

## **DIGITAL AC PRIMARY VOLTAGE CONTROLLER**

**FDA-series**



**HANMI TECHWIN**

**TEL: +82-31-498-9270**

**FAX: +82-31-498-9275**

# WELCOME...

to the FDA Series of HANMI TECHWIN

## Safety Information

Persons, supervising and performing the electrical installation or maintenance of a Drive and its external Option Unit, must be suitably qualified and competent in these duties.

They should be given the opportunity to study and if necessary to discuss this UserGuide before work is started.

The voltages present in the Drive and external Option Units are capable of inflicting a severe electric shock and may be lethal. Main supplies should be removed before

any servicing work is performed. The installation instructions should be adhered to. Any questions or doubt should be referred to the supplier of the equipment. In order

to prevent the risk of injury to personnel working on or near the motor or its driven equipment and to prevent potential damage to equipment, users and operators, all necessary precautions must be taken if operating the Drive.

**— Contents —**

- 1. Introduction**
- 2. Features**
- 3. Control Circuit Diagram**
- 4. Operating Characteristics**
- 5. Operating Explanation**
- 6. Schematic Diagram of the Power Conversion System**
- 7. Control Board Schematic Diagram**
- 8. Control Keypad**
- 9. Functions of the Keys and Menu Structure**
- 10. Menu Explanation**
- 11. Standard Specifications**
- 12. Installation and wiring**
- 13. Checking Points before Operation**
- 14. Maintenance**
- 15. Dimension**

## **1. Introduction**

This FDA series, Digital AC Primary Voltage Controller developed by HANMI TECHWIN, uses thyristors for the control of a three phase induction motor. The FDA series has been developed and standardized to meet the industrial requirements of the industry such as a wide range of speed control, frequent forward and reverse operation, and fast acceleration and deceleration. Accordingly this FDA series equipment is suitable for the control of Rolling Machines, Winches, Cranes and other material handling machinery with induction motors.

Due to the thyristor control type, this controller has a quick response, excellent acceleration and deceleration characteristics and can cope with various dynamic requirements such as continuous and stepless speed control, current and torque control with no intermediate steps. In addition, the control performance and the flexibility of the function of the controller shall be improved by using a digital control .

## **2. Features**

### **① Full Digital Type Crane Control System**

This crane control system has been designed as programmable software using full digital system which has enabled us to minimize the size of the control board and eliminate the need of a relay control circuit.

The whole control system has been minimized. Therefore, it is lighter and reliability is far superior to the old system.

### **② Adjusting Parameter Setting and Monitoring Functions**

Because the parameters are inputted to meet the specified conditions using the Keypad during the commissioning, the operation is simple.

This system can memorize and recall up to ten times of former faults and display them on LCD.

Also, the actual running condition of the thyristor controller can be recalled and Displayed on the LCD and thus fault finding is improved.

### **③ Simple Adjustment of Plugging Braking Torque**

Adjustment of the plugging braking torque is simple and easy. Just select either vertical load or horizontal load. And in case of selecting horizontal load, adjust the plugging braking torque to the required setting by the Keypad.

### **④ Perfect Protection**

This system has a perfect protection capable of handling over current, over voltage, under voltage and short circuit.

Also, since the electronic thermal function is inside the system, there is no need for an outside thermal relay.

## ⑤ Memorization of Set Parameters Without Battery

We have prepared against power failure by using a NV-RAM which memorizes the stored data and retains it. The NV-RAM does not require a battery back up system.

## ⑥ 4-Quadrants Control

This 4-quadrant operating system is suitable for crane systems.

Especially on hoisting down motion, regeneration is possible, so operation efficiency is improved by as much as 10% comparing with that of plugging operation. Also, if

stop is required, the brake is started after hoisting speed is reduced by the application of plugging braking.

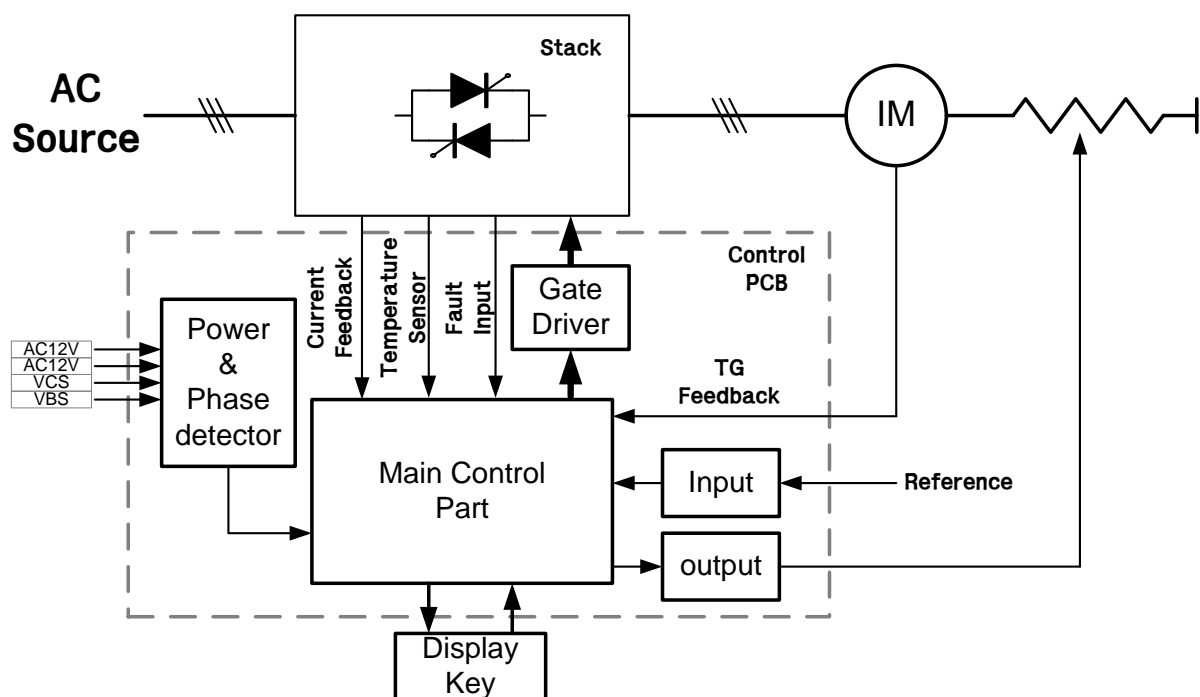
Thus, the braking time is short and the life of the brake lining becomes longer.

## ⑦ Improved Reliability

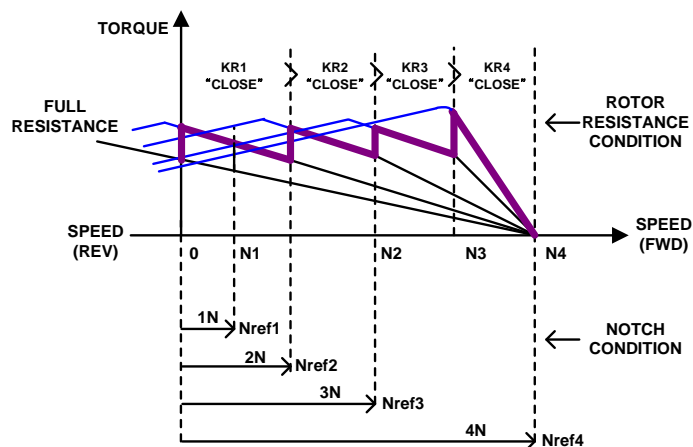
Since the control power function has been designed as redundancy in order to use single power and back-up power at the same time, the control function is not influenced by a voltage drop.

There is no setting volume and the interface part is divided by a photo coupler to avoid being influenced by noise. Therefore, reliability is improved.

## 3. Control Circuit Diagram



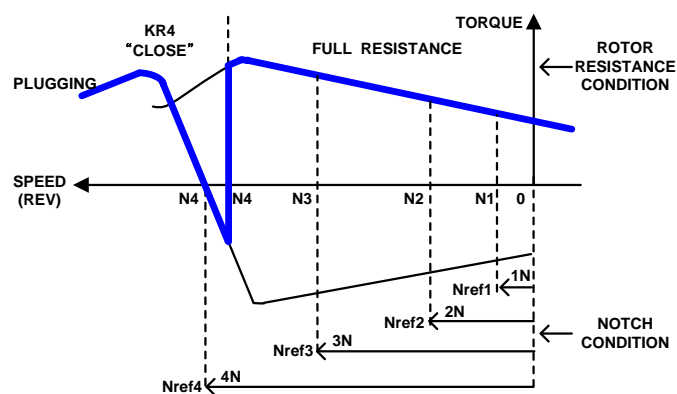
## 4. Operating Characteristics



&lt;Up Mode&gt;

Mode		KR1	KR2	KR3	KR4
UP	1N	●			
	2N	●			
	3N	●	●		
	4N	●	●	●	●
DOWN	1N				
	2N				
	3N				
	4N				●

&lt;Vertical Mode&gt;



&lt;Down Mode&gt;

Mode		KR1	KR2	KR3	KR4
UP	1N	●			
	2N	●			
	3N	●	●		
	4N	●	●	●	●
DOWN	1N	●			
	2N	●			
	3N	●	●		
	4N	●	●	●	●

&lt;Horizontal Mode&gt;

● : CLOSE

## 5. Operating Explanation

### ■ Vertical Load

#### (1) UP Mode

- ① At 1st notch and 2nd notch, the system is operated with Nref1 and Nref2 as the reference speed respectively by short-circuiting KR1.
- ② At 3rd notch, the system is operated with Nref3 as the reference speed and when the speed is increased up to  $N_1$ , the system is operated with KR2 short-circuited.
- ③ At 4th notch, the system is operated with Nref4 as the reference speed and when the speed is increased up to  $N_2$ , KR3 becomes short-circuited and then when the speed is increased up to  $N_3$ , the system is operated in the state that KR4 is short-circuited and the rotor resistance is zero.

This means, as the speed is increasing, the wiring resistance is short-circuited in sequence and the maximum torque is maintained all the time.

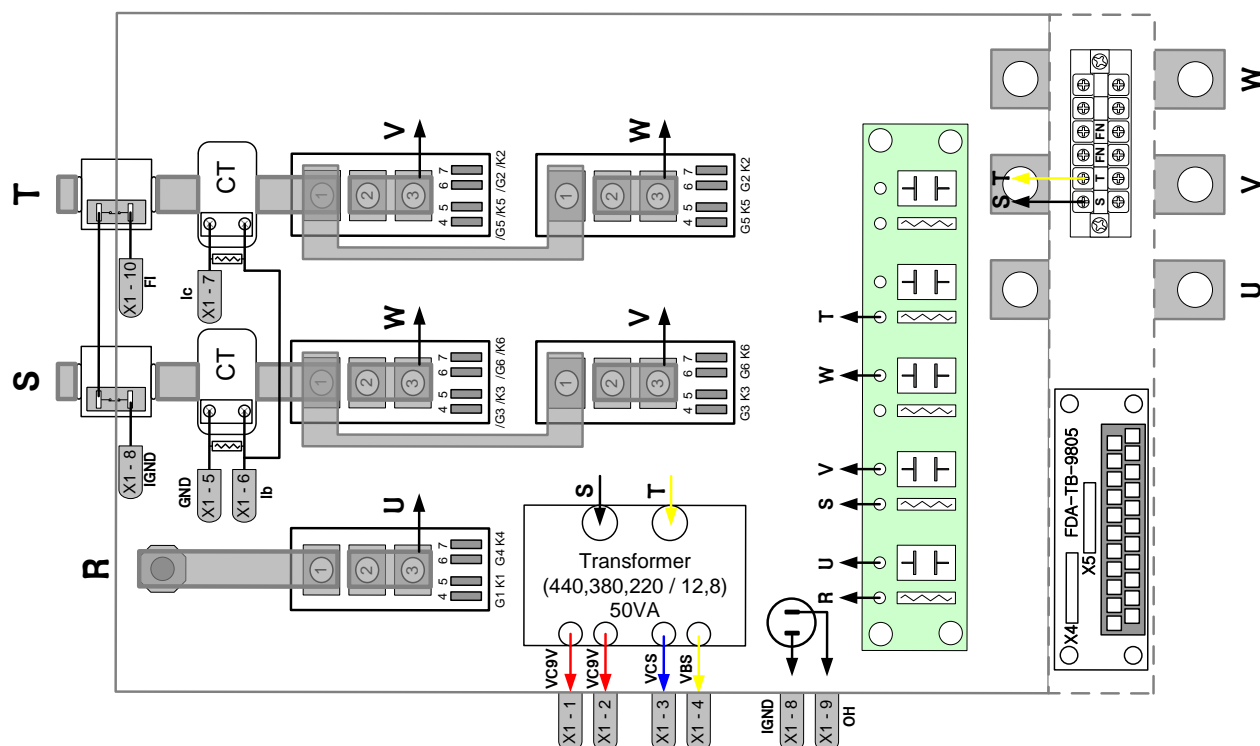
#### (2) DOWN Mode

- ① At 1st notch, 2nd notch and 3rd notch, the system is operated using the full resistance of the rotor resistor with Nref1, Nref2 and Nref3 as the reference speed respectively.
- ② At 4th notch, the system is operated with Nref4 as the reference speed and when the speed is increased up to  $N_4$ , the system is operated by short-circuiting KR4. At this time, the rising torque is maintained even at the fast speed by supplying antiphase voltage into the system.

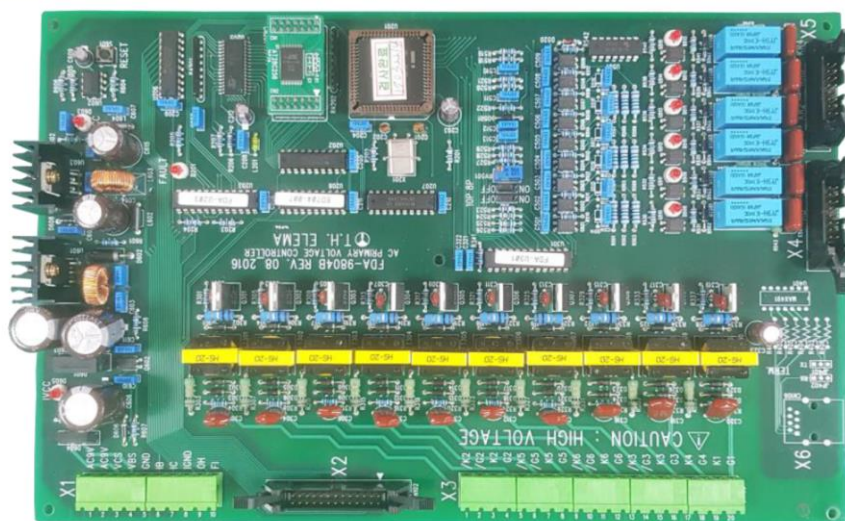
### ■ Horizontal Load

The operating sequence is the same as the UP Mode in the Vertical Load.

## 6. Schematic Diagram of the Power Conversation System



## 7. Control Board Schematic Diagram

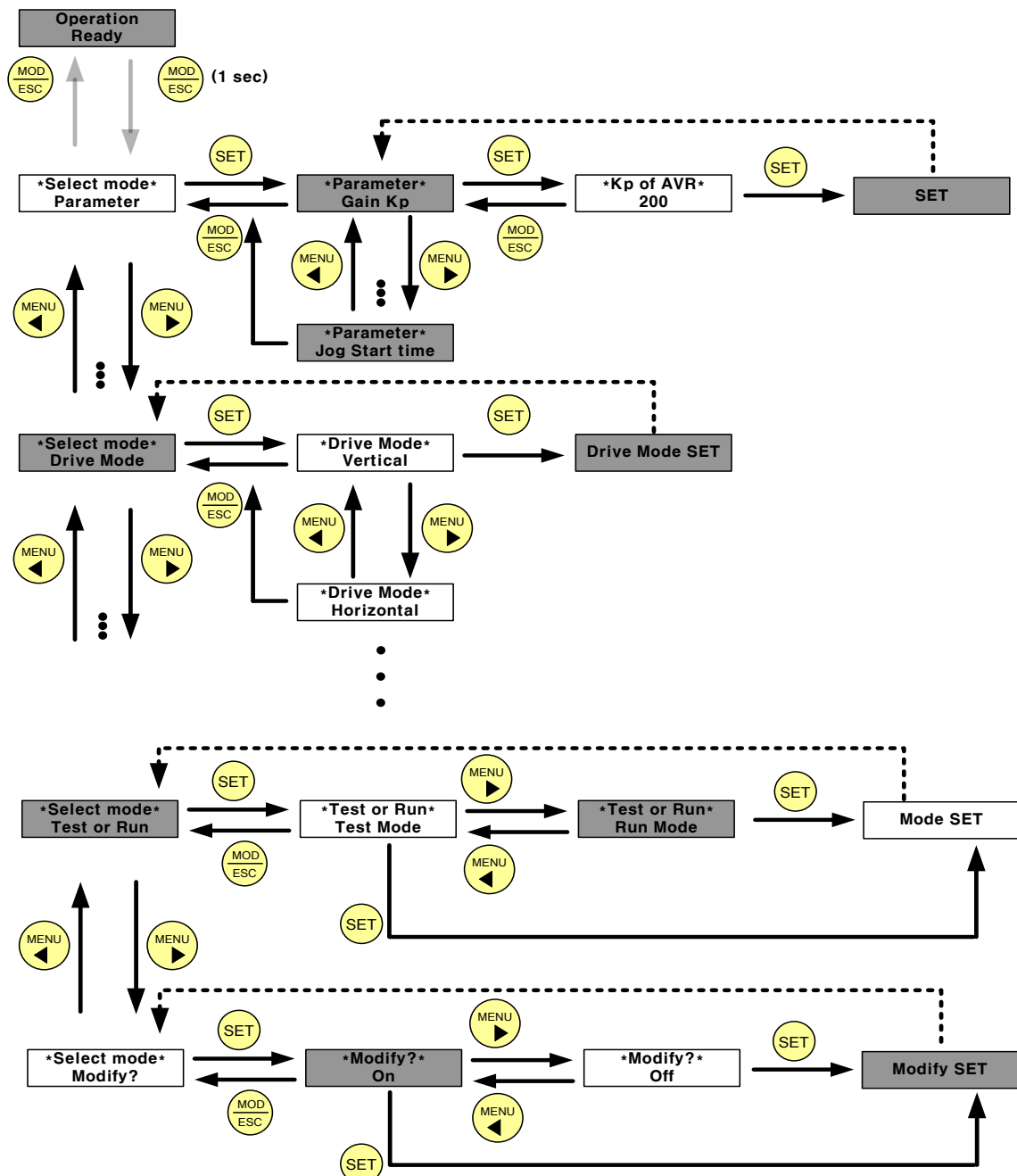




Reading values of parameters  
Reading status messages

## Programming the parameters

### Controlling the motor



## 9. Functions of the Keys and Menu Structure

KEY	EXPLANATION
<u>MOD</u> ESC	You can enter each mode by pressing this key for 3 seconds. And also, you can escape from each mode by pressing this key.
SET	By pressing this key, the mode or parameter can be selected or set.
▲	By pressing this key, the numerical value of the selected parameter increases.
▼	By pressing this key, the numerical value of the selected parameter decreases.
MENU ▶	By pressing this key, the items on the menu can be displayed. When setting parameters, the digit moves to the right.
MENU ◀	By pressing this key, the items on the menu can be displayed. When setting parameters, the digit moves to the left.

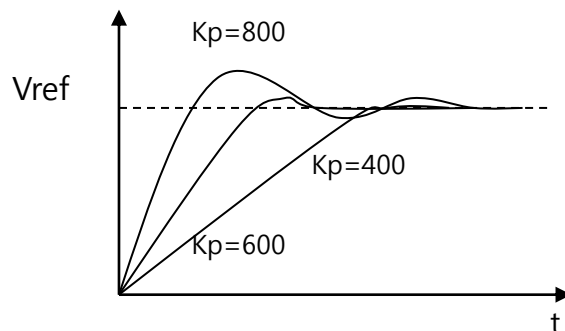
	EXPLANATION			
	MENU LEVEL 1	MENU LEVEL2	RANGE	DEFAULT
SELECT MODE	PARAMETER	GAIN KP	1 ~ 1999	600
		GAIN KI	1 ~ 999	20
		CURRENT GAIN	1 ~ 300	50
		SOFTSTART TIME	0 ~ 12000	2000 [ms]
		SOFTSTOP TIME	0 ~ 12000	2000 [ms]
		CURRENT LIMIT	0 ~ 400	350 [%]
		OVER CURRENT	100 ~ 600	450 [%]
		OC count set	1 ~ 250	25
		Sync_Speed[Ns]	600 ~ 1800	720 [rpm]
		NREF1	1 ~ 100	15 [%]
		NREF2	10 ~ 100	30 [%]
		NREF3	10 ~ 100	60 [%]
		NREF4	10 ~ 100	110 [%]
		N0	1 ~ 50	10 [%]
		N1	10 ~ 60	30 [%]
		N2	10 ~ 100	60 [%]
		N3	10 ~ 100	80[%]
		N4	10 ~ 100	90[%]
		DELTA N	1 ~ 110	10 [%]
		OFF DELAY TIME	1 ~ 15000	2000 [ms]
		PLUGGING LIMIT	0 ~ 350	150 [%]
		BRAKE CLOSE TIME	0 ~ 9000	1500 [ms]
		Motor cur DG	10 ~ 999	100 [%]
		Jog Start Time	0 ~ 10	7 [%]
	OPERATOR		STICK/POTENTIO	STICK
	DRIVE MODE		VERTICAL /HORIZONTAL	VERTICAL
	SOFT STARTING		ON / OFF	ON
	PLUGGING -H MODE		ON / OFF	ON
	INITIALIZE		FAULT INIT / PARAMETER INIT	FAULT INIT
	FAULT SCAN		0 ~ 9	0
	TEST OR RUN		TEST MODE /RUN MODE	RUN MODE
	Emergency Chk		ON / OFF	ON
	TG Line Check		ON / OFF	ON
	Modify?		ON / OFF	OFF

	EXPLANATION			
	MENU LEVEL1	MENU LEVEL2	RANGE	DEFAULT
Select Mode	Special Params	2'nd Resi Ctrl	Speed/Time/Speed & Time	Speed
		N1 Time	500 ~ 9000	2000 [ms]
		N2 Time	500 ~ 9000	2000 [ms]
		N3 Time	500 ~ 9000	2000 [ms]
		N4 Time	500 ~ 9000	2000 [ms]
		Plug Control	KR1 Off/KR1 On	KR1 Off
		Plug Run Limit	1 ~ 100	100 [%]
		Plug Stop Limit	1 ~ 100	100 [%]
		Plug Hold Time	100 ~ 9000	300 [ms]
		Start Down Dir	Down/Up	Down
		1N Limit Volt	1 ~ 100	100 [%]
		2N Limit Volt	1 ~ 100	100 [%]
		3N Limit Volt	1 ~ 100	100 [%]
		4N Limit Volt	1 ~ 100	100 [%]
		Starting Volt	1 ~ 100	10 [%]
		Dead Zone Time	32 ~ 150	80 [ms]
		TG Select	TG/ETG/Not TG	TG
		ETG Max Alpha	90' ~ 180'	110'
		Brake AntiSlip	On/Off	On
		AntiSlip Speed	-9 ~ + 9	0 [%]

## 10. Menu Explanation

### ■ GAIN Kp

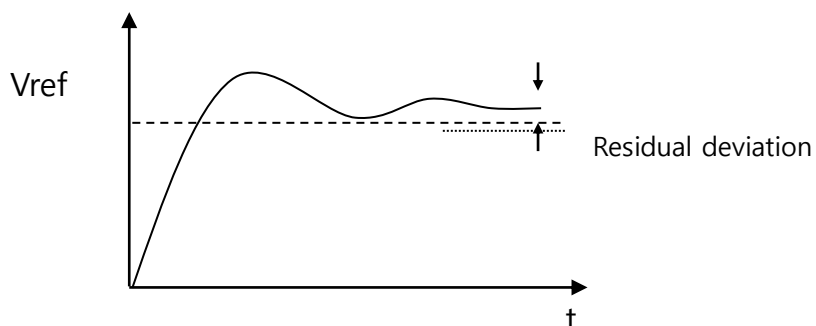
This is the gain of the output signal response to the deviation between the speed command value and the motor actual speed signal(T.G. Feedback). Increasing this value increases the output voltage proportional gain or slope as shown below.



Setting range : 1 ~ 1999  
Default : 600

### ■ GAIN Ki

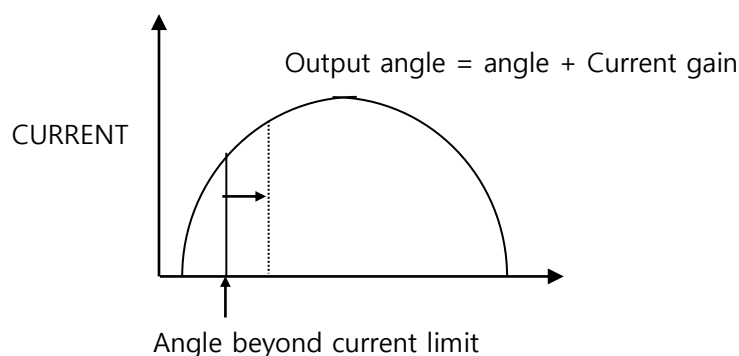
This is the response gain of the integration circuit that outputs the output signal to eliminate the residual deviation of the difference between the speed command reference value and the T.G Feedback signal.



Setting range : 1 ~ 999  
Default : 20

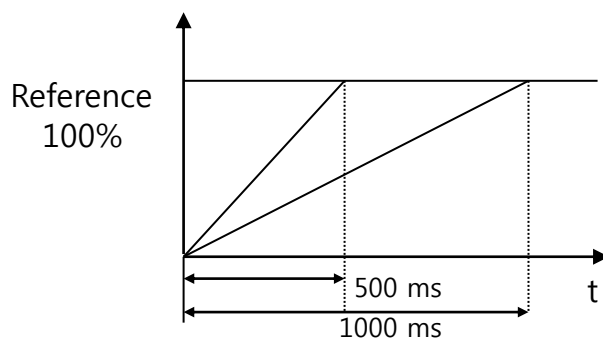
### ■ Current gain

It is a gain that suppresses the current increase by decreasing the output voltage by increasing the firing angle ( $\alpha$ ) when the motor output current exceeds the current limit (CURRENT LIMIT).



### ■ Soft start time

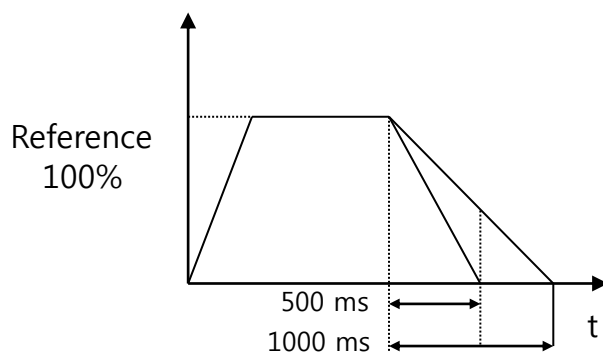
Determines the acceleration time of the motor. This value is the time until the speed command reference reaches the maximum value.



Setting range : 0 ~ 12000ms  
Default : 2000(Vertical mode)  
3000(Horizontal mode)

### ■ Soft stop time

Determines the deceleration time of the motor. This value is the time until the speed command reference reaches the maximum value.



Setting range : 0 ~ 12000ms  
Default : 2000(Vertical mode)  
3000(Horizontal mode)

### ■ Over current

Detects over-current when the current flowing through the motor is larger than the set value. It is detected at 2.8 ms intervals.

Setting range : 100 ~ 600%  
Default : 450%

### ■ O.C Count set

If the current flowing to the motor is over current for more than 2.8ms and it is larger than the set value of O.C COUNT SET, UNIT will output fault signal "OVER CURRENT" and stop output.

Setting range : 1~ 250  
Default : 25

Fault signal The "OVER CURRENT" output is output when the overcurrent time is greater than 2.8 ms X O.C Count Set. At this time, all signals are stopped.

**■ Current limit**

This function is to decrease the output current by detecting the current flowing through the motor and increasing the firing angle when it exceeds the set value. This value works in conjunction with the above CURRENT GAIN.

Setting range : 0 ~ 400%

Default : 350%

**■ Sync\_Speed[Ns]**

The unit displays the actual speed on the LCD screen, and inputs the motor synchronous speed in rpm.

ex) If the motor is 8 poles (60 Hz)

$$(120 * f) / P = 120 * 60 / 8 = 900 \text{ rpm}$$

Setting range : 600 ~ 1800rpm

Default : 720rpm

**■ Nref1**

When a joystick controller is used, if a positive or negative signal is input to the unit as a reference for step 1, the motor speed increases by the set value.

Setting range : 1 ~ 100%

Default : 15%

**■ Nref2**

When a joystick controller is used, if a positive or negative signal is input to the unit as a reference for step 2, the motor speed increases by the set value.

Setting range : 10 ~ 100%

Default : 30%

**■ Nref3**

When a joystick controller is used, if a positive or negative signal is input to the unit as a reference for step 3, the motor speed increases by the set value.

Setting range : 10 ~ 100%

Default : 60%

**■ Nref4**

When a joystick controller is used, if a positive or negative signal is input to the unit as a reference for step 4, the motor speed increases by the set value.

Setting range : 10 ~ 100%

Default : 110%

**■ N0**

When the motor stops, this parameter determines the closing time of the brake. When the value is below the set value of N0, the relay output "KB" of the unit is turned off.

Setting range : 1 ~ 50%  
Default : 10%

- When  $N0 > T.G$ , Unit relay output KB is off

**■ N1**

If the motor speed T.G feedback value is larger than the N1 set value, the relay output KR2 for the secondary resistance short circuit is activated in the unit.

Setting range : 10 ~ 60%  
Default : 30%

- Unit relay output KR2 operates when  $N1 < T.G$ .
- In case of Stick, KR2 is operated only when it is more than 3 levels

**■ N2**

If the motor speed T.G feedback value is larger than the N2 set value, the relay output KR3 for the secondary resistance short circuit is activated in the unit.

Setting range : 10 ~ 100%  
Default : 60%

- Unit relay output KR3 operates when  $N2 < T.G$ .
- In case of Stick, KR3 is operated only when it is more than 4 levels

**■ N3**

If the motor speed T.G feedback value is larger than the N3 set value, the relay output KR4 for the secondary resistance short circuit is activated in the unit.

Setting range : 10 ~ 100%  
Default : 80%

- Unit relay output KR4 operates when  $N3 < T.G$ .
- In case of Stick, KR4 is operated only when it is more than 4 levels

**■ N4**

Down operation in vertical mode (Hoist mode) does not require N1 ~ N3 because it uses full resistance up to 1st, 2nd and 3rd stage due to plugging braking. In other words, KR4 is operated when the motor speed feedback is larger than N4 in down level 4 operation.

Setting range : 10 ~ 100%  
Default : 90%

- Hoist down In level 4 and  $N4 < T.G$ , relay output KR4 is activated in the unit.



### ■ Delta N

When reverse phase braking (plugging) is performed, all resistors are turned on when the difference between the speed reference (reference) and the T.G feedback signal exceeds the set value by setting the time of turning on all resistance (KR1 ~ KR4 off point).

Setting range : 1 ~ 110%

Default : 10%

- If reference - T.G > Delta N, all resistance is applied.

### ■ Off delay time

Off delay time when the motor is stopped Off-delay time This function decelerates the motor speed electrically by using reverse-phase braking for the set time. This is the reverse phase braking time from when the speed is below N0

Setting range : 1 ~ 15000ms

Default : 2000ms

- Hoist down mode is adjusted by Brake close time.

### ■ Plugging limit(Horizontal mode)

If the current flowing through the motor during reverse phase braking (Plugging) is larger than this setting value, the voltage and current are decreased by increasing the firing angle. This value can be set up to the maximum current limit value and it is connected with Plugging-H mode.

Setting range : 0 ~ 350%

Default : 150%

- Plugging Limit <Reduces current when motor current is exceeded.

### ■ Brake close time

When the motor is stopped in N0 in the vertical mode (Hoist mode), the brake is closed regardless of the speed when the set Brake Close Time has elapsed.

Setting range : 0 ~ 9000ms

Default : 1500ms

### ■ Motor cur DG

Select the function to display the current flowing to the motor during operation as % value or actual current value on the UNIT LCD screen as follows.

- When displaying as% value  
100A / 100% Motor Rated Current: 100%



Rated by motor rated current

- Indicated by actual current

**■ Jog start time**

It is a function to determine when soft start starts. It is expressed as% of rated speed.

Setting range : 0 ~ 10%  
Default : 7%

**■ Operator**

The motor speed command can be set by the stick operation of multi-stage operation and the potentio operation by unsteady operation. Stick type can be set from 1 to 4 stages, and multi-stage operation is performed from 1 to 4 stages. The Potentio method operates at 0 ~ 4v analog value.

Setting : Stick / Potentio  
Default : Stick

**■ Drive mode**

It is a mode to select whether the crane operation load is vertical (Vertical: Host) and horizontal (horizontalization, traveling).

Setting : Vertical / Horizontal  
Default : Vertical

**■ Soft starting**

This is a function to turn acceleration / deceleration on / off. When this mode is off, the motor speed reaches the command speed quickly.

Setting : ON / OFF  
Default : ON

**■ Plugging – H mode**

If you set "Off", it is natural to decelerate without reverse braking by setting whether or not reverse phase braking (Plugging) is performed in horizontal load (Horizontal: Main and lateral).

※ Vertical load (Vertical mode) is not applicable.

Setting : ON / OFF  
Default : ON

**■ Initialize**

Fault Initialize and Parameter Initialize are the functions to save all parameters stored in nv\_RAM as default values. If fault initialize is initialized with set key, all 10 previously stored fault information are deleted. When the parameter is initialized with the set key, the parameter value is stored as a default value for each mode (Vertical, Horizontal).

**■ Fault scan**

10 past fault conditions can be checked, and the latest faults are stored in the order of 0 ~ 9.

0 line power off : Recent fault condition

.

.

.

9 over current

Setting : 0 ~ 9

Default : 0

**■ Test of Run**

The RD, KB, and KR1 to KR4 relays are operated according to the operation peration by checking the status of various sequences connected to the external without flowing current to the motor.

**■ Emergency check**

The Emergency Fault is a function to prevent the decay when the (-) TG voltage is observed in the motor stop state (Operation Ready). If you hoist, it will be automatically canceled and you can turn it ON when using this function.

Setting : ON / OFF

Default : ON

**■ TG line check**

If the TG voltage is not detected (when the motor is stopped) or the TG voltage suddenly does not come on while the output voltage of the controller is output, it is recognized as a TG Line Fault. Turning this function ON / OFF

Setting : ON / OFF

Default : ON

**■ Modify?**

The changed parameters are saved only when the Modify parameter is "On".

If it is "Off", it will return to the previous value even if the parameter is changed.

Setting : ON / OFF

Default : ON

**■ 2'nd Resi Ctrl**

Set the shorting method of the secondary resistance of wound-rotor type induction motor.

1. Speed: Depending on the speed of the induction motor, the secondary resistance is short-circuited.
2. Time: Depending on the Notch, the secondary resistance will short-circuit after the set time of "N1 Time" ~ "N4 Time".
3. Speed & Time: After the notch input, the secondary resistance will short-circuit according to the set time of "N1 time" to "N4 time" and the speed of the induction motor.

\* "Time" is not set in "Vertical" mode.

Setting : Speed / Time / Speed&Time  
Default : Speed

**■ N1 time**

Time setting value for relay output KR1 for induction motor secondary resistance short circuit

\* This parameter is valid only when the setting of "2'nd Resi Ctrl" is set to Time or Time & Speed.

Setting range : 500 ~ 9000ms  
Default : 2000ms

**■ N2 time**

Time setting value for relay output KR2 for induction motor secondary resistance short circuit

\* This parameter is valid only when the setting of "2'nd Resi Ctrl" is set to Time or Time & Speed.

Setting range : 500 ~ 9000ms  
Default : 2000ms

**■ N3 time**

Time setting value for relay output KR3 for induction motor secondary resistance short circuit

\* This parameter is valid only when the setting of "2'nd Resi Ctrl" is set to Time or Time & Speed.

Setting range : 500 ~ 9000ms  
Default : 2000ms

**■ N4 time**

Time setting value for relay output KR4 for induction motor secondary resistance short circuit

\* This parameter is valid only when the setting of "2'nd Resi Ctrl" is set to Time or Time & Speed.

Setting range : 500 ~ 9000ms  
Default : 2000ms

**■ Plug control**

When plugging, short-circuit of induction motor secondary resistor short-circuit relay KR1 is decided. If the torque for reverse braking is insufficient, use "KR1 ON". In this case, the motor current may flow a lot, so be sure to check the resistance value.

Setting : KR1 OFF / KR1 ON

Default : KR1 OFF

**■ Plug run limit**

When reverse motor phase braking is required during operation of the induction motor (when changing from Ex: Notch 4 stage to 1 stage) This function is to limit the voltage of the reverse phase braking. When set to 50%, only the maximum 50% of the input voltage is output.

\* Since the slip may occur under a vertical load, set it to 100% and use it.

Setting range : 1 ~ 100%

Default : 100%

**■ Plug stop limit**

It is a function to limit the voltage of the reverse phase braking when the operation is stopped (0 Notch). It is mainly used for horizontal load. When it is low value at 0 Notch, it causes many slip.

\* Since the slip may occur under a vertical load, set it to 100% and use it.

Setting range : 1 ~ 100%

Default : 100%

**■ Plug hold time**

After brake close signal [Parameter: N0, Off Delay Time, Brake Close Time (Only Down Mode)], the plugging continues for the set time.

\* If the brake closes late after the brake close signal (KB Relay OFF) on the controller, you can prevent the slip by setting the time appropriately.

Setting range : 100 ~ 9000ms

Default : 300ms

**■ Start down dir**

This parameter can only be set for vertical load. This parameter sets whether to start the SCR gate direction from the "up" direction or from the "down" direction when operating from the ready state to the initial lowering stage. If there is a lot of slip at the bottom of the trailer, set it to "Up" direction.

Setting : Down / Up

Default : Down

**■ 1N limit volt**

1 Notch This parameter limits the output voltage. No more than the set% voltage (input voltage: 100%) is output.

\* This parameter is only valid when it is set to "Horizontal Mode".

Setting range : 1 ~ 100%

Default : 100%

**■ 2N limit volt**

2 Notch This parameter limits the output voltage. No more than the set% voltage (input voltage: 100%) is output.

\* This parameter is only valid when it is set to "Horizontal Mode".

Setting range : 1 ~ 100%

Default : 100%

**■ 3N limit volt**

3 Notch This parameter limits the output voltage. No more than the set% voltage (input voltage: 100%) is output.

\* This parameter is only valid when it is set to "Horizontal Mode".

Setting range : 1 ~ 100%

Default : 100%

**■ 4N limit volt**

4 Notch This parameter limits the output voltage. No more than the set% voltage (input voltage: 100%) is output.

\* This parameter is only valid when it is set to "Horizontal Mode".

Setting range : 1 ~ 100%

Default : 100%

**■ Starting volt**

Determines how much to drive the initial voltage at RUN in Ready state. The output voltage is expressed as a ratio of the input voltage.

Setting range : 1 ~ 100%

Default : 10%

**■ Dead zone time**

When the direction of SCR changes during operation, it is the time when all SCRs in the forward and reverse directions are turned off.

Please note that the short / reverse SCR may be short-circuited.

Setting range : 32 ~ 150ms

Default : 80ms

**■ TG select**

Sets the speed feedback device. TG is based on 1000rpm / 60V, and Elect TG is based on 'TFC-7050A' developed by our company. When setting to Elect TG, it is necessary to add 2.7k $\Omega$  in parallel to 'R523' of the control board. If there is no feedback device, select "No TG".

\* "Elect TG" and "No TG" can be set only when "Horizontal" is selected.

Setting : TG / ETG / Not TG

Default : TG

**■ ETG max alpha**

Since the electronic TG measures the secondary side slip of the wound induction motor, it is necessary to apply a constant voltage that can measure the slip at all times during operation. "ETG Max Alpha" is the parameter that represents the minimum voltage applied to the primary of the induction motor by the firing angle.

\* This parameter is only valid when it is set to "Elect TG".

Setting range : 90 ~ 180 °

Default : 110 °

**■ Brake antislip**

If there is heavy weight in the hoist, the brake will open when the brake is opened. This function prevents slip when a slip (free fall) occurs. The relay contact of 'Brake Open Test' must be input to C Notch (TB terminal 5 of controller) to operate normally.

\* It is set to "Vertical" and maintains the speed of "AntiSlip Speed" when C notch is input.

Setting : ON / OFF

Default : ON

**■ Antislip speed**

If there is heavy weight in the hoist, When the brake is released, a slip occurs. This function prevents slip when a slip (free fall) occurs. The relay contact of 'Brake Open Test' must be input to the C Notch (TB terminal 5) of the controller for normal operation.

Setting range : -9 ~ +9%

Default : 0%

## 11. Standard Specifications

1)

ITEM	37H		45H		100H		200H			250H		300H	400H	600H	
Motor Capacity[kW]	2.2	3.7	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132
Rated Output Current[A]	6.5	10	13	17	25	29	39	54	61	72	106	141	167	209	251
SCR Quantity	5EA													10EA	
Power Source	3Ph 380/400/440/460/480 [V] 50/60 [Hz]														
Permissible Voltage Fluctuation	±10[%]														
Permissible Frequency Fluctuation	±5[%]														
Control Method	Full digital type primary voltage control														
Speed Setting Signal	DC 0 ~ 5[v] or Notch input signal (4 notch)														
Speed Detection Signal	Tacho – Generator														
Motor Protection	Short circuit protection and electronic thermal function														
Over Current	Current limit setting (setting up to 300[%])														
Stack Overheat	Protection by thermal switch at 85 [°C]														
Ambient Temperature	-20 ~ +85 [°C]														

2)

ITEM	700H	1000H	1300H	The unit over 1300H is requested to us
Motor Capacity [kW]	160	200	300	
Rated Output Current [A]	296	367	541	
SCR Quantity	10EA			
Ext.	Same as above			

## 12. Installation and Wiring

### ■ Installation Condition

- ① Below 1000 [m] above sea level.
- ② Ambient temperature : -20 ~ +85 [°C].
- ③ Free from corrosive gases or liquids.
- ④ Free from iron dust or dirt.



### ■ Wiring

- ① Wiring must be performed in strict accordance with the requirements in the drawings.
- ② Connections of the power source should be performed in such an order as **R-S-T**.
- ③ Wiring of the main circuit and that of control circuit should be separated from each other.
- ④ Ground terminal must be connected to ground conductor.

## 13. Checking Points before Operation

- ① Before supplying electric power, make sure that wiring and connectors are kept in good contact condition.
- ② Permissible voltage fluctuation and the unbalance of the control power should be checked.
- ③ Phase order of R-S-T on main circuit should be checked.

## 14. Maintenance

### ■ Periodic Inspection

#### ① Air Filter Cleaning

Much dust on the air filter can reduce a considerable of air ventilation, accordingly inactivating cooling function of the thyristor. Air filter should be cleaned once at the every 3 to 6 months and should be replaced with new one after using it 10 times.

#### ② Thyristor Heat Sink Cleaning

Frequent cleaning of the thyristor heat sink is recommended.

### ■ Replacement of parts

#### ① Thyristor

Replace the damaged thyristor with the new one of the same specification. Before removing the damaged thyristor from the heat sink, special attention should be paid not to do damage to the gate lines.

#### ② P.C.B.

Mark of the P.C.B should be verified first.

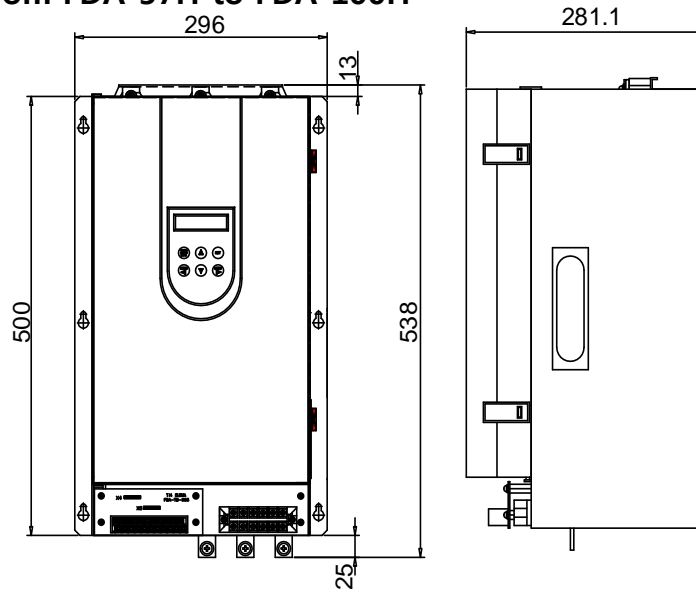
Impurity on the P.C.B can result in poor contact leading to its malfunction.

#### ③ Connector

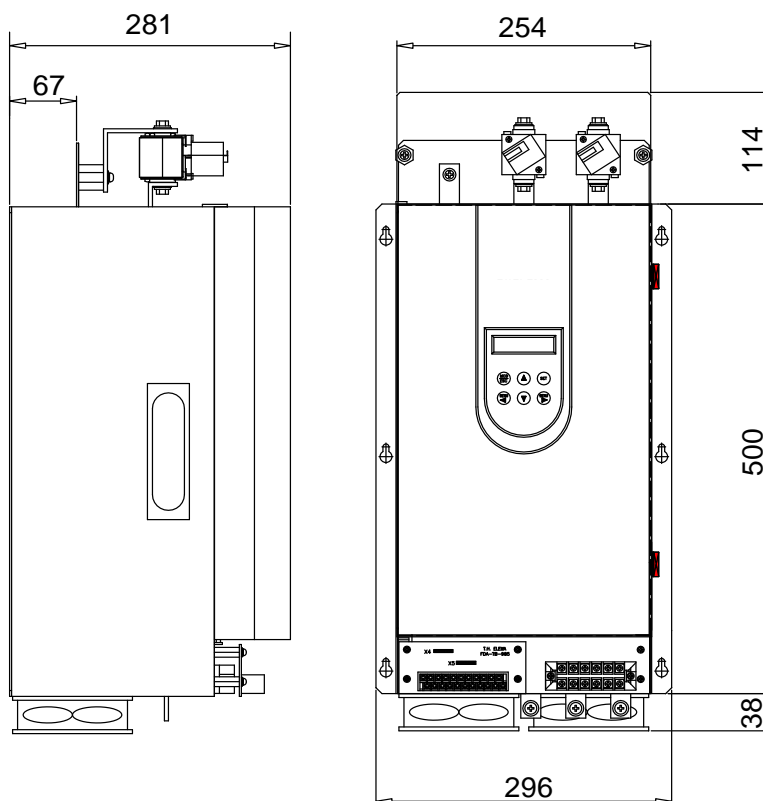
Before replacing faulty connector, be sure to mark the wiring number and location of wires. After replacing, the connector should be fixed tightly so as to prevent itself from poor contact resulting in its malfunction.

## 15. Dimension

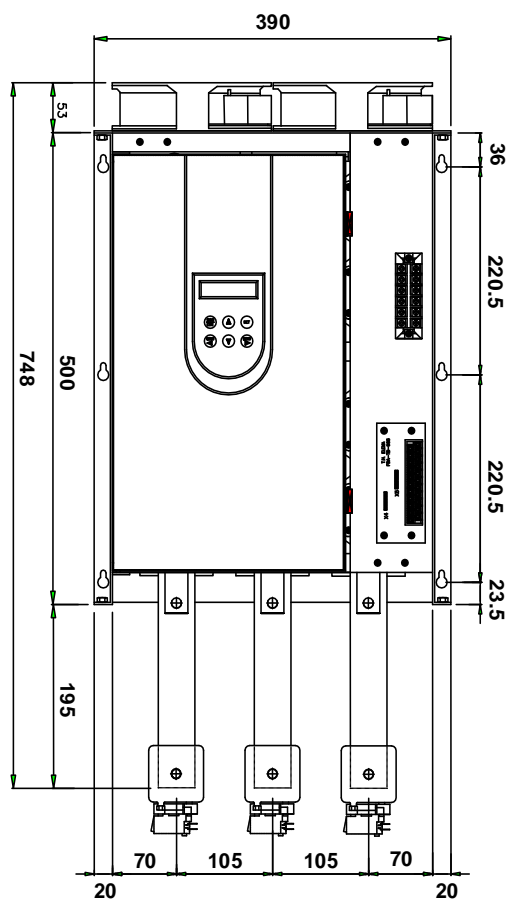
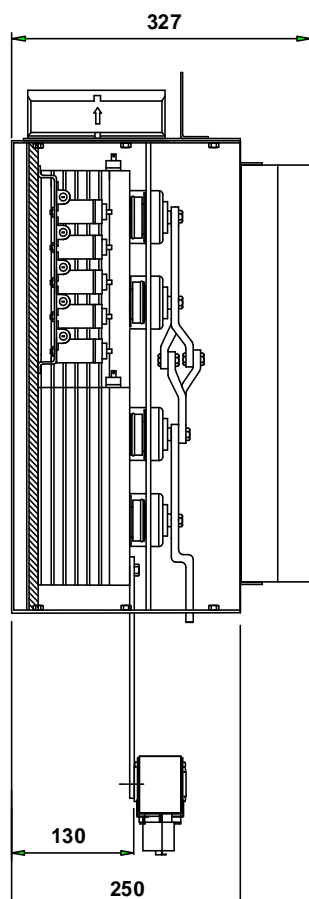
### 1) From FDA-37H to FDA-100H



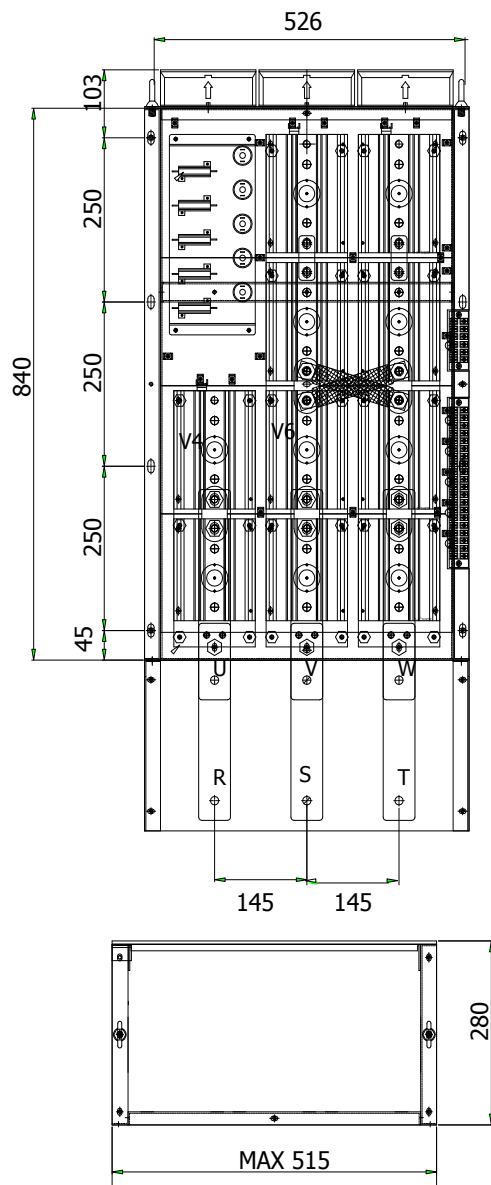
### 2) From FDA-200H to FDA -400H



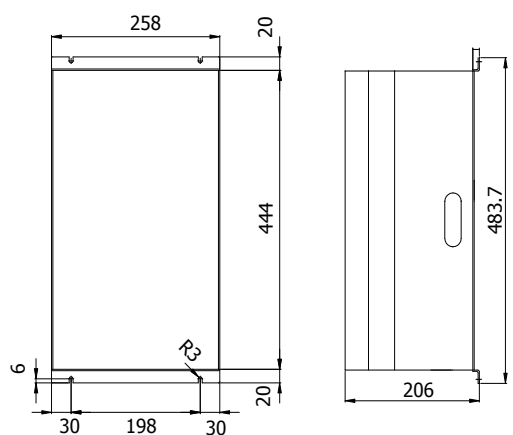
## 3) FDA -600H



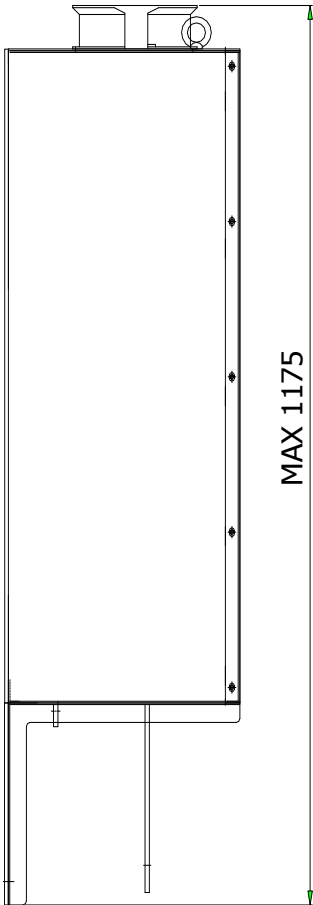
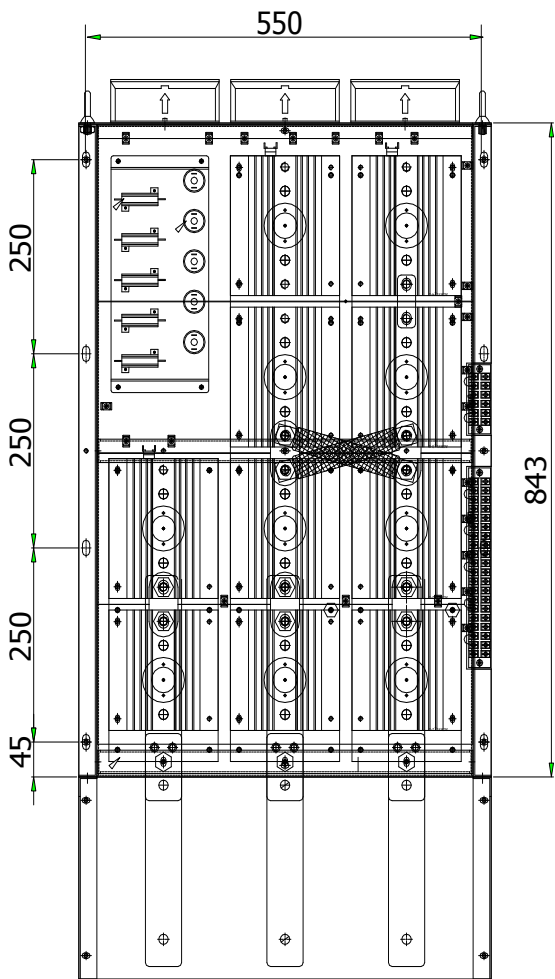
4) From FDA-1000H



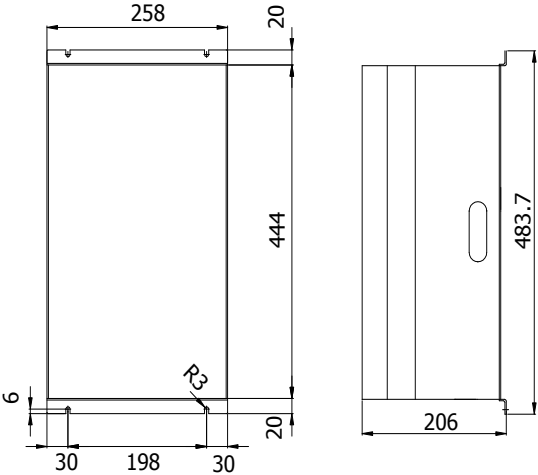
Thyristor Control Drive



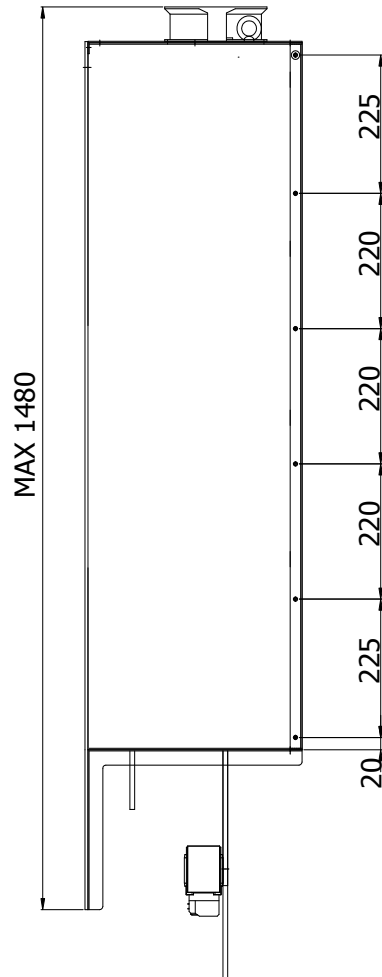
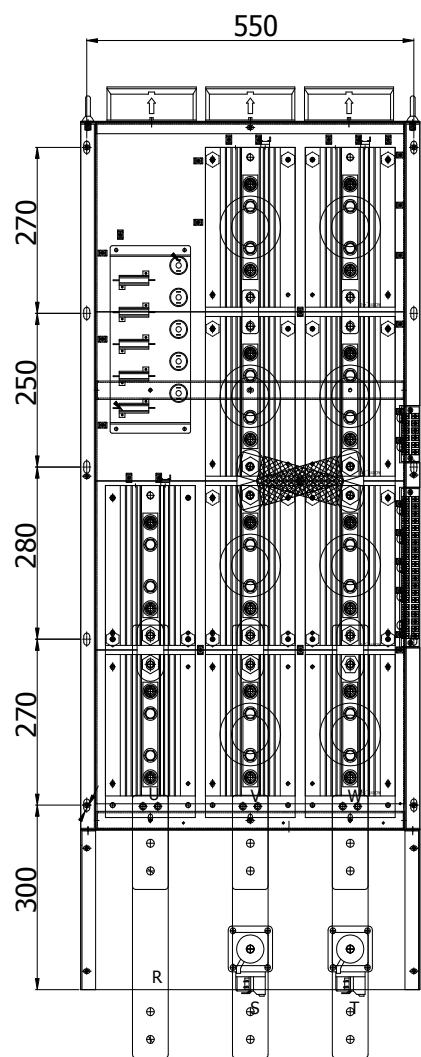
5) From FDA -1300H



Thyristor Control Drive



6) FDA -2000H



Thyristor Control Drive

