HIOS®

The Information Guide of
HIOS Screwdrivers and transformers
for automated & fixed applications

(August 2015)

－HIOS Electric Screwdrivers

－Transformers for HIOS Screwdriver
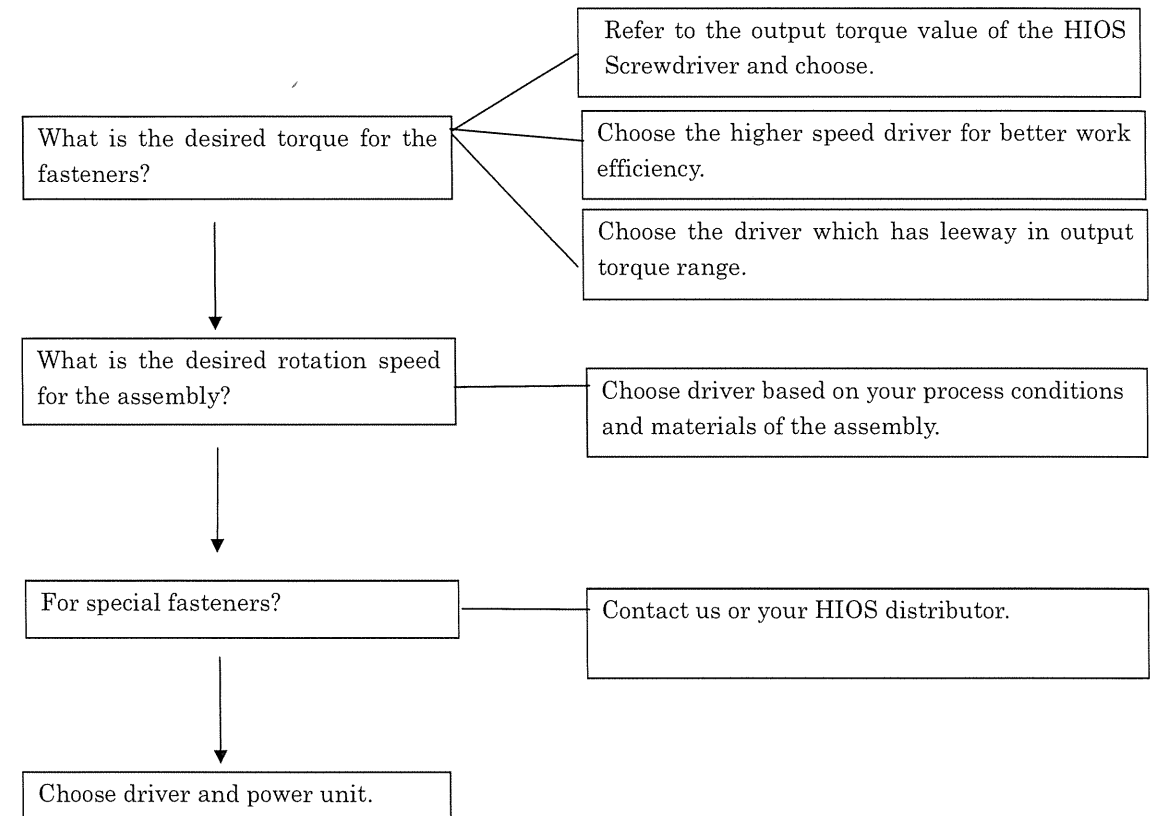
HIOS Inc.

Operation Manual No. ET-A035 | 15A |

CONTENTS

Check points to select

What is the desired torque for the fasteners?
- Refer to the output torque value of the HIOS Screwdriver and choose.
- Choose the higher speed driver for better work efficiency.
- Choose the driver which has leeway in output torque range.

What is the desired rotation speed for the assembly?
- Choose driver based on your process conditions and materials of the assembly.

For special fasteners?
- Contact us or your HIOS distributor.

Choose driver and power unit.

Attention :
We are unable to add the features that the optional models have to the standard model once you purchased it.
Please read the points of selecting HIOS screwdrivers for automation above or contact us or your HIOS distributor before place an order.
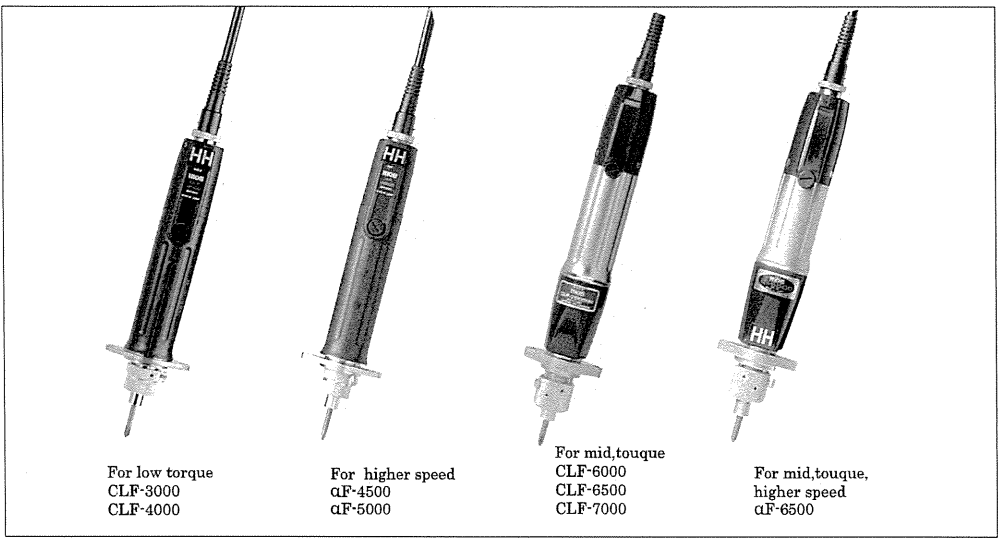
■Combination of HIOS Screwdriver and Transformer

Transformer
CLT-AY-61

HIOS Screwdriver
CLF-Series,
α F-Series,
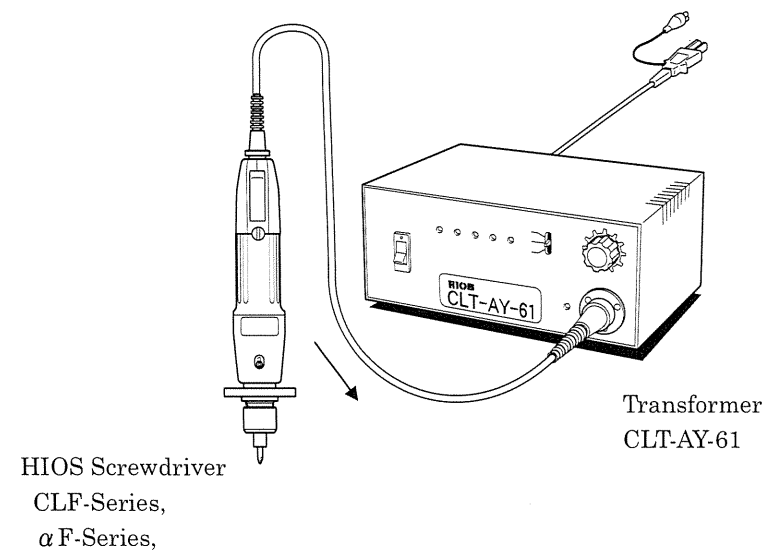
(Caution)　These standard models provide only clockwise rotation.

■Output Torque Value

Driver Modle	OutPut Torque Value																								
kgf·cm	0	0.5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	30	40	50
N·m		0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	3	4	5
CLF-3000		━━━━																							
CLF-4000			━━━━																						
CLF-6000						━━━																			
CLF-6500						━━━━━━━																			
CLF-7000							━━━━━━━━━━━━━																		
αF-4500						━━━																			
αF-5000						━━━━━																			
αF-6500						━━━━━━																			

■Lineup of HIOS Screwdrivers

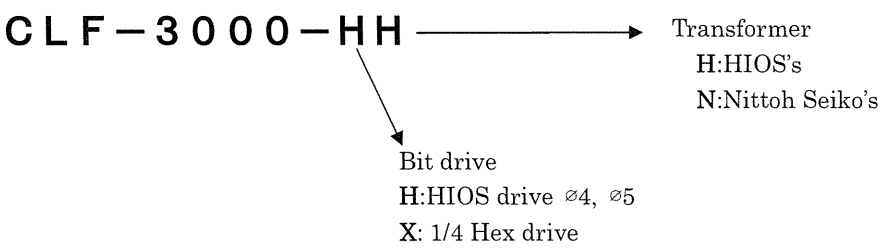| For low torque	For higher speed	For mid,touque	For mid,touque,
CLF-3000	αF-4500	CLF-6000	higher speed
CLF-4000	αF-5000	CLF-6500	αF-6500
		CLF-7000	

■Features

●Can be mounted on X/Y robots.

●High torque accuracy enables to stabilize screw tightening.

●LED lights on HIOS Transformer indicate status of input and output signal.

●Compact and light HIOS screwdriver makes it easy to mount on existing assembling systems.

●Desired screwdriver for automatic assembling lines.

●Wide torque range and non-step & easy torque adjustment

●External carbon brush is easy to be replaced.

　Carbon brush holds up in 1 million times of screw tightening.
　(It depends on your process conditions)

●Detachable connector driver cord makes maintenance of Screwdriver easy.

■Model No. of HIOS Screwdrivers

C L F − 3 0 0 0 − H H

→ Transformer
  H:HIOS's
  N:Nittoh Seiko's

↓ Bit drive
  H:HIOS drive ⌀4, ⌀5
  X: 1/4 Hex drive

		HIOS's	Nittoh Seikou's
CLF・・・	3000	HH	HN
	4000	HH・XH	HN・XN
	6000	HH・XH	HN・XN
	6500	HH・XH	HN・XN
	7000	HH・XH	HN・XN
αF・・・	4500	HH・XH	HN・XN
	5000	HH・XH	HN・XN
	6500	HH・XH	HN・XN

φ4、φ5

HIOS drive H4:φ4、H5:φ5

1/4 Hex drive
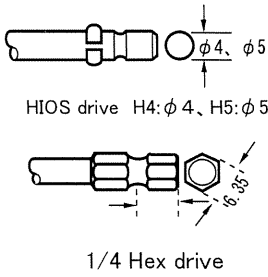
Trailing Alphabet
HH-Bit drive and Transformer are both HIOS.
HN-Bit drive:HIOS,Transformer:Nittoh.
XH-Bit drive:1/4 Hex,Transformer:HIOS.
XN-Bit drive:1/4 Hex,Transfomer:Nittoh.

Caution
If you use Nittoh transformer with HIOS Screwdriver, the model must be HN or XN must be used.
Please make sure to inform us of your transformer model no. before placing orders.

Internal wiring diagram of HIOS Screwdrivers

Meta-con NO.

HIOS (HH,XH)

Nittoh(HN,XN)

Micro SW for torque detection — Motor +

■Optional parts and models for HIOS Screwdriver
● Suction(Vacuum) Attachment・・・For vacuuming screws.
● Counter clockwise rotation model・・・Screwdriver rotates CCW direction.
● Oil seal protection model・・・For tightening fasteners upwards with the driver, this model prevents that the grease oil comes into the motor.

■Specifications of Standard type

Driver Modle	Torque Value Range			No road speed (r.p.m) ※1	Applicale Screw size (mm)		Weight(g)	Bit type	
	N・m	lbf・in	(kgf・cm)	HI/LOW	Machine Screw	Tapping Screw		Hios	1/4 HEX
CLF-3000(HH/HN)	0.03-0.15	0.3-1.3	(0.3-1.5)	1000/560	1.0-2.0	1.0-1.7	400	H4	
CLF-4000(HH・XH／HN・XN)	0.1-0.35	0.9-3.0	(1-3.5)	1000/560	1.4-2.6	1.4-2.3	430	H4	O
CLF-6000(HH・XH／HN・XN)	0.3-0.6	2.6-5.2	(3-6)	750/400	2.0-3.0	2.0-2.6	610	H5	O
CLF-6500(HH・XH／HN・XN)	0.1-1	0.9-8.8	(4-10)	850/440	2.0-3.0	2.0-3.0	670	H5	O
CLF-7000(HH・XH／HN・XN)	0.5-1.5	4.3-13	(5-15)	780/420	2.0-4.0	2.0-4.0	754	H5	O
αF-4500(HH・XH／HN・XN)	0.4-0.6	3.5-5.2	(4-6)	1700/940	2.0-3.0	2.0-2.6	430	H5	O
αF-5000(HH・XH／HN・XN)	0.4-0.75	3.5-6.5	(4-7.5)	1100/600	2.0-3.0	2.0-3.0	430	H5	O
αF-6500(HH・XH／HN・XN)	0.5-1.1	4.3-9.5	(5-11)	1700/950	3.0-4.0	2.6-3.0	670	H5	O

*1 The rotation speed is steplessly adjustable between HIGH and LOW.

*2 Use 1/4 hex bit.

The torque value range and the unloaded rotation speed in the above table are found by measuring under the conditions which are designated by HIOS.
Screwdrivers・・①:CLF-3000,②:CLF-4000,CCLF-,③:CLF-6000,④:CLF-6500、⑤:CLF-7000
⑥:αF-4500, ⑦:αF-5000, ⑧:αF-6500

The measuring conditions
1. The voltage adjusting dial −at HI (30V) and LOW(17V) positions
2. Input voltage −AC100V (the stabilized power supply)
3. The unloaded rotating speed of ①~⑧ are measured after 5min.of aging with CLT-AY-61.
4. HIOS digital torque meter HP-10(or HP-100) is used for measuring.

Note
1: The capacity of each screw driver is assured within the torque value listed in the table, However, after mounted in the automatic controlled system, several conditions such as the loss of power in the joint parts (from the body to the bit) or others, inertia and so on must be regarded.
Therefore, margin of capacitance should be considered when selecting the model.
2: In case that the universal joint or some jigs are used, the output torque value maybe different from the specifications.

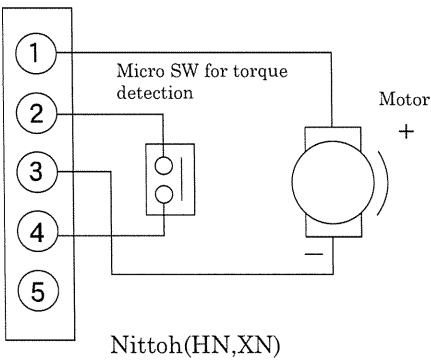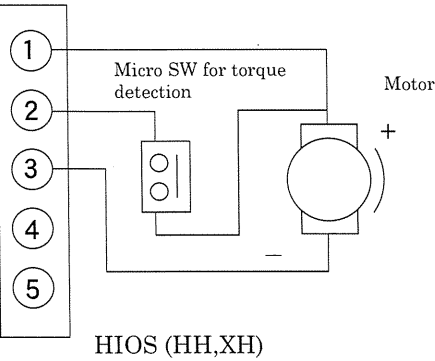## ■Cautions for installing the screwdrivers
1. In case that some interventions such as universal joint or other are used. The inertia and the resistance may affect the torque value. So the joint parts should be lighting as much as possible to avoid unnecessary load.

2. The flange and the screwdrivers are fixed by counterclockwise screw. So the screwdrivers must be secured when the installation in order to resist the counterclockwise loading.
3. When the standard type of screwdriver is facing up, the screwing is impossible. In such case, the custom-made screwdrivers (oil seal protection) should be used.(see page 5)
4. Do not load excess of 5 kg (in the directions of the thrust) on the screwdrivers.
5. The loading (in the direction of the thrust) on the screwdriver should be inflicted vertically.
6. The installation should be designed so as not to inflict the shock on the screwdrivers when it vibrates up and down.
7. Whenever the universal joint is used, confirm the exact rotation of bit by spinning the top of bit slightly.

■Adjustment
How to adjust the torque value
Loosen the fixing screw on Torque Adjusting Nut and fix the applicable value referring to the rough torque indication table below. The digital HIOS Torque Meter for automatic assembling system will be effective for more accurate fixing.
Tighten fasteners and check the torque value with HIOS Torque Meter to obtain the applicable value and fix the Torque Adjusting Nut with the fixing screw.
NOTE
Make sure not to tighten the fixing screw too much, or the Torque Adjustment Bolt may be damaged.
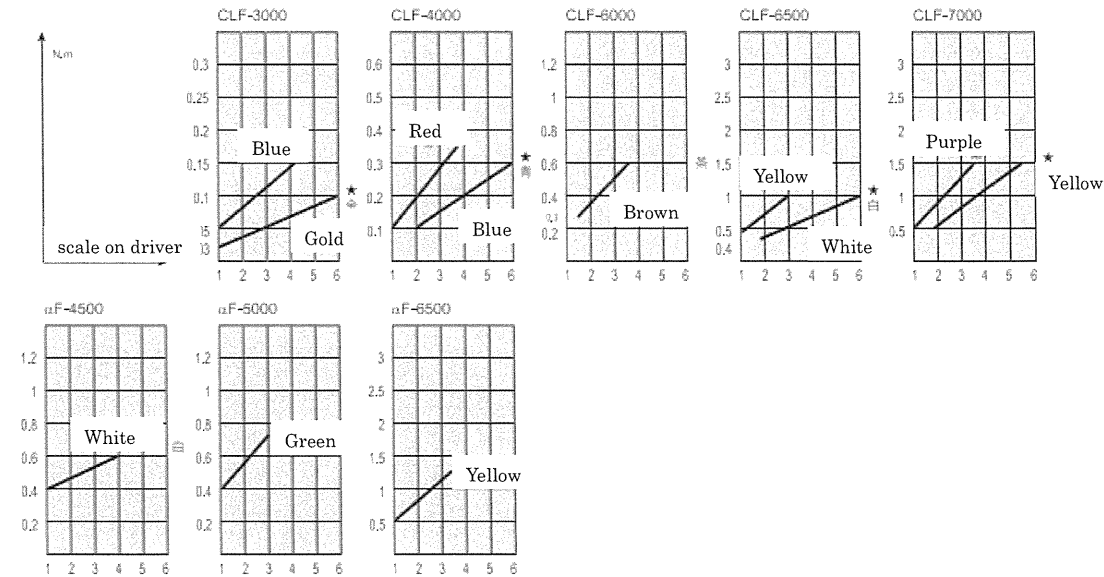
■How to change the Carbon Brush
Loose the Carbon Brush Cap and replace the used Carbon Brush with the new one.
When mount the carbon brush, the curve of contact surface should be fit to the contact part.
Note
The Carbon Brush of these drivers are installed externally in the drivers to replace it easily.
It can stand about 1,000,000 times of screw tightening.
We recommend replacing it before overuse to maintain its good performance.

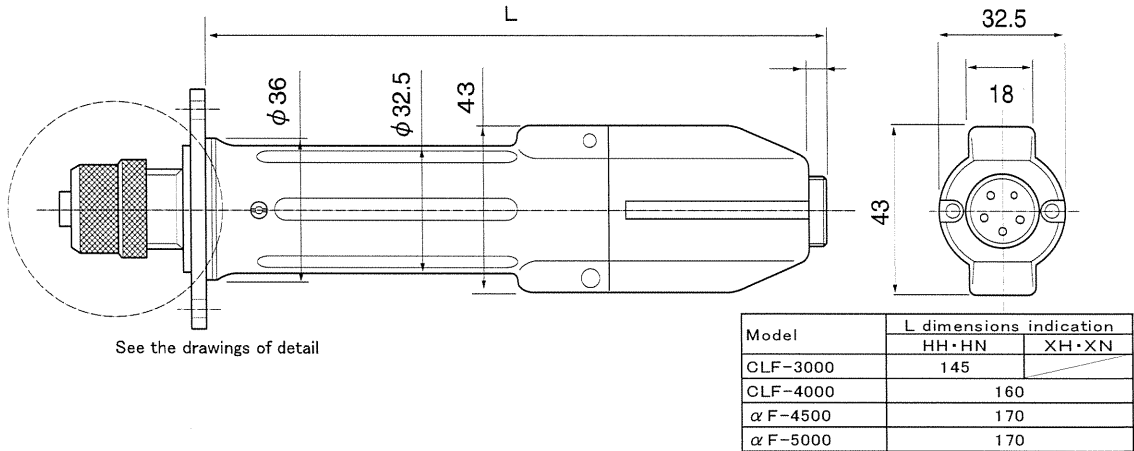| Order codes	Carbon Brush				
	A45-0420	CL4-0420	CL65-0490	CL850-0381	CL816-0421
Model	CLF-3000	CLF-4000	CLF-6000	CL-850A	CL-816A
	AF-4500		CLF-6500		CL-825A
	AF-5000		CLF-7000		
			AF-6500		

■How to attach the bit
・ Push up the joint shaft collar and insert the bit.
・ Pull the inserted bit to confirm it is securely fixed.

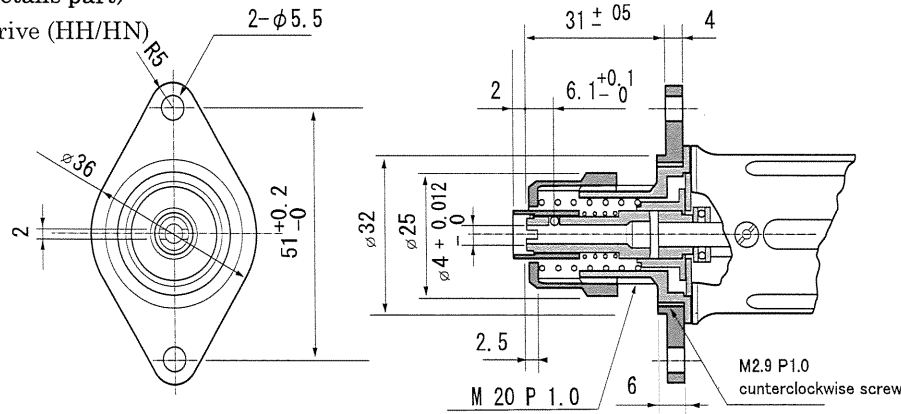■The External Drawings of HIOS Screwdrivers
CLF-3000(HH/HN),   CLF-4000(HH/HN,XH/XN)
AF-4500(HH/HN,XH/XN)   AF-5000(HH/HN,XH/XN)

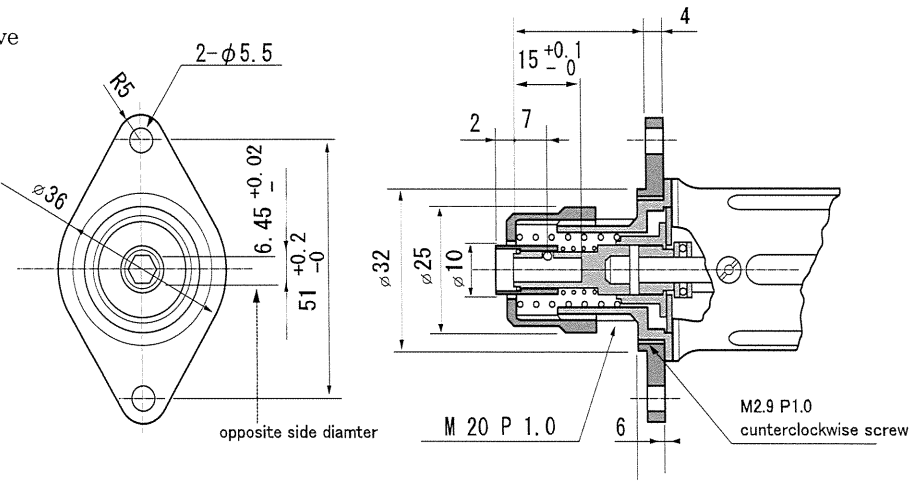External dimensions is available in DXF on the HIOS website at www.hios.com

See the drawings of detail

Model	L dimensions indication	
	HH・HN	XH・XN
CLF-3000	145	
CLF-4000	160	
αF-4500	170	
αF-5000	170	

(The details part)
HIOS drive (HH/HN)

1/4 Hex drive (XH/XN)

2-φ5.5
R5
φ36
6.45 +0.02 −
51 +0.2 −0
4
15 +0.1 −0
2 7
φ32
φ25
φ10
M 20 P 1.0
6
M2.9 P1.0
cunterclockwise screw
opposite side diamter

●The direction of screwing flange has no issue.

※Thickness of the flange for HN・XN model has been changed from 4mm to 8mm since June 1996.

The External Drawings of HIOS Screwdriver

CLF-6000(HH/HN, XH/XN), CLF-6500(HH/HN, XH/XN)
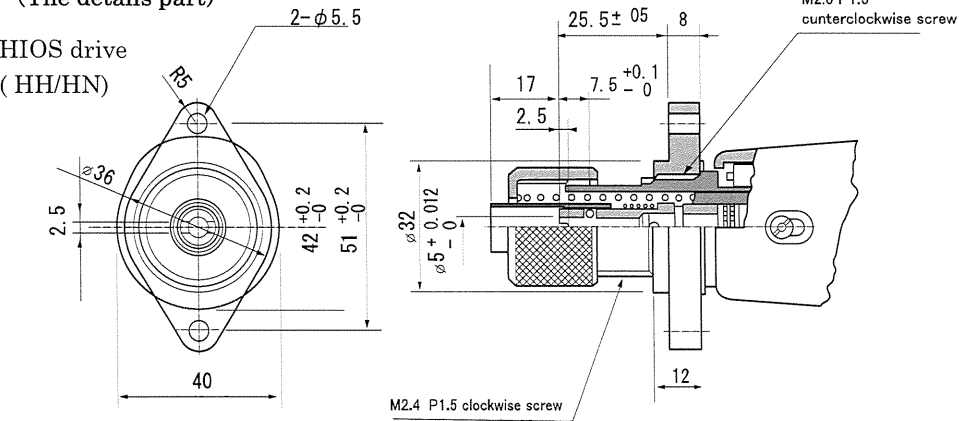CLF-7000(HH/HN,XN/XN)   AF-6500(HH/HN,XH/XN)

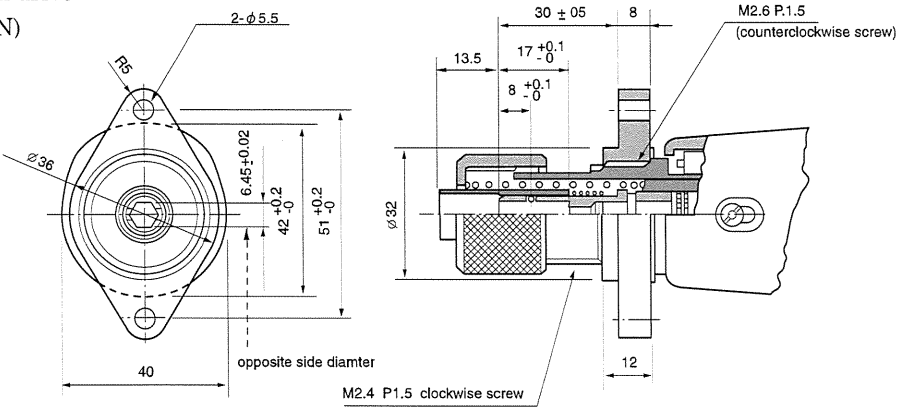External dimensions is available in DXF on the HIOS website at www.hios.com

L
φ42
φ37
φ55
5
37
18
55
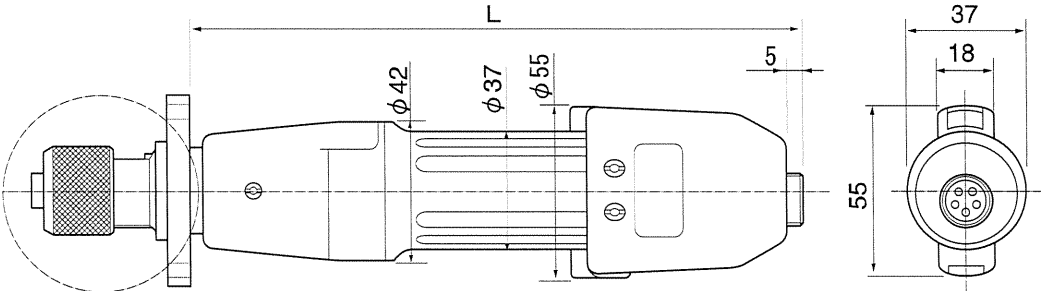
See the drawings of detail

Model	L dimensions indication	
	HH・HN	XH・XN
CLF−6000	183	
CLF−6500	197	
αF−7000	217	
αF−6500	197	

(The details part)

HIOS drive
(HH/HN)

2-φ5.5
R5
φ36
2.5
42 +0.2 −0
51 +0.2 −0
φ32
φ5 +0.012 −0
φ5 +0.01 0
40
25.5± 05
8
M2.6 P1.5
cunterclockwise screw
17
7.5 +0.1 −0
2.5
12
M2.4 P1.5 clockwise screw

1/4 Hex drive (XH/XN)

2-φ5.5
R5
φ36
6.45+0.02 −0
42 +0.2 −0
51 +0.2 −0
40
opposite side diamter
30 ± 05
8
13.5
17 +0.1 −0
8 +0.1 −0
φ32
M2.6 P.1.5
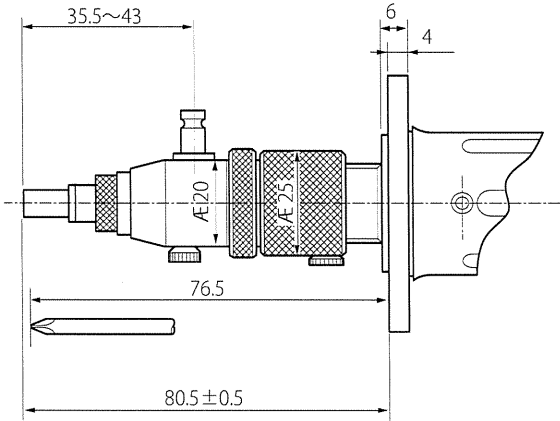(counterclockwise screw)
12
M2.4 P.1.5 clockwise screw

●The direction of screwing the flange has no issue.

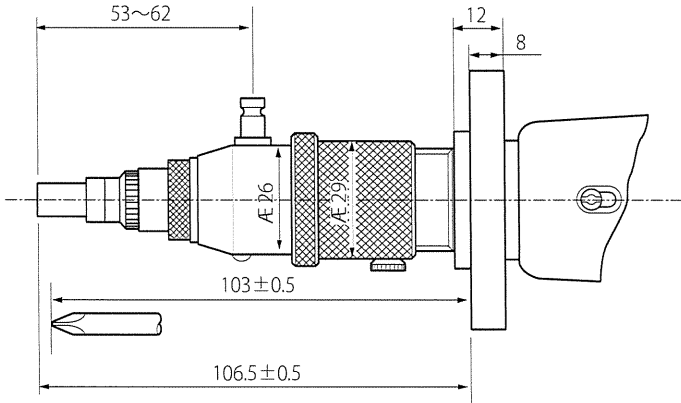### ■ The External Drawings of Suction (Vacuum) Attachment for HIOS drive

HIOS drive
H4 φ4 (HH/HN)
CLF-3000
CLF-4000
αF-4500

＊The bit uses length of 60mm.

35.5〜43
6
4
Æ20
Æ25
76.5
80.5±0.5

HIOS drive
H5 φ5 (HH/HN)
CLF-6000
CLF-6500
CLF-7000
αF-6500

＊The bit uses length of 100mm

53〜62
12
8
Æ26
Æ29
103±0.5
106.5±0.5
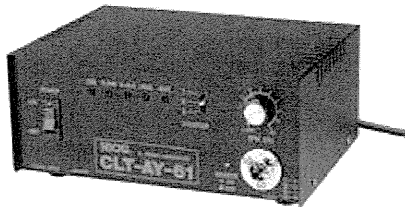
●For more information, please contact us or your HIOS distributor.
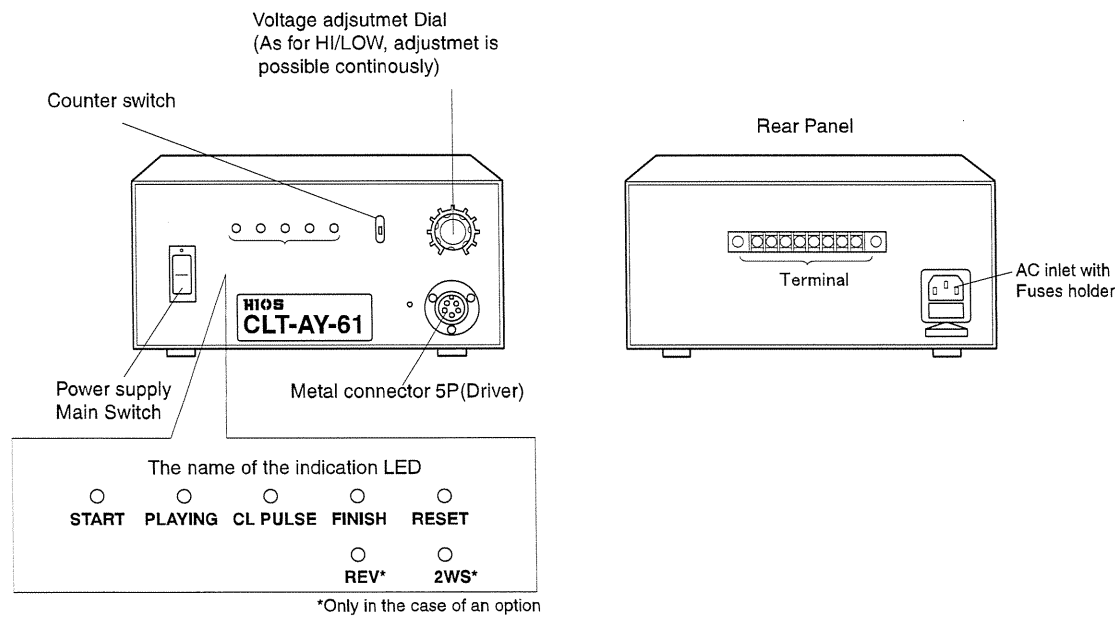
■ HIOS Transducer
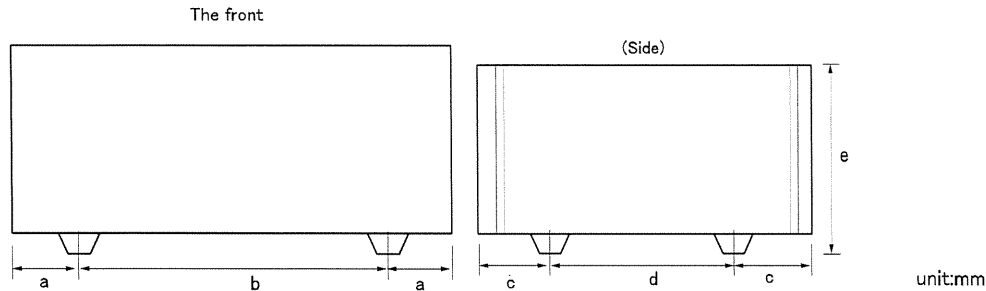
CLT-AY-61 Option: 2WV, REV or 2WV+REV

CLT-AY-61 is a substitution model of CLT-AY-51AVR which can be used with a HIOS CLF and α F series only. The feature of this transformer is better durability and easy to use.

●Specifications

Model	CLT-AY-61
Input Voltage	AC100V、 AC120V or AC220-240V ±5% (50／60Hz)
Output Voltage	DC17-30 variable(PPM) Max.4A
Power consumption	68W
External dimensions (mm)	232×177×106(H)
Weight (kg)	4.2kg
AC cord length (mm)	1.8m(inlet type with ground wire)
Compatible drivers (1 tool only)	CLF-3000,CLF-4000,CLF-6000, CLF-6500,CLF-7000, α F-4500,α F-5000,α F-6500

Voltage adjsutmet Dial
(As for HI/LOW, adjustmet is possible continously)

Counter switch

HIOS
CLT-AY-61

Power supply
Main Switch

Metal connector 5P(Driver)

Rear Panel

Terminal

AC inlet with
Fuses holder

The name of the indication LED

○ START ○ PLAYING ○ CL PULSE ○ FINISH ○ RESET

○ REV* ○ 2WS*

*Only in the case of an option

●Dimensions

The front

(Side)

e

a   b   a   c   d   c   unit:mm

a	b	c	d	e	Rubber foot		
					a	b	c
21mm	190mm	38.5mm	100mm	106mm	φ20mm	φ18mm	10mm

●The standard specifications of HIOS Transducer

1. Adjusting the output voltage is non-step from HI (approx.30V) to LOW (approx.17V) using the Voltage Adjusting Dial.
2. The circuit is a reset preference circuit which stops the screwdriver by inputting the RESET signal at any time.
3. The Counter Switch is available which can control the number of the driver shut off by the clutch up to 3 times for double or triple-fastening required under the certain screw tightening conditions.

4. Input system is selectable.
   1. Starting system : Pulse input starting system or Reading starting system
   2. Input system: Open collector Input (Low active) or Voltage input (High active).
   3. Screwdriver : HIOS-product(HH/XH)or Nittoh Seikou-product(HH/XN) are applicable Each selection or adjustment is changeable even after purchase. (See the operation manual of the Power Supply)
5. The LED lights on the front panel helps you to confirm Input / Output operation status. (The LED lights indicates START, PLAYING,CL,PULSE FINISH RESET and so on)
6. The inlet with fuse holder is adopted.

Options

HIOS transducer has 3 options below.

2WV: The control of low rotation (5 to 15V) by an external operation is possible. 2WV LED lights on during the LOW rotation.(The function will support the screw tightening.)

REV: The control of REV rotation by an external operation is possible . REV LED lights on during the REV rotation.

2WV+REV: Refer to the features above.

Note: The options above cannot be added to the standard CLT-AY after purchasing.
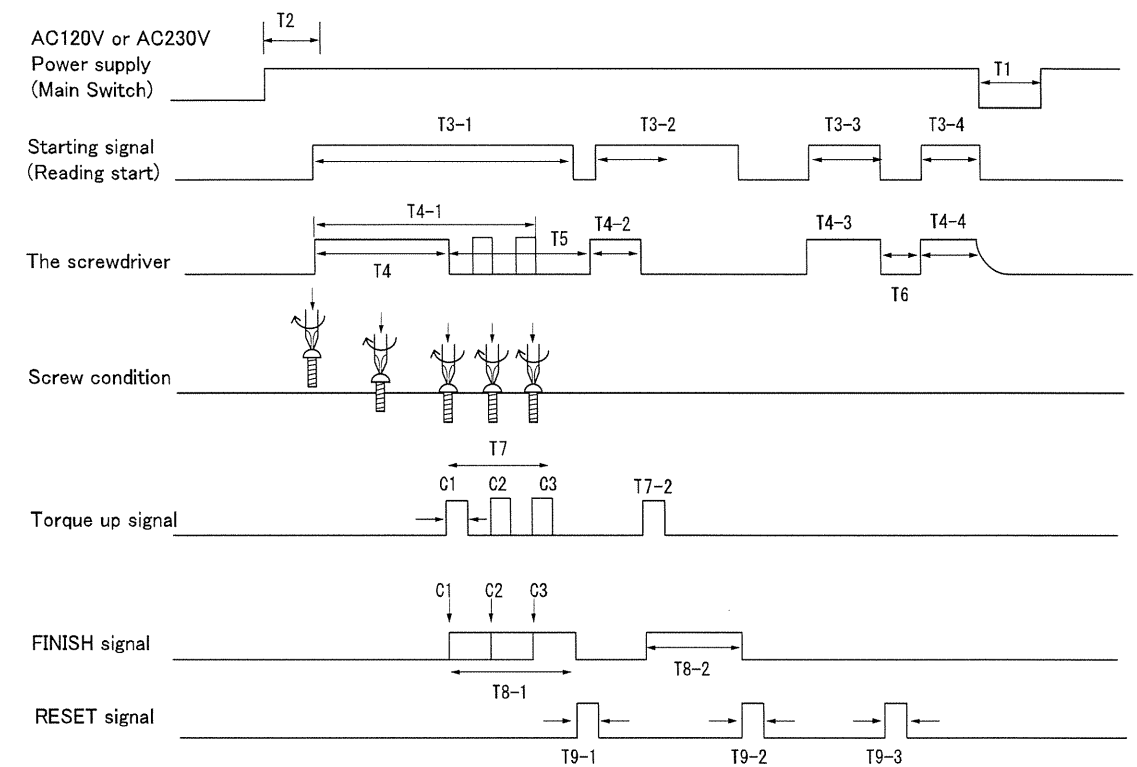
The Timing Chart for Pulse input starting system
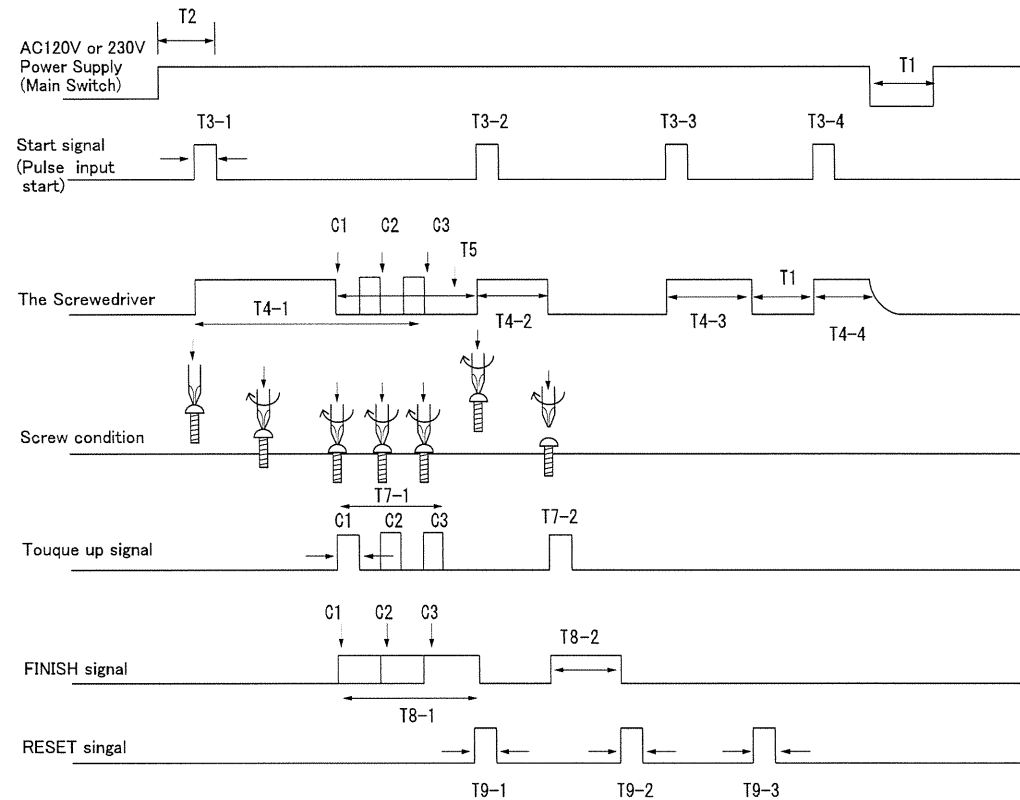
The Timing Chart for Reading starting system

Description

T1: Make sure that interval between ON and OFF of Main Switch is 2 sec or longer.

T2: Although the Power Supply is turned ON and the STARTING signal is the ON state, the circuit of the Power Supply starts on initial status.

T3: The proper input time of STARTING signal on the PULSE start method should be 10 mS to 50 mS. (You can check the input time with the LED on the front panel.)

T4: It indicates that the driver is rotating. (Also you can check the input signal with the LED on the front panel.) The timing chart (C1, C2, C3) depends on the number of driver shutoff set with the Counter Switch.

T5: It indicates that the driver was shut off by the clutch.

T6: It indicates that the driver was stopped by RESET signal.

T7: This signal is output from the driver to the Transformer when torque is achieved. (It can be checked with the LED on the front panel.)

T8: This output signal is to inform the completion of screw tightening. The timing chart (C1, C2, C3) depends on the number of driver shutoff set with the Counter Switch. This output signal stops right after RESET signal is input.

T9: Input this RESET Signal to stop the driver when it is necessary. (It can be checked with the LED on the front panel.)
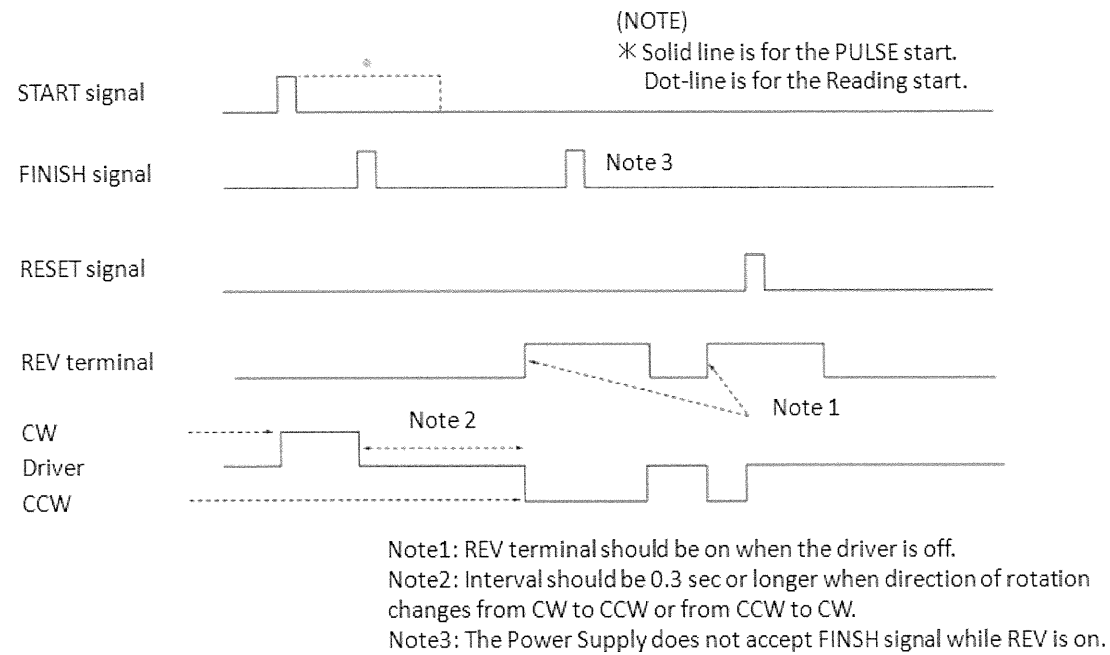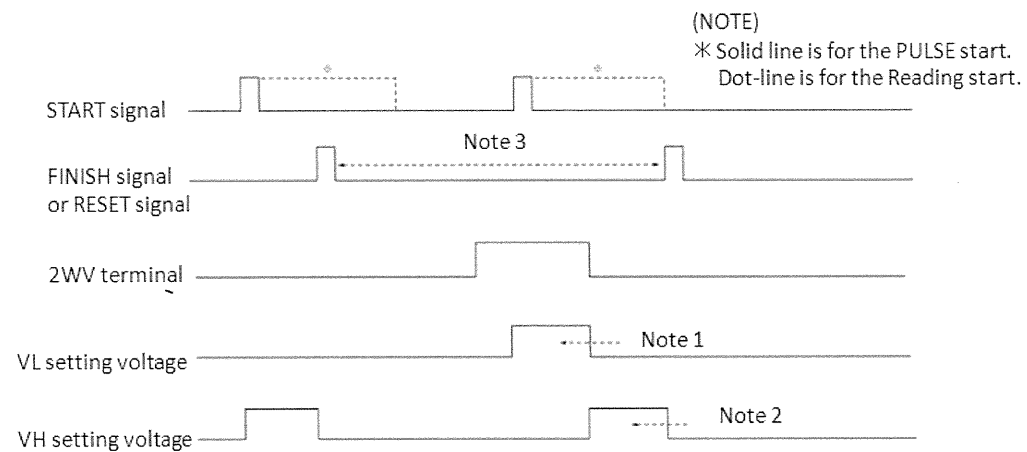
Description

T1: Make sure that interval between ON and OFF of Main Switch is 2 sec or longer.

T2: Although the Power Supply is turned ON and the STARTING signal is the ON state, the circuit of the Power Supply starts on initial status.

T3: This signal is with the STARTING signal and STOP signal. The driver keeps rotating while the signal is input. However, once torque is achieved, the driver stops and the FINISH signal is output. (It can be checked with the LED on the front panel.)

T4: It indicates that the driver is rotating. (Also you can check the input signal with the LED on the front panel.) The timing chart (C1, C2, C3) depends on the number of driver shutoff set with the Counter Switch.

T5: It indicates that the driver was shut off by the clutch.

T6: It indicates that the driver was stopped by RESET signal.

T7: This signal is output from the driver to the Transformer when torque is achieved. (It can be checked with the LED on the front panel.)

T8: This output signal is to inform the completion of screw tightening. The timing chart (C1, C2, C3) depends on the number of driver shutoff set with the Counter Switch. This output signal stops right after RESET signal is input.

T9-3: Input this RESET Signal to stop the driver when it is necessary. (It can be checked with the LED on the front panel.)

The timing chart for REV option model

(NOTE)
� Solid line is for the PULSE start.
    Dot-line is for the Reading start.

START signal

FINISH signal   Note 3

RESET signal

REV terminal   Note 1

CW
Driver   Note 2
CCW

Note1: REV terminal should be on when the driver is off.
Note2: Interval should be 0.3 sec or longer when direction of rotation
changes from CW to CCW or from CCW to CW.
Note3: The Power Supply does not accept FINSH signal while REV is on.

The timing chart for 2WV option model

(NOTE)
✶ Solid line is for the PULSE start.
    Dot-line is for the Reading start.

START signal

FINISH signal   Note 3
or RESET signal

2WV terminal

VL setting voltage   Note 1

VH setting voltage   Note 2

Note1: VL setting voltage (Appx. 5 – 15V changeable) is output when 2WV terminal short-circuit.
Note2: VH setting voltage (Appx. 7 – 30V changeable) is output when 2WV terminal open-circuit.
Note3: Make sure not to set FINISH signal during VL.

�※ Please confirm with your HIOS distributor before ordering these 2 option models.