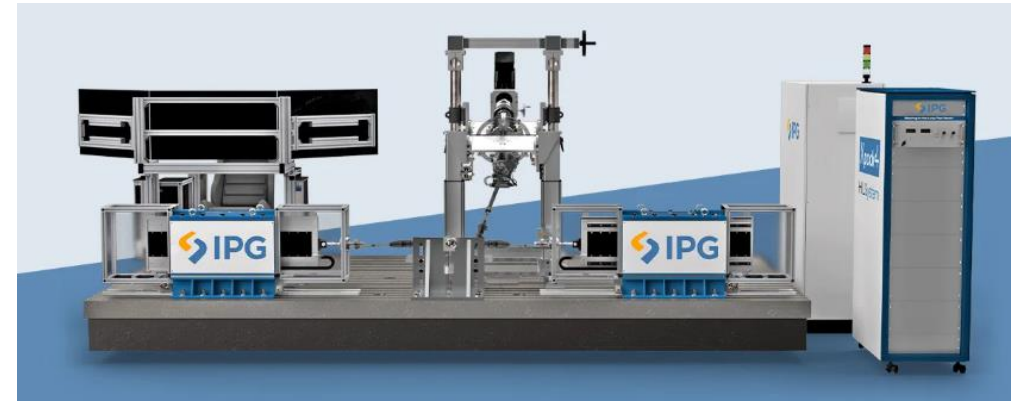
低出力用
7.5KW 以下

リニアモーターアプリケーションに対する NIDEC CT drivesだけのメリット

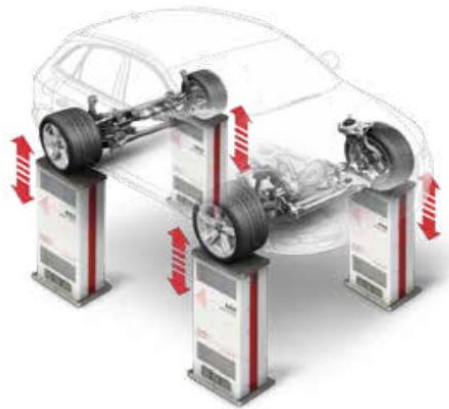
Automotive Test systems



Four poster testing MC



Driving force simulator



Shock absorber Test System HUD020 with 4 synchronized actuators



低出力用
7.5KW 以下



リニアモーター使用前 CT Drive設定方法整理

Linear motor Setup Reference

7.4.1 P1 position interface

This section shows the parameter settings which must be made to use each of the compatible feedback device types with P1 position interface on the drive. For more information on the parameters listed here please refer to the *Parameter Reference Guide*.

Table 7-3 Parameters required for feedback device set-up on the P1 position interface

Parameter	AB, FD, FR, AB Servo, FD Servo, FR Servo, SC, SC Servo	SC Hiperface	SC EnDat	EnDat	SC SSI	SSI	SC BiSS	BiSS	Resolver
P1 Marker Mode (03.031)	✓								
P1 Rotary Turns Bits (03.033)		•	•	•	✓	✓	✓	✓	
P1 Rotary Lines Per Revolution (03.034)	✓	•	•		✓		✓		
P1 Comms Bits (03.035)		•	•	•	✓	✓	✓	✓	
P1 Supply Voltage (03.036)*	✓	✓	✓	✓	✓	✓	✓	✓	
P1 Comms Baud Rate (03.037)			✓	✓	✓	✓	✓	✓	
P1 Device Type (03.038)	✓	✓	✓	✓	✓	✓	✓	✓	✓
P1 Auto-configuration Select (03.041)		✓	✓	✓					
P1 SSI Binary Mode (03.048)					✓	✓			
P1 Resolver Poles (03.065)									✓
P1 Resolver Excitation (03.066)									✓
P1 Additional Configuration (03.074)							✓	✓	

✓ Information required to be entered by the user.

• Parameter can be set-up automatically by the drive through **auto-configuration** parameter. Must be set by the user if **auto-configuration** is disabled (i.e. Pr 03.041 = Disabled (0)).

* Pr 03.036: If the output voltage from the encoder is >5 V, then termination resistors must be disabled by setting Pr 03.039 to 0.

Table 7-3 shows a summary of the parameters required to set-up each feedback device. More detailed information follows.

1. エンコーダー設定

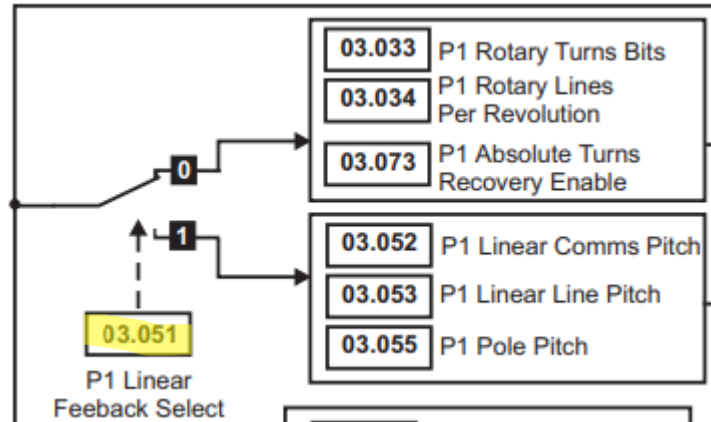
1) 使用エンコーダーに合うパラメータを設定

- Pr03.041のAuto-Configuration機能をサポートできないエンコーダーの場合、Pr03.041をdisabledに変更した後、手動で設定する必要があります。

(続き)

Linear motor Setup Reference

1. エンコーダー設定
- 2) Linear Feedback Select設定



Parameter	03.051 P1 Linear Feedback Select		
Short description	Set to 1 to configure the P1 interface to operate with a linear position feedback device		
Mode	RFC-S		
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Background read, Auto-configuration write
Display Format	Standard	Decimal Places	0
Coding	RW		

If *P1 Linear Feedback Select* (03.051) = 0 then the drive P1 position feedback interface is configured to operate with a rotary position feedback device. *P1 Rotary Turns Bits* (03.033) and *P1 Rotary Lines Per Revolution* (03.034) should be used to set up the position feedback interface.

If *P1 Linear Feedback Select* (03.051) = 1 then the position feedback interface is configured to operate with a linear position feedback device. *P1 Linear Comms Pitch* (03.052) and *P1 Linear Line Pitch* (03.053) should be used to set up the position feedback interface.

Linear motor Setup Reference

Parameter	03.041 <i>P1 Auto-configuration Select</i>		
Short description	Set to 1 to enable interrogation of the encoder to determine the set up required		
Mode	RFC-S		
Minimum	0	Maximum	1
Default	1	Units	
Type	8 Bit User Save	Update Rate	Background read
Display Format	Standard	Decimal Places	0
Coding	RW, TE		

Value	Text
0	Disabled
1	Enabled

P1 Device Type (03.038): SC Hiperface, SC EnDat, EnDat, EnDat Alt

If auto-configuration is enabled (i.e. *P1 Auto-configuration Select* (03.041) = 1) then during position feedback initialisation the encoder is interrogated to determine whether the encoder is a rotary or linear encoder and *P1 Linear Feedback Select* (03.051) is set up appropriately. Then the following parameters are set up based on information from the encoder:

Rotary	Linear
<i>P1 Rotary Turns Bits</i> (03.033)	<i>P1 Linear Comms Pitch</i> (03.052)
<i>P1 Rotary Lines Per Revolution</i> (03.034)	<i>P1 Linear Line Pitch</i> (03.053)
<i>P1 Comms Bits</i> (03.035)	<i>P1 Comms Bits</i> (03.035)
<i>P1 Additional Configuration</i> (03.074)	<i>P1 Linear Comms And Line Pitch Units</i> (03.054)

1

The following actions are also taken to set up the timing for the encoder.

Comms Protocol	Actions taken
EnDat 2.1	<i>P1 Calculation Time</i> (03.060) = From the encoder <i>P1 Recovery Time</i> (03.061) = 30µs Line delay measured and result written to <i>P1 Line Delay Time</i> (03.062)
EnDat 2.2	<i>P1 Calculation Time</i> (03.060) = From the encoder <i>P1 Recovery Time</i> (03.061) is set to 4µs (and the encoder itself is set up to use its short recovery time of 3.75µs) if the <i>P1 Comms Baud Rate</i> (03.037) is 1M or more. Line delay measured and result written to <i>P1 Line Delay Time</i> (03.062)

2

Once these parameters have been set up it should be possible for the drive to operate correctly with the encoder. Auto-configuration occurs as part of the position interface initialisation if selected, and so if the auto-configuration fails (i.e. communications cannot be established) then initialisation will not be completed. If initialisation has not been completed successfully the drive cannot be enabled (see *Enable Conditions* (06.010)). For SC Hiperface encoders the drive must identify the encoder model number to perform auto-configuration. If communications is established, but the drive cannot recognise the encoder model, an *Encoder 12* trip is produced immediately.

1. Encoder Setup

3) Linear motor Auto-configuration Select

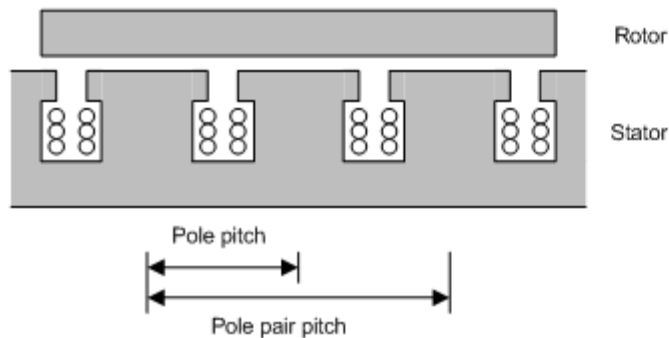
- Linear motorの場合、
右の ① 表参考

4) Endatの場合 ② の 表参考

Linear motor Setup Reference

Parameter	03.055 <i>P1 Pole Pair Pitch</i>		
Short description	Defines the change of position for one electrical revolution of the drive output with a linear position device.		
Mode	RFC-S		
Minimum	0.01	Maximum	1000.00
Default	10.00	Units	mm
Type	32 Bit User Save	Update Rate	Background read
Display Format	Standard	Decimal Places	2
Coding	RW		

P1 Pole Pair Pitch (03.055) gives the distance equivalent to one electrical revolution when linear position feedback is used with a motor. One electrical revolution is one cycle of the a.c. output current from the drive. If the linear position feedback device is being used with a linear motor, then *P1 Pole Pair Pitch (03.055)* should be set to the pole pair pitch of the motor. The pole pitch for linear motors can be the distance between the pole pieces on the stator as shown below. If this is the case the pole pair pitch is twice the length of the motor pole pitch. If *Number Of Motor Poles (05.011)* is set up correctly for a linear motor as 2, then the position feedback as shown in *P1 Position (03.029)* should change by one revolution (65536) over the distance defined by *P1 Pole Pair Pitch (03.055)*.



2. Motor Setup

1) Motor Pole pitch 入力

* モーターデータ 記入

Linear motor Setup Reference

Parameter	01.055 <i>Linear Speed Select</i>		
Short description	Set to 1 to enable linear speed units		
Mode	RFC-S		
Minimum	0	Maximum	1
Default	0	Units	
Type	1 Bit User Save	Update Rate	Background read
Display Format	Standard	Decimal Places	0
Coding	RW		

Normally the units for speed parameters are rpm for both rotary and linear applications. For a linear application one revolution corresponds to one motor pole. If the position feedback device that is selected for motor control with *Motor Control Feedback Select (03.026)* is a linear device, and if the feedback is being provided by the drive P1 or P2 interface (not an option module), then if *Linear Speed Select (01.055)* = 1 the units for speed parameters are mm/s with the following exceptions:

1. All speed parameters are displayed in rpm if sensorless mode is active, i.e. *Sensorless Mode Active (03.078)* = 1.
2. Speed feedback parameters associated with each feedback interface, i.e. *P1 Speed Feedback (03.027)* for position feedback interface P1, etc., are always displayed in rpm for a rotary device.

Linear Speed Selected (01.056) shows whether rotary or linear speed is being used. If *Linear Speed Selected (01.056)* = 0 then rotary speed is being used otherwise if it is 1 then linear speed is being used.

To enable the use of linear speed units, *P1 Linear Feedback Select (03.051)* must also be set to 1 to allow *Linear Speed Selected (01.056)* to be set to 1.

Parameter	05.011 <i>Number Of Motor Poles</i>		
Short description	Set to the number of poles of the motor		
Mode	RFC-S		
Minimum	0	Maximum	240
Default	3	Units	PolePairs
Type	8 Bit User Save	Update Rate	Background read
Display Format	Standard	Decimal Places	0
Coding	RW, BU		

2. Motor Setup

2) Pr01.055 : ON 変更

3) Pr05.011 : 2の変更

Linear motor Setup Reference

Example) Linear motor + Endat2.2 Parameter Table

Pr01.055	ON
Pr03.035	32
Pr03.037	4M Baud
Pr03.038	Endat
Pr03.041	Disabled
Pr03.051	ON
Pr03.052	0.100
Pr03.054	micrometres
Pr03.055	45.00 mm
Pr03.061	4 us
pr05.011	2 Poles

Linear motor Setup Reference

Encoder 仕様

Model	AK MC 15	AK MC 15 B	AK MC 15 F	AK MC 15 M		AK MC 15 P	AK MC 15 Y
Interface	EnDat 2.2	BiSS C unidirectional	Fanuc serial interface ai Interface	Mitsubishi high speed interface		Panasonic serial interface	Yaskawa serial interface
Version	EnDat 2.2	BiSS/Cu	Fanuc05	Mit03-4	Mit03-2	Pana02	YEC07
Measuring step	0,1 µm (100 nm) 0,05 µm (50 nm)						
Calculation time t_{calc}	≤ 5 µs	--	--	--	--	--	--
Clock frequency	≤ 16 MHz	--	--	--	--	--	--
Traversing speed	≤ 600 m/min						
Interpolation error	Approx. ±1 µm						
Electrical connection	Cable, 1 m or 3 m with M12-connector 8-pin or D-sub connector 15-pin						
Voltage supply	DC 3.6 V to 14 V (3.6 V at least required in the scanning head)						
Power consumption	At 3.6 V: ≤ 950 mW At 14 V: ≤ 1050 mW						
Current consumption typ.	At 5 V: 100 mA (without load)						
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 500 m/s ² (EN 60 068-2-6) ≤ 1000 m/s ² (EN 60 068-2-27)						
Operating temperature Storage temperature	-10 °C to 70 °C -20 °C to 70 °C						
Mass	Scanning head: 12 g (without cable), connecting cable: 22 g/m, connector: M12-connector: 15 g; D-sub connector: 28 g						

Motor仕様

定格仕様

항목	CDM40-1600C	
定格推力*	N	1,600
最大推力*	N	4,000
連続電流	Arms	16.5
最大電流*	Arms	45.8
推力定数	N/Arms	97.0
自己吸入力	N	10,446
ドライバー	Panasonic	MFDL□ A3△△ (3.0kW)
	Servotronix	CDHD2-0202A(3.0kW)

- 指令値に対する応答速度がPanasonicより速い
=> **High dynamic application**
- 互換性優秀

