NITTO KOHKI

Electric Screwdrivers

delvo® Brushless Type C Series (Current control type)

Model **DLV45C**

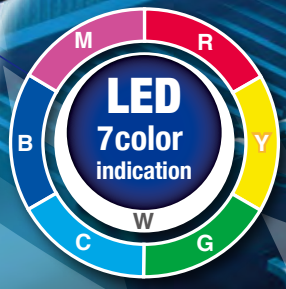
30 separate torque settings can be set on a single driver

- Extensive torque range (5.3 - 39.8 Lbf-in)
- Current controlled torque system for programmable settings
- High power DC brushless motor
- ESD (Electrostatic Discharge) protected housing
- Can be used handheld or be mounted on robotic arm
- Adjustable speed control for machine or tapping screws
- Programmable three stage speed control function
- Two types of measuring options (Time/Motor rotation signal)
- Two external I/O signal connection ports (NPN ⇔ PNP, RS-232C)
- LED color indicator for job status, tool identification
- Optional programming for driver through PC software (available on NittoKohki website)
- Built-in screw counting function

Lever Start Type
DLV45C12L

Push to Start Type
DLV45C12P

Controller
DCC0241X-AZ



NITTO KOHKI U.S.A., INC.
www.nittokohki.com

delvo®

All in one!

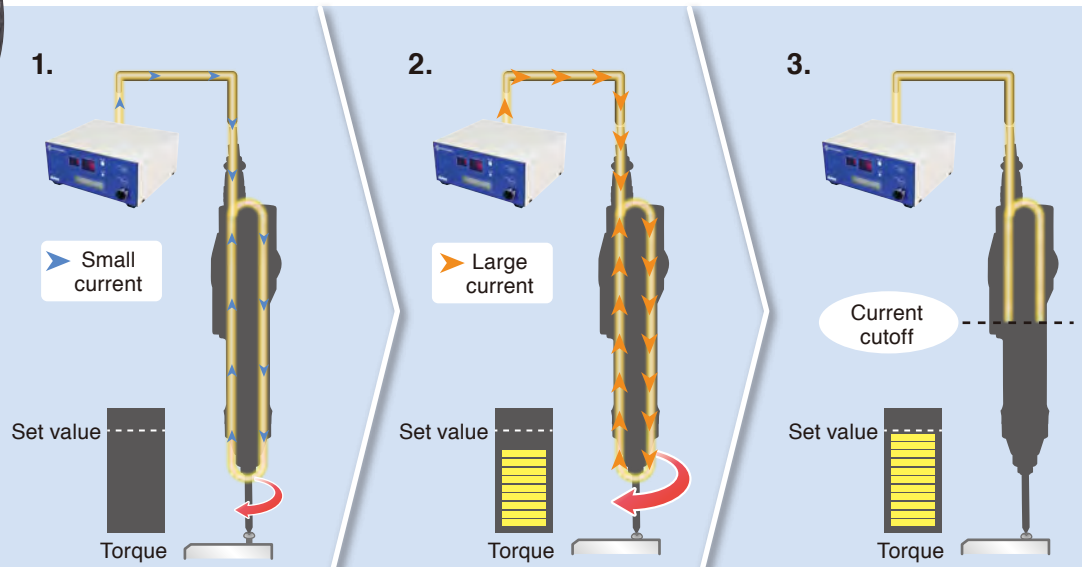
30 separate

1st	2nd	3rd	4th
1.2 Nm 1000 min^{-1}	1.8 Nm 500 min^{-1}	3.0 Nm 800 min^{-1}	1.8 Nm 500 min^{-1}

Delvo®
Brushless Type C Series (Current control type)
Model **DLV45C**

Brushless Electric Screwdriver for Machine screw (2.5 - 6.0 mm)

Lever Start · Push to Start · Low Voltage · Brushless Motor · Grounded Bit · LED Equipped · ESD Protection · Soft Start · Variable Speed · Soft Stop



Operation of Current Controlled Torque System

1. Start
At start-up, a small amount of current is allowed.

2. Middle
As the load increases during fastening, so does the amount of current allowed.

3. Seating
When the current amount goes up to the optimum value configured from a preset torque, current flow is cut off to stop the motor.

Specifications

Electric Screwdriver

Model			DLV45C12L-AY ⋮ K	DLV45C12P-AY ⋮ K
Starting Method			Lever Start	Push to Start
Power Source			From dedicated controller	
Torque Adjustment			From 1 - 100% in 1% increments	
Torque		(Lbf-in [Nm])	5.3 - 39.8 [0.6 - 4.5]	
Free speed	SOFT fastening setting	(min^{-1})	400 - 1200	
		Speed Level	Level 1 - 9	
	HARD fastening setting	(min^{-1})	100 - 700	
		Speed Level	Automatically set by torque setting	
Power Consumption		(W)	44	
Screw Size	Metric Thread	(mm)	3 - 6	
	Inch Thread		#5 - 1/4"	
	Tapping Screw	(mm)	3 - 5	
Bit Type		(mm)	0.35(9) ⋮ 1/4(6.35)	
Weight		(lbs [kg])	1.39 [0.63]	
Standard Accessories			Bit NK35 (No.2×7×75): 1 pc. Connection Cord 2 m (DLW9078): 1 pc. Suspension Bail: 1 pc. 80" (2 m) cord with UL three-prong plug : 1 pc.	

Controller

Model	DCC0241X-AZ
Input Voltage	100 - 240 V AC, 50/60 Hz
Output Voltage	40 V DC
Input Signal Method	Photocoupler input (24 V DC drive (5 mA/1 input), NPN/PNP switchable)
Output Signal Method	Photocoupler output (30 V DC or less, 80 mA/1 output or less, NPN/PNP switchable)
Service Power Source	24 V DC (Maximum capacity 200 mA)
Serial Signal Method	RS-232C
ESD (Electrostatic Discharge) Protection	Adopted (IEC61340-5-1 compliant)
Weight (lbs [kg])	3.97 [1.8]

Caution
*Speed and torque differs depending on the temperature. (Use within the range of +10 to + 40°C [+50 to +104°F])
*Do not retighten screws that are already tightened. The torque will become larger than the set torque.

About optional accessories (See page 9 "Optional Accessories")
*For torque measurements, please use Nitto Kohki's Torque Checker and Soft Joint / Hard Joint (sold separately).

torque settings
can be consolidated into one.

5th
3.0 Nm
1000 min^{-1}

. . . . . .

30th
3.0 Nm
400 min^{-1}

Stores 30 patterns !

Two types of fastening modes available depending on fastening conditions. Select the optimum fastening mode, torque range, and rotation speed for each individual fastening conditions.

SOFT / HARD fastening Settings

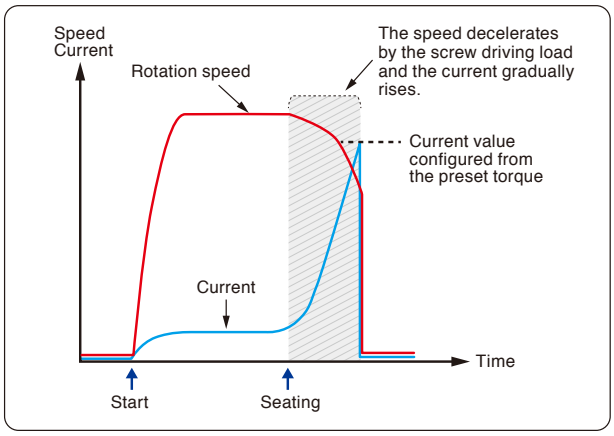
Instruction manual P68, P69

SOFT fastening setting

Suitable for workpieces with high fastening load such as tapping screws or fastening soft objects such as rubber.

Timing chart

A program that seats the screw at the preset rotation speed.

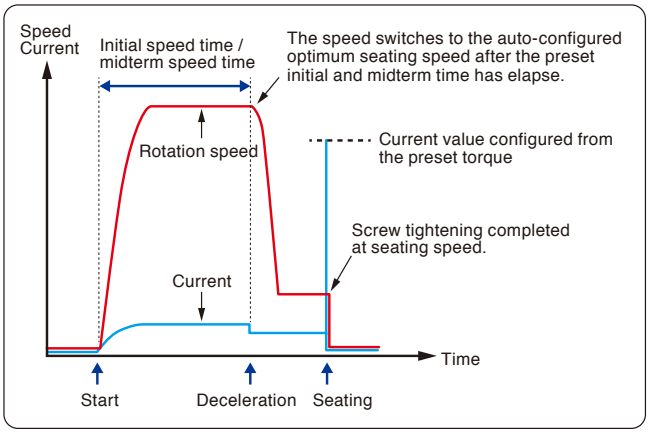


HARD fastening setting

Suitable for workpieces with small fastening load such as threaded holes or rigid bodies such as metal.

Timing chart

A program that seats the screw at the auto-configured optimum rotation speed based on the torque percentage after the initial speed / midterm speed time has elapsed.



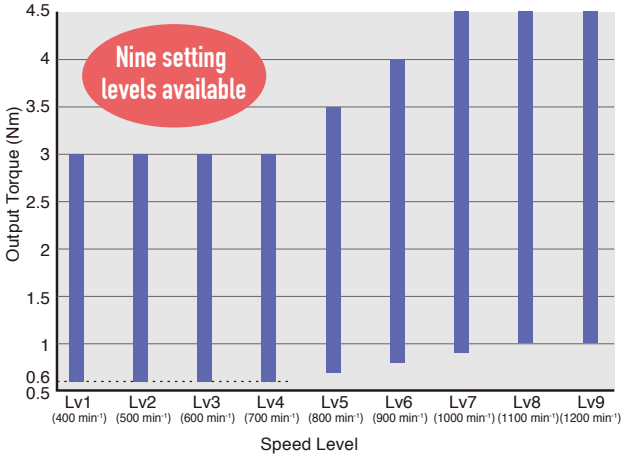
*When measuring the torque with Torque Checker, use Soft Joint (DLW4050) for SOFT fastening setting, use Hard Joint (DLW4040) for HARD fastening setting. (See page 9)

Torque range: Output Torque and Rotation Speed

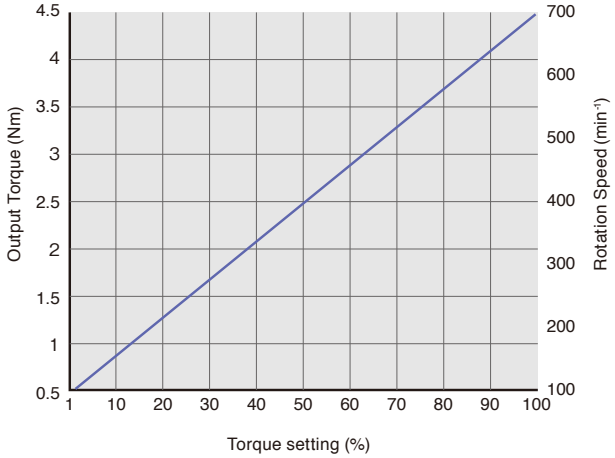
Instruction manual P11, P12

There are nine levels of rotation speed available, 400 - 1200 RPM.
Capable of delivering high torque even at lower speed setting (Soft fastening mode)

Torque Range of SOFT fastening setting



Torque Range of HARD fastening setting



Built-in programmable three stage speed control function

Instruction manual P30 to P32

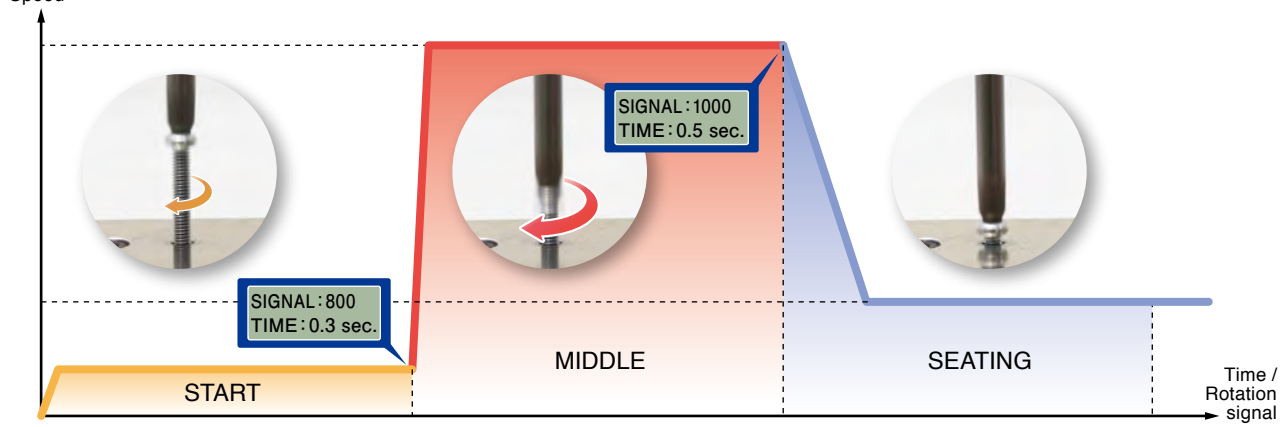
Built-in programmable three stage speed control function combines the "accuracy of low speed" and the “productivity of high speed” for every screws.

◇ **Timing chart (Below rotation speeds and times are examples)**

POINT! **Programming assistance for time settings**

The value of motor of running time /signal is visible on the controller display for ensuing precise adjustment.

*In hard fastening setting, optimum seating speed is automatically configured from the preset target torque.
(Instruction manual P12)



Low speed start-up minimizes cross-threading, stripped screw.

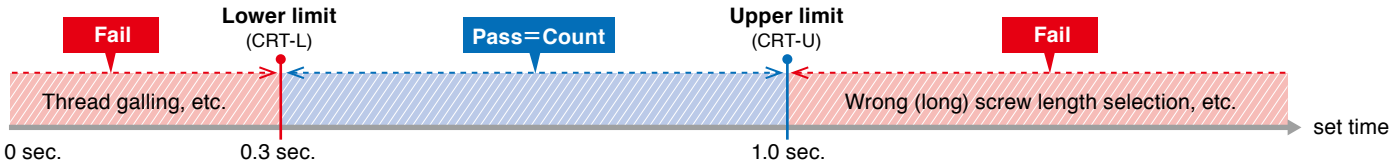
High speed drive increases productivity.

Low speed at torque-up minimizes stripped screw and overshoot torque.

Screw fastening time measuring (Upper / Lower limit)

Instruction manual P32

Once the upper / lower limit of screw fastening time (Correct Timer) is set, every screw fastening time is monitored to determine Pass/Fail. Only when the fastening time goes between the preset upper/lower time, it passes the count.



Two types of measuring methods

Instruction manual P41

Two measuring options are available for fastening time configuration

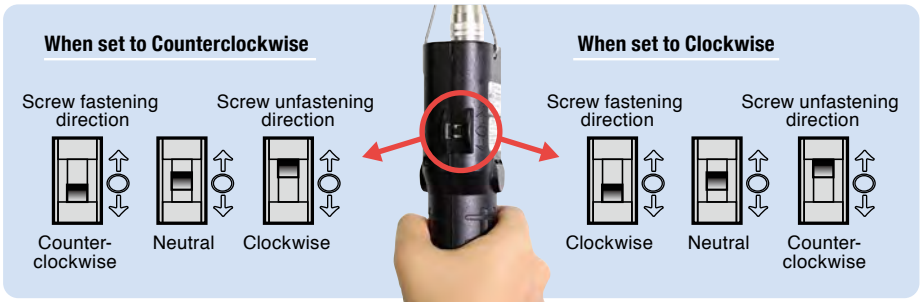
TIME
Measure the actual fastening time for intuitive setting.

MOTOR SIGNAL
By motor rotating signal measurement, preset settings are automatically re-configured when the speed setting is changed.

Rotation direction setting

Instruction manual P37

Select the direction of forward rotation, clockwise or counterclockwise.



Channel setting

Instruction manual P4, P28, P70

Fastening settings are programmed and stored in a program unit called "Channel (CH)". Maximum 30 Channels are storable.

Stores up to 30 Channels

◇ **Example of motion setting**

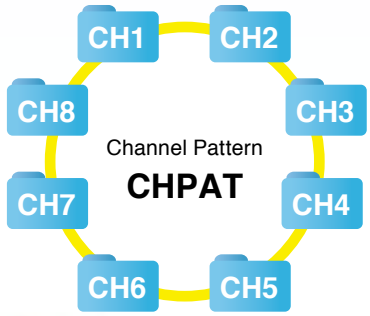
Motion setting \ Channel	CH1	CH2	CH3	CH4	.....	CH30
1: Screw fastening mode	SOFT	SOFT	HARD	SOFT	.....	HARD
2: Number of screw fastening	2 pcs.	13 pcs.	5 pcs.	3 pcs.	.....	20 pcs.
3: Speed level at finish	Lv5	Lv9	AUTO	Lv1	.....	AUTO
4: Torque	10%	80%	30%	45%	.....	20%
5: Speed level at start	Lv1	OFF	Lv9	Lv3	.....	Lv1
6: Rotation time at start	0.1 sec.	—	0.3 sec.	0.8 sec.	.....	1.0 sec.
7: Speed level at midterm	Lv9	OFF	OFF	Lv8	.....	Lv7
8: Rotation time at midterm	0.5 sec.	—	—	1.2 sec.	.....	0.5 sec.
9: Speed level at reverse rotation	Lv9	Lv9	Lv7	Lv5	.....	Lv5
⋮	⋮	⋮	⋮	⋮	.....	⋮
26: Rotation direction	RIGHT	RIGHT	RIGHT	LEFT	.....	RIGHT

Channel Pattern setting

Instruction manual P4, P38, P70

Capable of creating a sequence of maximum 8 Channels in a program unit called "Channel Pattern(CHPAT)"
The controller stores 30 different Channel Patterns and the Channel Patterns also can be linked or looped to switch over in sequence.

Sequence up to 8 Channels



CHPAT 1 CH3 → CH25 → CH11 → CH10 → CH8 → CH22 → CH15 → CH18 — 8 Channels

⋮

CHPAT 30 CH5 → CH30 → CH20 → CH13 — 4 Channels

◇ **Example of Channel Pattern**

CHPAT 1 Register 4 Channels

CH11 → CH12 → CH13 → CH14 → End → Repeat

CHPAT 2 **CHPAT 3** Register 10 Channels

(CHPAT 2)

CH11 → CH12 → CH13 → CH14 → CH15 → CH16 → CH17 → CH18 → Go to CHPAT 3

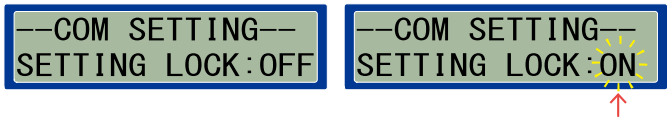
(CHPAT 3)

CH19 → CH20 → End → Go to CHPAT 2

Setting lock function

Instruction manual P42

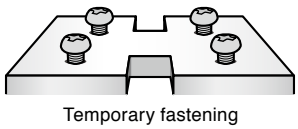
A password is required to change the settings to avoid accidental setting change.

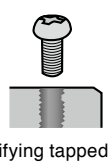


Auto reverse function

Instruction manual P35

The screwdriver reverses when either reaching the preset torque or time. It is beneficial to fasten screws temporarily, or verify tapped holes.


Temporary fastening

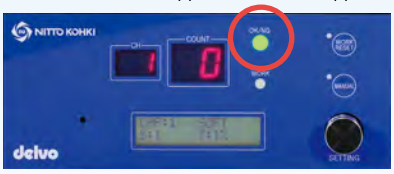

Verifying tapped holes

Built-in LED function

Instruction manual P19, P37

Built-in LED lamp lights in preset color from 7 different types for tool/Channel identification. Also it lights in red, green or blue to indicate the job status (see below).

Status in three colors



Controller

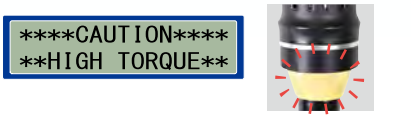
- OK(PASS)
- NG(FAIL)
- Count up

Two safety functions

1. Caution mode

Instruction manual P43

Caution mode allows you to set a specific torque percentage value as a threshold to alert the operator to an increased torque. When the tool is set for a torque exceeding that value, it will give the operator a caution by LED flashing and message.

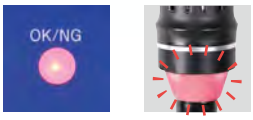


Flashes in yellow

2. Refastening prohibited time setting

Instruction manual P36

Refastening prohibited time setting deactivate the screwdriver for a moment (0.0 to 9.9 seconds) after it reaches the preset torque.



Controller

Flashes in red

External I/O signal

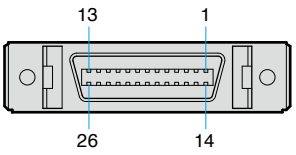
Two types of I/O signal communication ports are available.

1. External I/O Cable

Instruction manual P47 to P52

Use External I/O Cable DLW9091.
Compatible with both NPN/PNP.

It can be wired according to the externally connected equipment.



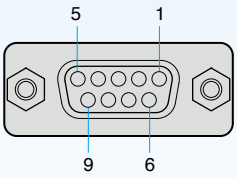
Connector: IEEE1284
half pitch connector (26-pin)

Terminal No.	Function	Details	I/O
1	+24 V DC	Built-in service power supply (Capacity: Maximum 200 mA)	Service power supply
2	0 V DC		
3	Input signal common terminal	Input signal common terminal (See page 49 of instruction manual)	Input
4	Output signal common terminal	Output signal common terminal (See page 50 of instruction manual)	Output
5	Switching signal A	Specify Channel or Channel Pattern using a 5-bit input signal.	Input
6	Switching signal B		
7	Switching signal C		
8	Switching signal D		
9	Switching signal E		
10	Forward rotation start	Startup with external input signal. The electric screwdriver operates while the input signal is ON.	
11	Reverse rotation start		
12	Workpiece	Input workpiece signal (workpiece detection signal output). Workpiece signal is ON while input signal is ON.	
13	External reset	Input external reset signal	
14	N/A	No connection	–
15	Channel A	The Channel being operated or being set is ON	Output
16	Channel B		
17	Channel C		
18	Channel D		
19	Channel E		
20	Forward rotation signal	Output signal is ON during forward rotation	
21	Reverse rotation signal	Output signal is ON during reverse rotation	
22	Operation OK	Output signal is ON when the screw fastening of the set count is complete and judged as operation OK (PASS).	
23	Count up	Output signal ON for 0.3 seconds when screw fastening is normal (at torque-up).	
24	Operation NG	Output signal ON when workpiece signal is OFF during operation and judged as operation NG (FAIL).	
25	Screw fastening NG	Output signal ON for 0.3 seconds when screw fastening is NG (FAIL).	
26	N/A	No connection	–

2. RS-232C

Instruction manual
P55 to P58

Use Communication Cable (Straight-through) DLW9092 to connect with PCs or sequencers (PLC).



Connector pin layout
(D-SUB 9-pin (female))

◇ Specifications (RS-232C)

Transmission method	Asynchronous (asynchronous communication)
Communication line	Full duplex
Transmission speed	38400 bps
Number of data	8
Parity	None
Stop bit	1
Handshake	None
Delimiter (communication separator)	Receive: CR+LF (¥r¥n) Send: CR+LF (¥r¥n)

Pin No.	Signal name	I/O
2	TxD	OUT (This tool⇒PC)
3	RxD	IN (PC⇒This tool)
5	GND	GND

*Other pins are not used

◇ Send / receive commands

Operation	Send command	Response from controller
Forward rotation drive	FWD¥r¥n	FWD¥r¥n
Reverse rotation drive	RVS¥r¥n	RVS¥r¥n
Drive stop	STP¥r¥n	STP¥r¥n
Switching Channel / Channel Pattern *1	MOV:p¥r¥n (p=1 to 30)	At Channel switching CH :p¥r¥n At Channel Pattern switching CHP:p¥r¥n
Screw count reset	CRT¥r¥n	CRT¥r¥n
Workpiece reset	WRT¥r¥n	WRT¥r¥n
Workpiece signal ON	WIN¥r¥n	WIN¥r¥n
Workpiece signal OFF	WOT¥r¥n	WOT¥r¥n
Resend request *2	RSD:p¥r¥n (p=1 to 10)	Command sent nth time before, specified by the parameter value

*1 The switching target differs depending on the setting of the common setting "Channel change type" (CH CHANGE).
When the Channel Pattern is switched, the Channel is also switched, so the responses are sent continuously.

*2 Up to the latest ten commands sent from the controller to the PC or sequencer are stored.
When signals could not be received correctly due to noise or some other reason, the command of nth time before, specified by the parameter will be sent from the PC or sequencer.

[Example] Send command "RSD:3¥r¥n" →Returns the command sent by the controller three times before.
Since control is performed even when communication between the controller and PC or sequencer fails, use this function when you wish to maintain the reliability of transmission and reception. This command transmission is not included in the ten commands that are stored.

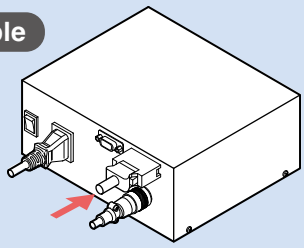
In addition to RS-232C signals, commands are sent from the controller to the PC or sequencer(PLC) when processing is performed manually or by contact signals.

◇ Notification command

Operation	Notification from controller
At forward rotation drive start	FWD¥r¥n
At reverse rotation drive start	RVS¥r¥n
At drive stop completion	STP¥r¥n
Operation OK (PASS) notification	OK ¥r¥n
Workpiece signal ON	WIN¥r¥n
Workpiece signal OFF	WOT¥r¥n
Count up (screw fastening completes normally) notification p = Measured fastening time or signal is output	CUP:p¥r¥n (p=1 to 60000)
Operation NG (workpiece out while fastening count remaining) notification	WNG¥r¥n
Screw fastening NG (FAIL) notification p1=Screw fastening NG (FAIL) No. p2=Measured fastening time or signal is output	FNG:p1:p2¥r¥n
At Channel switching	CH :p¥r¥n (p=1 to 30)
At Channel Pattern switching	CHP:p¥r¥n (p=1 to 30)
When a non-supported command or parameter is input	CER¥r¥n

1. External I/O Cable

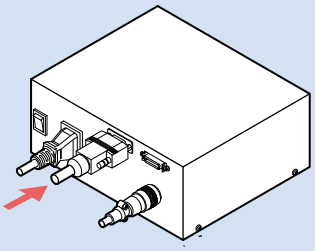
DLW9091



Use optional External I/O cable DLW9091 for connection to signal wirings.

2. RS-232C

DLW9092



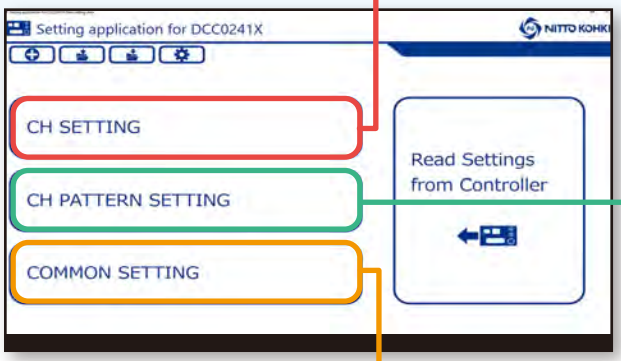
Use optional Communication Cable (straight-through) DLW9092 for connection to PC or PLC.

Easy setting with dedicated software

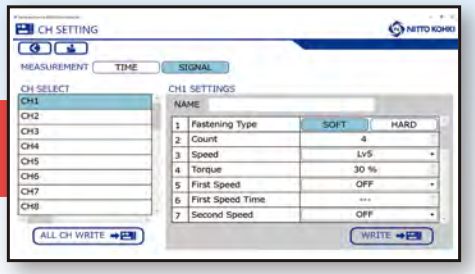
Free software is available for program settings.
Download free at nittokohki.com

Communication Cable
(Straight-through) DLW9092

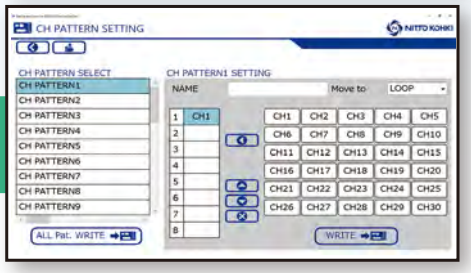
◇ **Setting software top page**



Channel setting



Channel Pattern setting

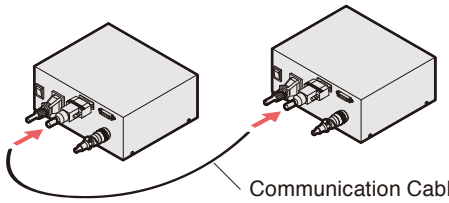


Common setting

Setting data transmission function between controllers

Instruction manual P45

Settings in both Channel and Channel Patterns are transferrable between two controllers through RS-232C cable.
The same programs can be copied to multiple controllers quickly.

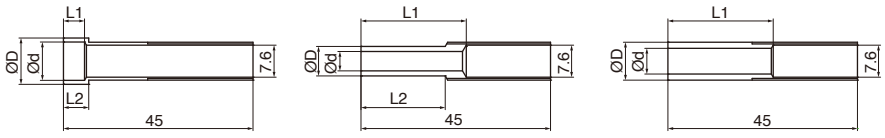


Communication Cable (Crossover)
DLW9093

Vacuum Sleeves and applicable Bits

Unit: mm

◇ **Vacuum Sleeve DLS4000 series**



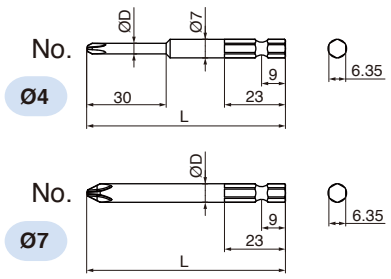
Type A **Type B** **Type C**

Model	Part No.	Ød		ØD		L1		L2		Bit (No.xdxL)*2	Type
		in.	mm	in.	mm	in.	mm	in.	mm		
DLS4220	TD08001	0.36	9.1	0.43	11	0.20	5	0.24	6	No.2x7x75	A
DLS4221	TD08002	0.41	10.6	0.49	12.5	0.22	5.5	0.28	7	No.2x7x75	A
DLS4222 *1	TD07850	0.31	8	0.43	11	0.21	5.3	0.87	22	—	A
DLS4223 *1	TD07851	0.32	8.2	0.39	10	0.20	5	0.24	6	No.2x7x75	A
DLS4224 *1	TD07852	0.27	6.8	0.35	9	0.39	25	—	—	—	C
DLS4225	TD09344	0.18	4.6	0.28	7	0.79	25	0.79	20	No.1x4x75	B
DLS4226	TD09617	0.20	5.1	0.28	7	0.79	25	0.79	20	No.1x4x75	B
DLS4227	TD09345	0.22	5.6	0.28	7	0.79	25	0.79	20	No.2x4x75	B
DLS4228	TD09618	0.24	6.1	0.35	9	—	25	—	—	No.2x4x75	C
DLS4229	TD09619	0.25	6.4	0.35	9	—	25	—	—	No.2x4x75	C
DLS4230	TD09620	0.28	7.1	0.35	9	—	25	—	—	No.2x4x75	C

*1) Made-to-order product *2) Select the correct size number that fits your screw head

◇ **Applicable Bit NK35**

Unit: mm



Part No.	Phillips No.	ØD		L	
		in.	mm	in.	mm
TD20306	1	0.16	4	2.95	75
TD20308		0.28	7	1.97	50
TD20309		0.28	7	2.95	75
TD20316	2	0.16	4	2.95	50
TD20317		0.16	4	1.97	75
TD20319		0.28	7	2.95	50
TD20320		0.28	7	1.97	75
TD20327	3	0.28	7	2.95	50
TD20328		0.28	7	2.95	75

* See delvo general catalog for other bit types.

Optional Accessories

Diamond Shape Flange Coupling
DLW9017

For fixture mount

Flange Coupling
DLW9019

For fixture mount

Screw Vacuum Pump
DLP2540 (115 V AC), DLP2570 (230 V AC)

Connect the tube to the vacuum pickup port.
The vacuum will pick up the screw.

Vacuum Pickup
DLP7401-K

For screw vacuum pickup

Vacuum Sleeve
DLS4000 series

Select according to the screw shape

Torque Checker
DLT1673A

For torque measurement of screwdrivers

Soft Joint
DLW4050

Bit is included

The bit for measuring is included.
(NK35BN 13×19×10×75)

For SOFT fastening torque measurement

Hard Joint
DLW4040

Bit is optional

The bit for measuring is not included.
(NK35BN 13×19×10×75)

For HARD fastening torque measurement

External I/O Cable 3 m
DLW9091

Connect when using external signals

Communication Cable 3 m
(Straight-through)
DLW9092

Connect to PCs and PLCs (sequencers) when using external signals

Communication Cable 3 m
(Crossover)
DLW9093

Connect controllers to transmit settings

Extension Cord 3 m
DLW9310

Extends cord length between controller and screwdriver

Connection Cord 2 m
DLW9078

Standard accessory of screwdrivers

Connects controller and screwdriver

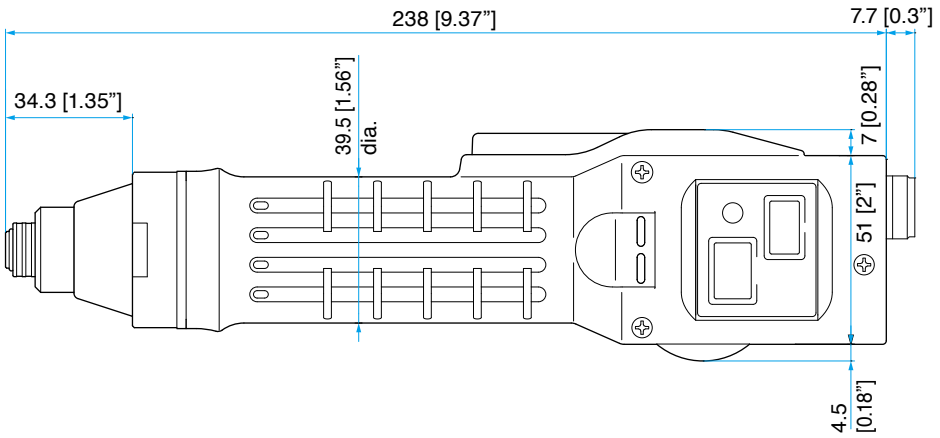
Pistol Grip
DLW2300ESD

ESD Protection

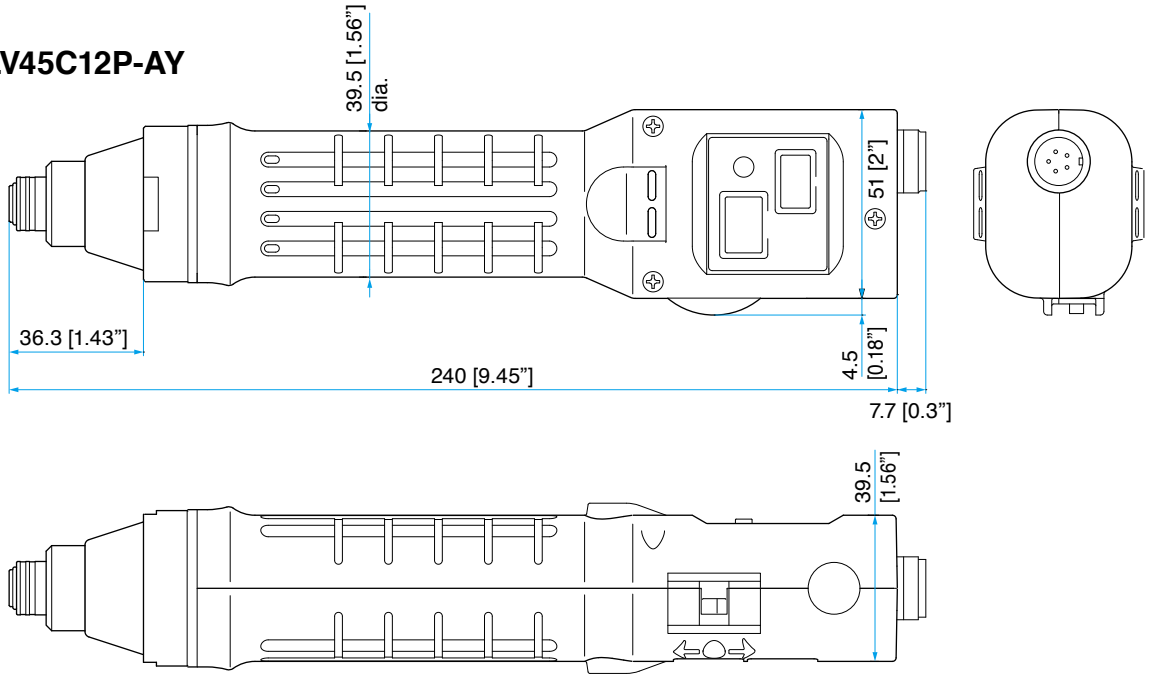
For operator fatigue reduction, suitable for horizontal fastening

External Dimensions

DLV45C12L-AY



DLV45C12P-AY



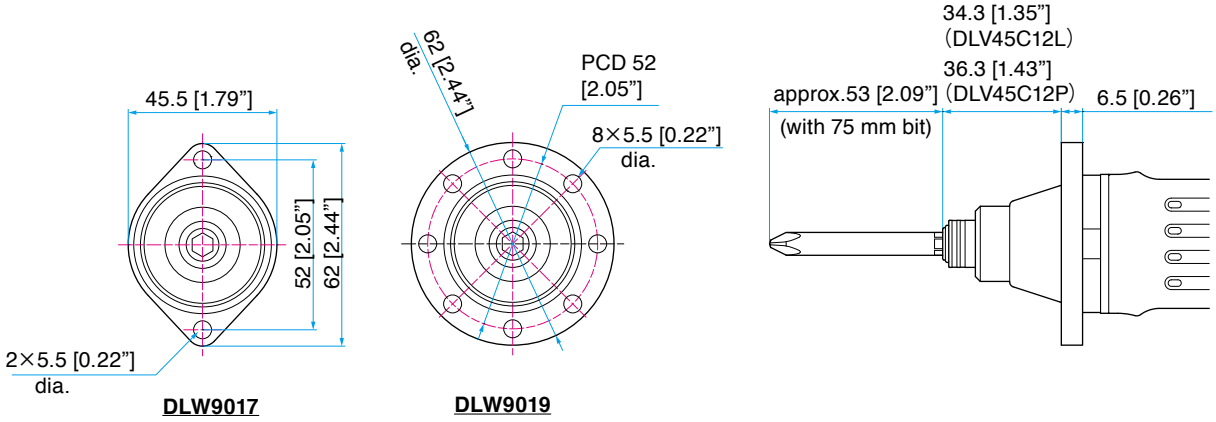
unit: mm [inch]

Example of installation on automated machines

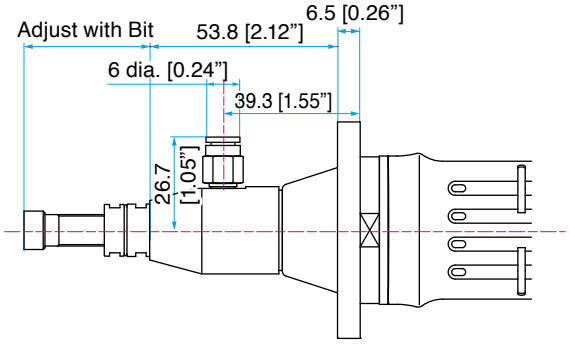
Can be mounted on desktop robots, Cartesian robots, 6-axis robots, etc.

External Dimensions

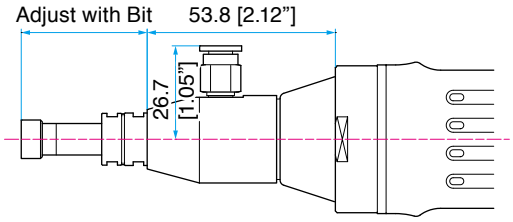
When Flange Coupling DLW9017/DLW9019 is mounted



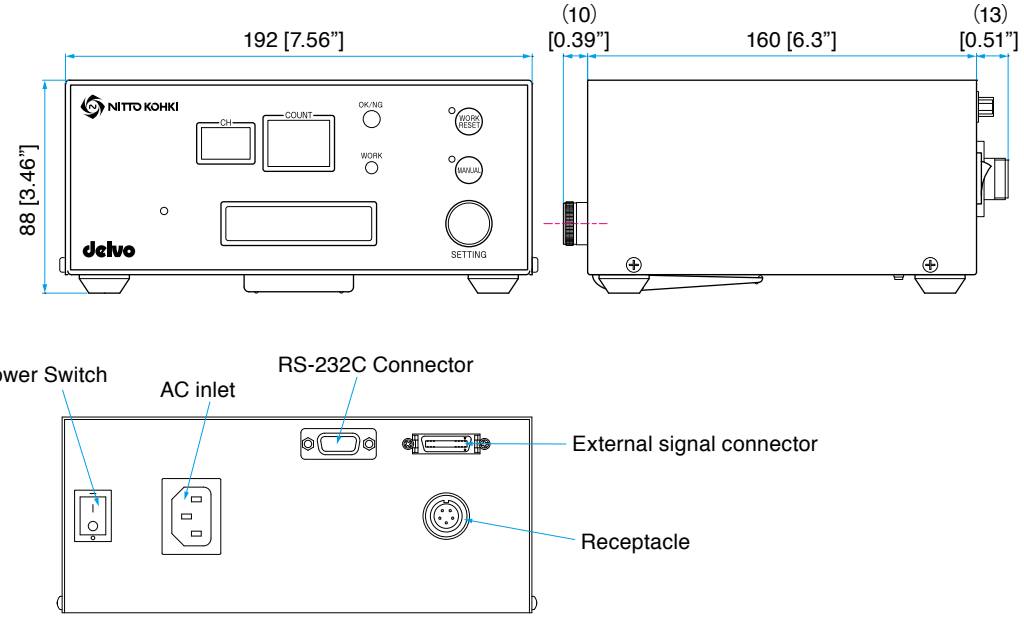
When Flange Coupling and Vacuum Pickup DLP7401-K is mounted



When Vacuum Pickup DLP7401-K is mounted



Controller DCC0241X-AZ



unit: mm [inch]

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