

Dedicated AC Drive for HVAC/R

# H100

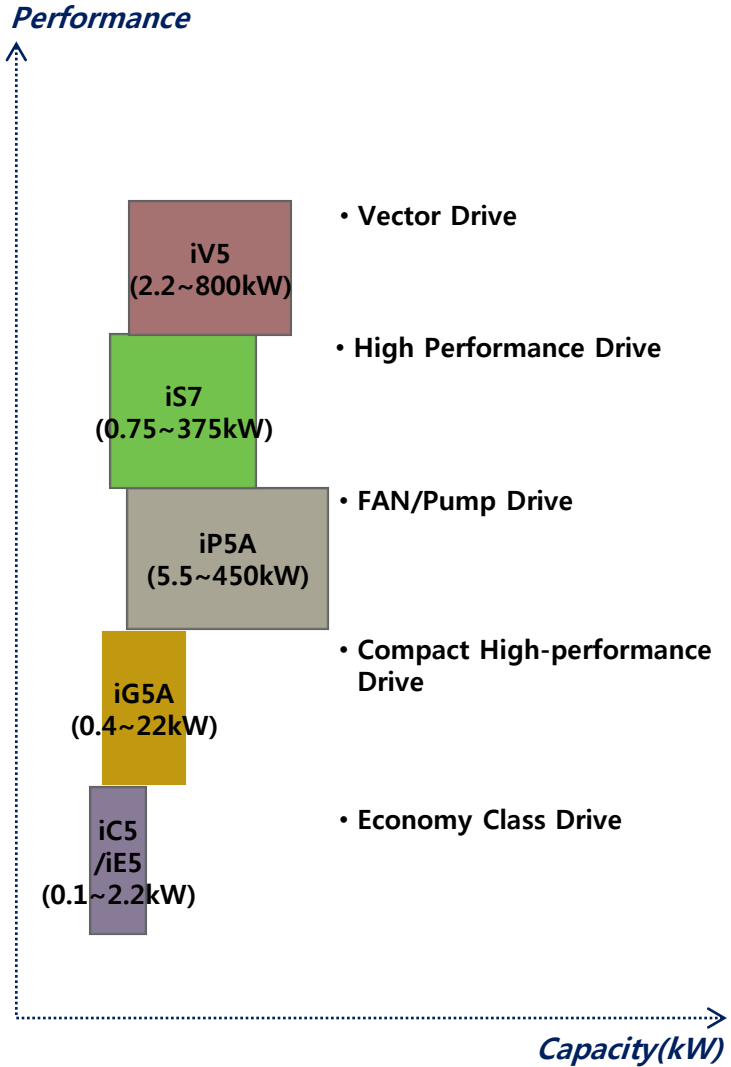
# H100

## LV Drive Line-up

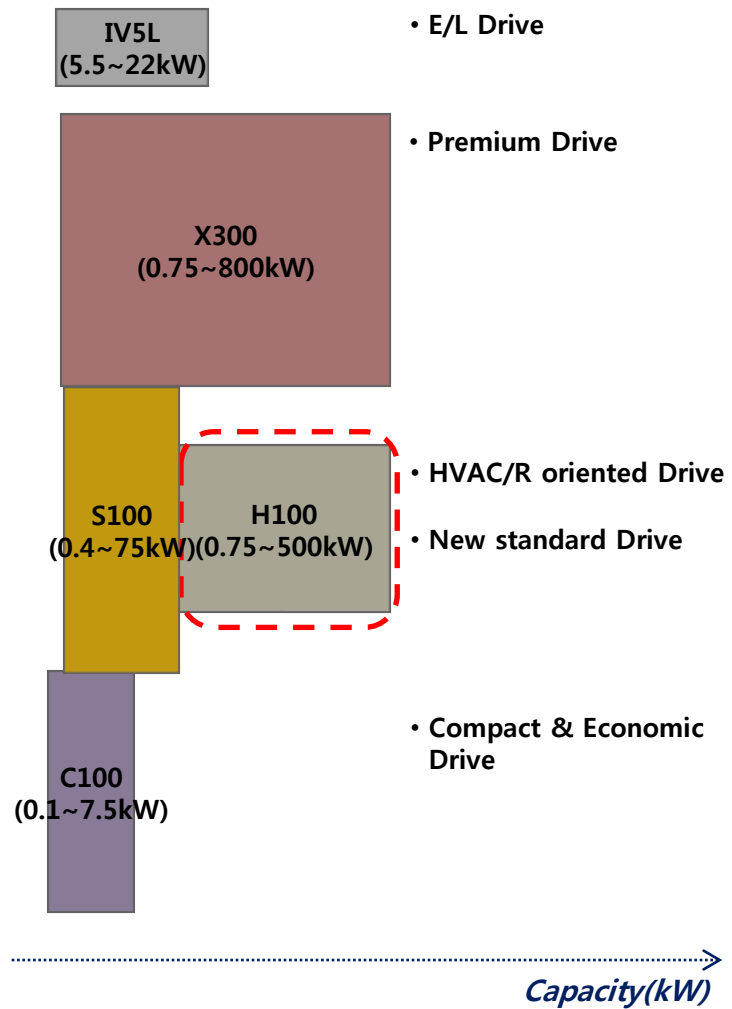
- 1] LV Drive Line-up

- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

### Current LV Drive Line-up



### Future LV Drive Line-up

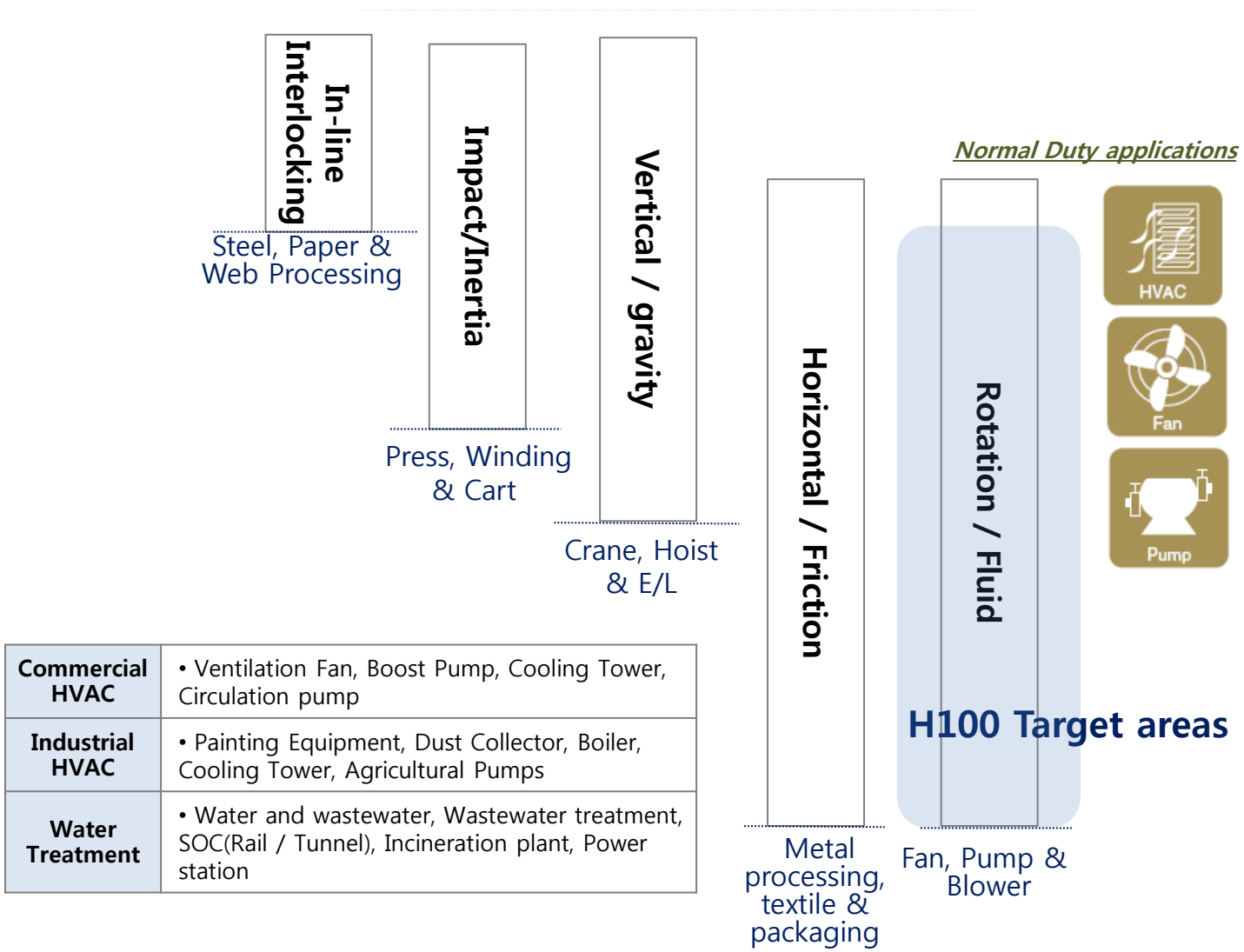


# H100

## Target Application

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Technical Difficulty



# H100

## Frame design

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LCD keypad



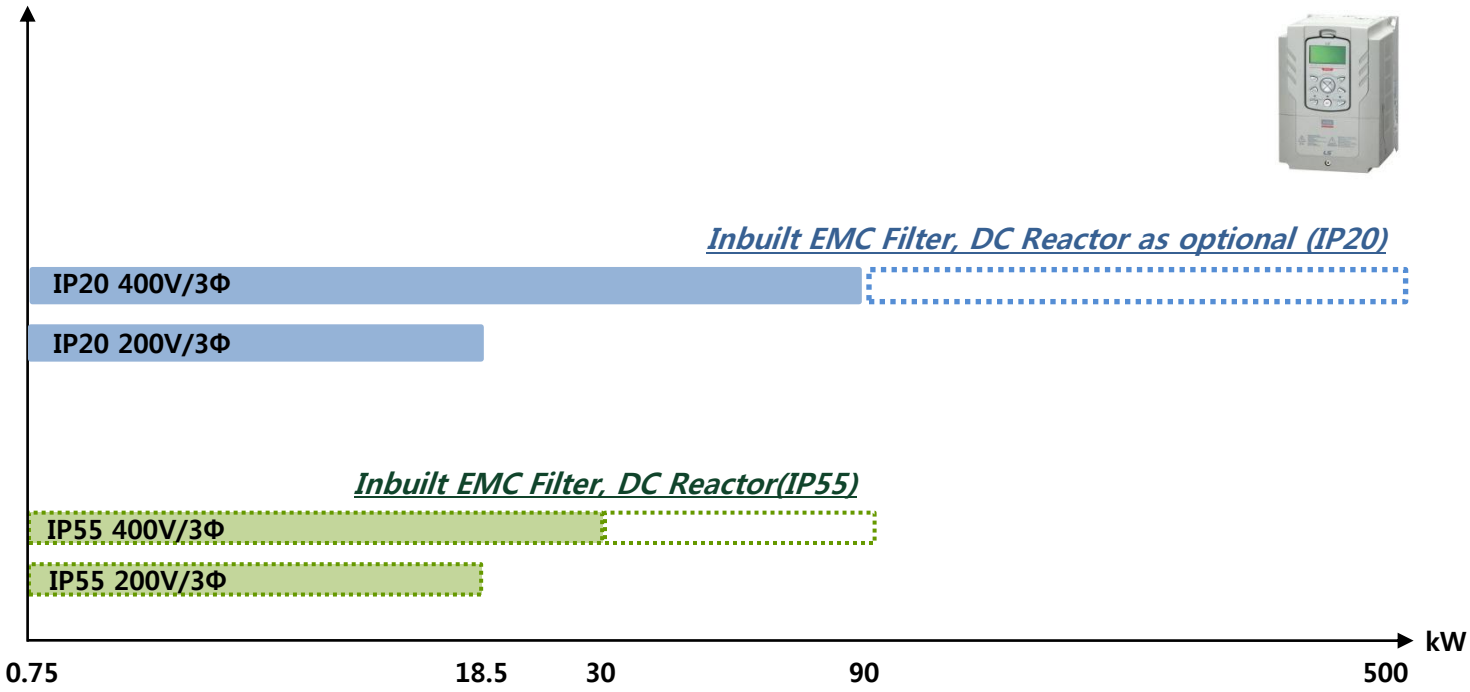
|      |           |           |         |      |         |         |
|------|-----------|-----------|---------|------|---------|---------|
| 200V | 0.75~11kW | 15kW      | 18.5kW  |      |         |         |
| 400V | 0.75~11kW | 15~18.5kW | 22~30kW | 37kW | 45~55kW | 75~90kW |

# H100

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## General specifications

- **Drive capacity**
  - 200V, Three-phase, 0.75~18.5kW(5~69A, ND)
  - 400V, Three-phase, 0.75~90kW(2.5~169A, ND)
- **Overload capacity (Dual rating)**
  - 120% for 60sec. (Normal Duty)
- **Input voltage range**
  - 200~240V Three-phase (-15%/+10%)
  - 380~480V Three-phase (-15%/+10%)
- **Communication**
  - Inbuilt BACnet(MS/TP, B-ASC), Metasys N2 LS Bus, Modbus-RTU
  - LonWorks as optional
- **Control method**
  - V/f
- **Output frequency**
  - 0~400Hz
- **Carrier frequency**
  - Normal Duty: 1~15kHz
- **Protection degree**
  - Standard: IP20, Optional: NEMA1
- **Global Certificated**
  - CE, UL, cUL, RoHS, \*Plenum Rated (UL1995)
  - 3C2 Conformal Coating on PCB





# H100

## General specifications

*Different specifications according to H100's capacity*

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| Drive capacity(kW)                | 0.75~30kW  |   | 37~90kW   |  |
|-----------------------------------|--|---|---|--|
| Design                            |            |   |  |  |
| Control terminal I/O              | 34pins(5mm pitch, two-stage)   |   |   |  |
| Keypad                            | Inbuilt Graphic LCD keypad as standard   |   |   |  |
| Inbuilt comm.                     | Inbuilt in RS485(Modbus RTU / LS Bus / BACnet / Metasys N2) as standard (Max. speed 115kbps) |   |   |  |
| Optional Comm.                    | LonWorks   |   |   |  |
| Extension I/O                     | 3 Digital Relay Outputs, 2 Digital Inputs, 1 Analog Output, 1 Analog Input                   |   |   |  |
| EMC Filter                        | Inbuilt EMC filter as standard:<br>400V/3Φ(C3)   | Inbuilt EMC filter as option:<br>37~55kW<br>400V/3Φ(C3) | Not inbuilt, but meet EMC Directive C3<br>75~90kW 400V/33Φ                          |  |
| DC Reactor                        | N/A  |   | Inbuilt DC reactor as standard  |  |
| Dynamic Braking Transistor        | Inbuilt Dynamic braking transistor as standard   |   | N/A   |  |
| Side by Side (Zero stack)         | Side by Side (2mm)   |   | N/A (50mm)  |  |
| Communication option installation | External option installation type  |   | Internal option installation type   |  |
| Top ventilation cover             | Close  |   |   |  |

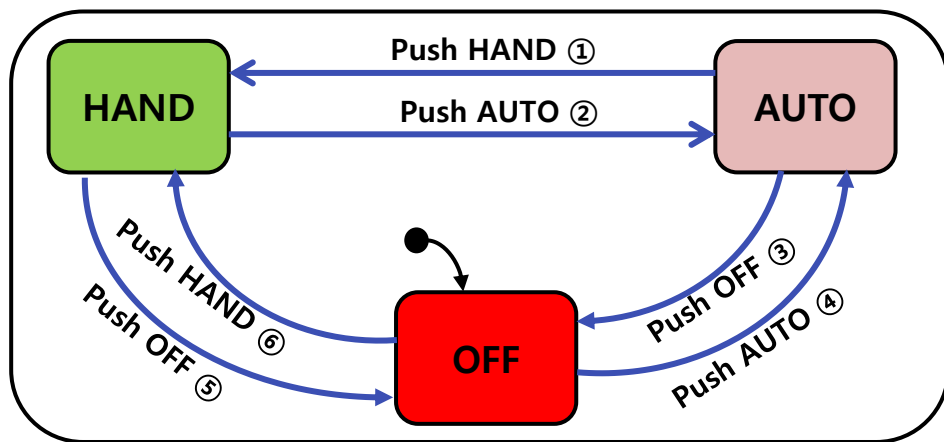
# H100

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## General specifications

### *Dedicated LCD Keypad for HVAC/R*

- ✓ HAND Mode (Local Control Mode) or AUTO Mode (Remote Control Mode) can be selected.
- ✓ Standard functions for HVAC/R
  - Hand key: Operation via keypad.
  - Hand key → up/down: changes speed. V/F only(PID is disabled)
  - Off key: Functions as Stop or Reset button in iS7 keypad.
  - Auto key: Operation as preset functions.



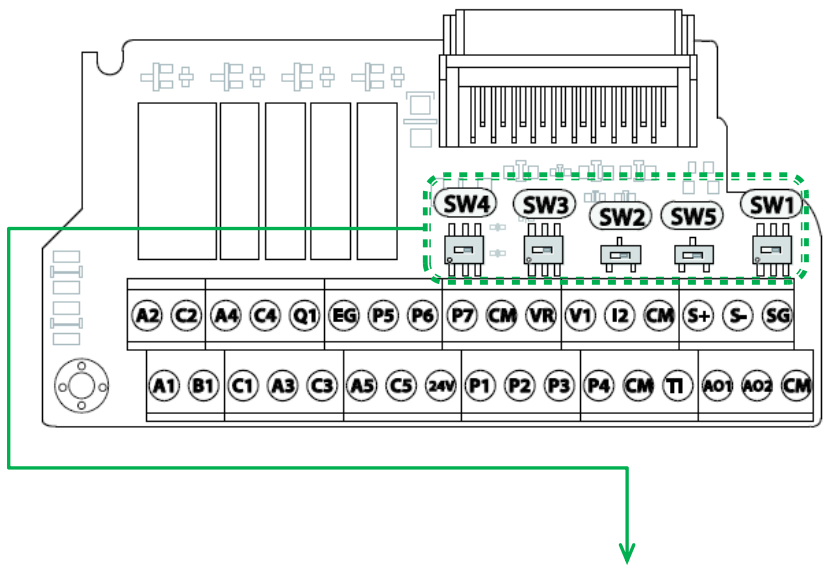
*\*'MULTI' key: One touch allows to access to user group that can be registered up to 64 parameters by user.*

# H100

## General specifications

### Control terminal I/O & Select Switch

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| Switch Description |                        | LEFT    | RIGHT   |
|--------------------|------------------------|---------|---------|
| <b>SW1</b>         | Termination Resistor   | ON      | OFF     |
| <b>SW2</b>         | NPN / PNP              | NPN     | PNP     |
| <b>SW3</b>         | Analog Input-1 Select  | V1      | T1(PTC) |
| <b>SW4</b>         | Analog Input-2 Select  | I2      | V2      |
| <b>SW5</b>         | Analog Output-1 Select | Voltage | Current |

|  | Standard I/O  |
|--|---|
| No. of Pins  | 34 pins   |
| Relay output   | A1,B1,C1<br>A2, C2<br><b>A3, C3</b><br>A4, C4<br>A5, C5 |
| 24V output   | 24  |
| Analog input voltage (+12V)                                    | VR  |
| Analog voltage input / PTC input                               | V1  |
| Analog voltage/Current input / PTC input                       | I2  |
| Analog voltage/Current output                                  | AO1   |
| Analog voltage output  | AO2   |
| RS485 signal / Ground  | S+,S- / SG  |
| I/O Ground(Except for comm.)                                   | CM  |
| <b>Multifunctional TR output / Pulse train output(0~32kHz)</b> | <b>Q1,EG</b>  |
| Multifunctional digital input (PNP/NPN)                        | P1~P7   |
| Pulse train input(0~32kHz)                                     | TI  |
| Terminal pitch   | 5mm   |

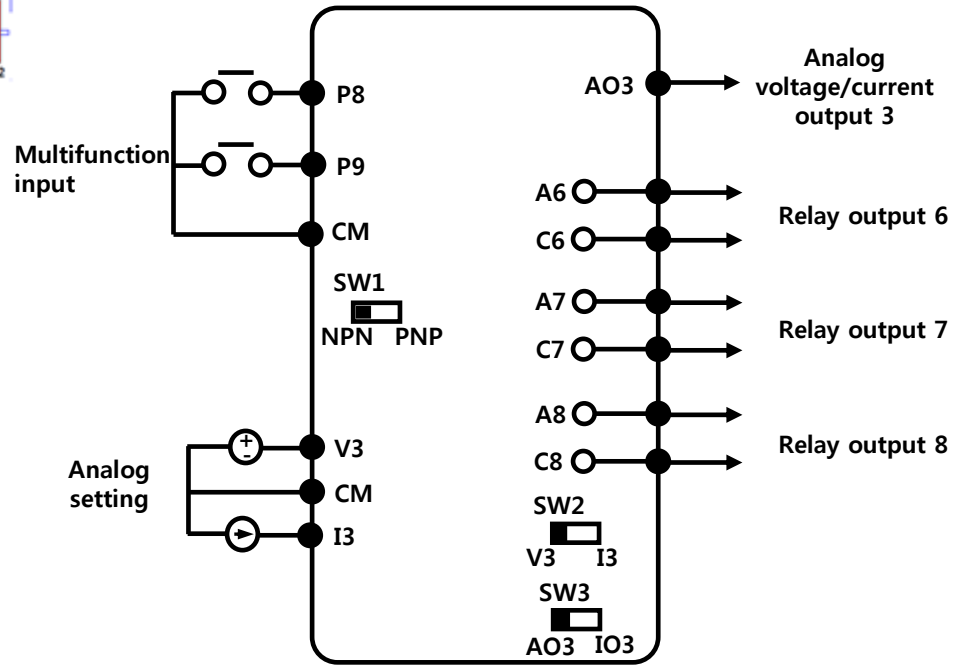
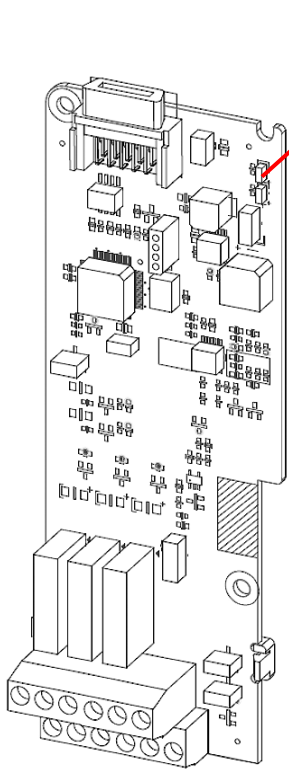


# H100

## General specifications

### Extension I/O

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| LED Status          | LED1                 | LED2        |
|---------------------|----------------------|-------------|
| When Power On       | On for 1sec          | On for 1sec |
| Normal Condition    | Blinking             | Off         |
| Connection Error    | Off                  | Off         |
| Version Error       | Synchronous Blinking |             |
| H/W Interface Error | Alternative Blinking |             |

| Switch Description |                        | LEFT | RIGHT |
|--------------------|------------------------|------|-------|
| SW1                | NPN / PNP              | NPN  | PNP   |
| SW2                | Analog Input-3 Select  | V3   | I3    |
| SW3                | Analog Output-3 Select | V03  | IO3   |

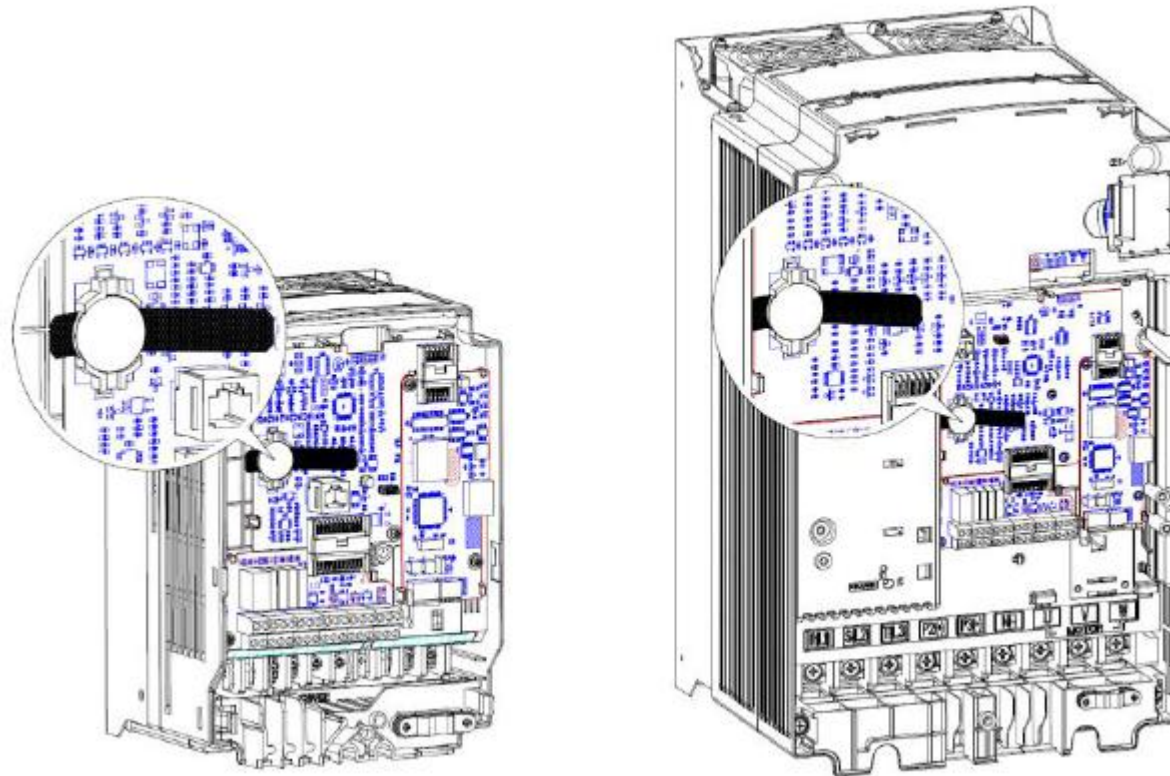
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## General specifications

### *Inbuilt RTC (Real time clock)*

Lithium-manganese battery (CR2032H: 3V, 240mAh, Maxwell) is installed on I/O PCB of H100. The protective film must be removed to activate RTC function.



**0.75~30kW**

**37~90kW**

*\*Life time of battery*

- In case of H100 powered on: 53,300 hours (Approximately 6 years)

- In case of H00 powered off: 25,800 hours (Approximately 2 years and 10 month)

*\*Date Error ±20ppm(parts per million): 10mins 30secs per year*

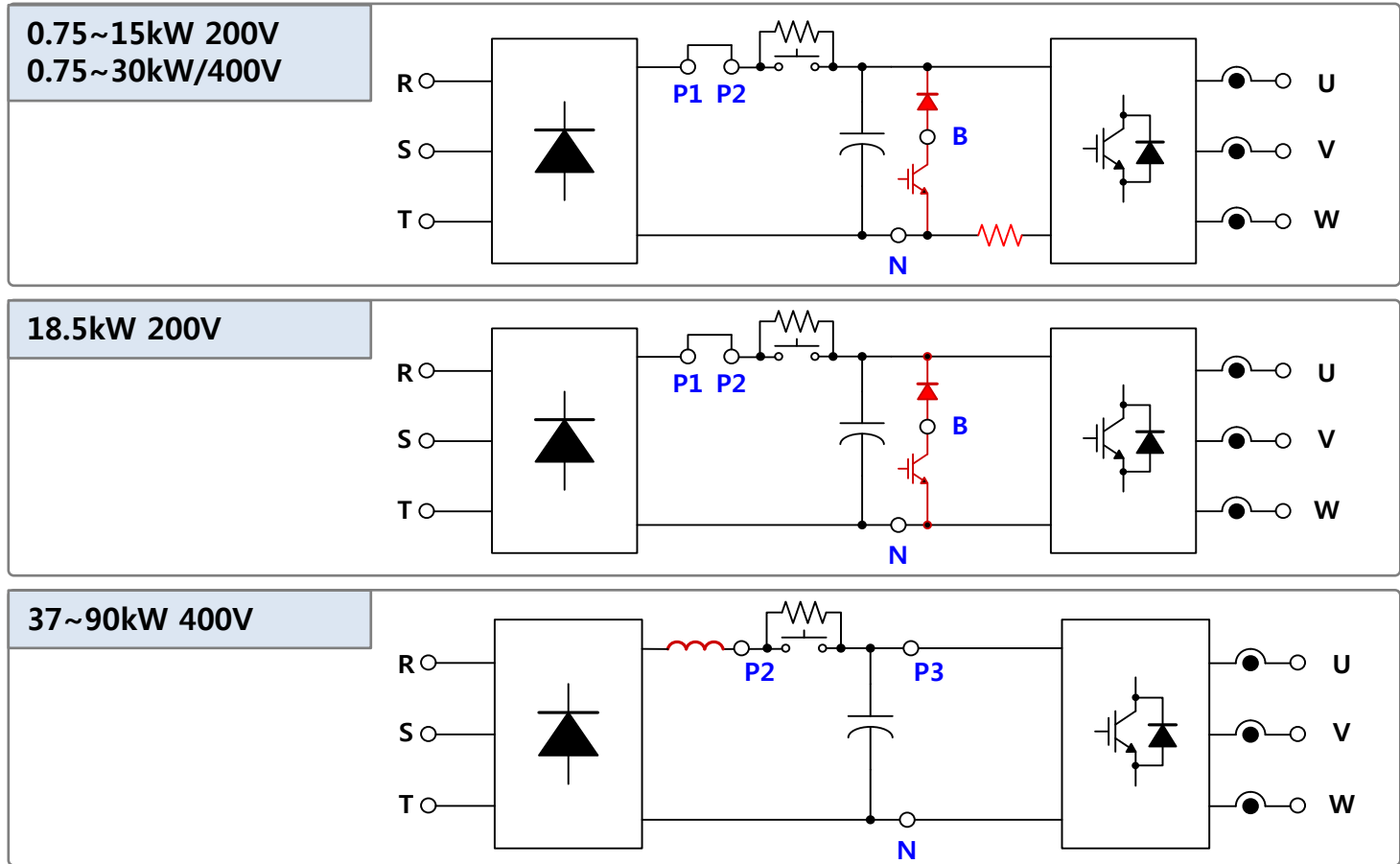
# H100

## General specifications

### Power Terminals

- 1] LV Drive Line-up
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DC Common(P2,N) Available



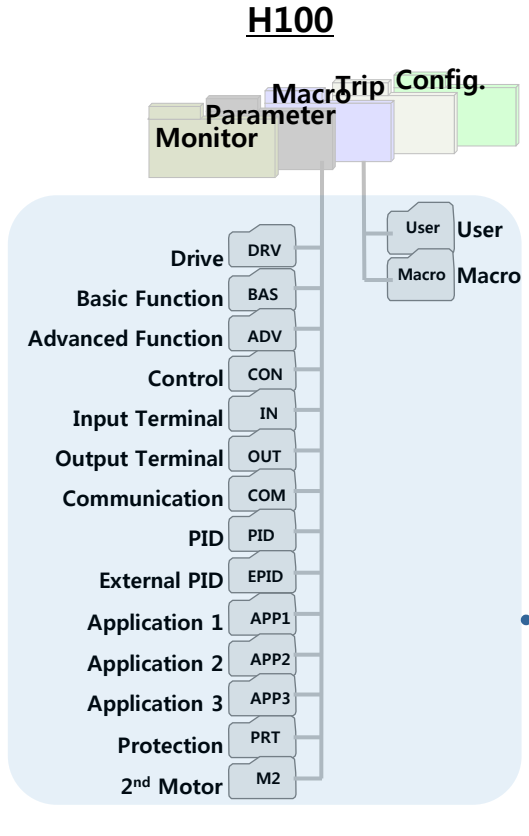
- 1] LV Drive Line-up
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# H100

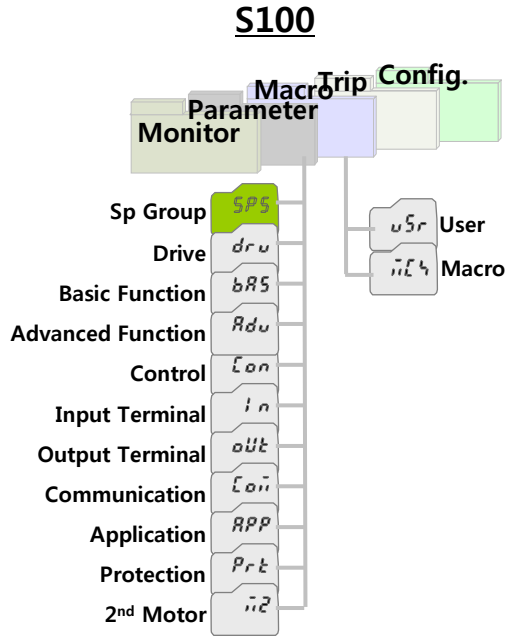
## General specifications

### Parameter structure

Since H100's software was developed based on S100, the basic parameter's structure is the same as S100's one.



Inbuilt H100 Keypad

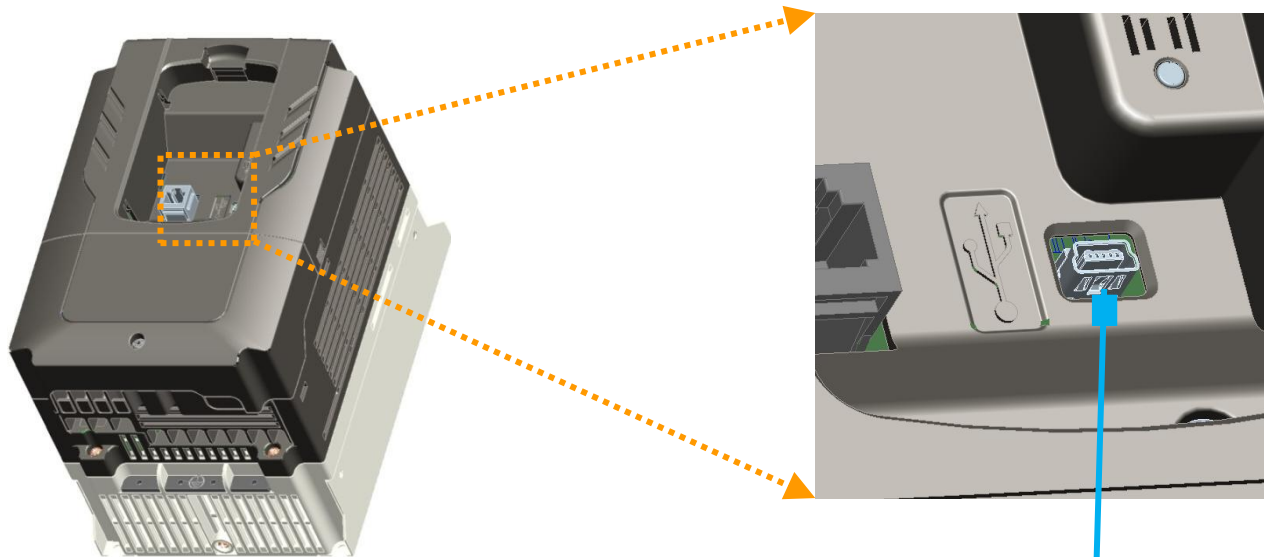


# H100

## General specifications

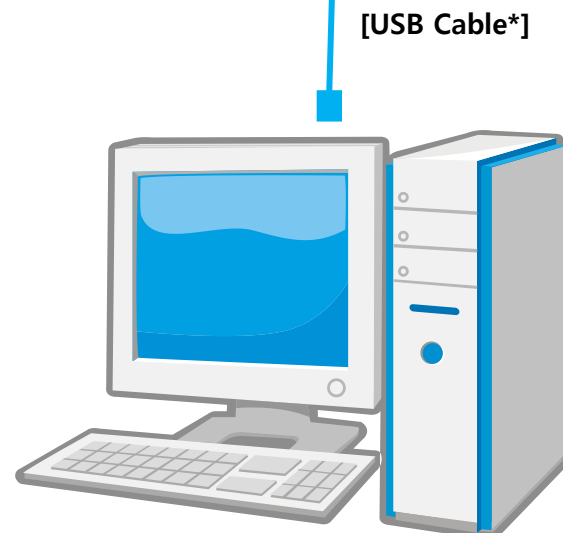
*USB Port is available to connect to PC for DriveView 7*

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## DriveView 7

- (1) Protocol: Modbus-TCP, Modbus-RTU, LS485
- (2) Functions :
  - 1) Drive Monitoring
    - Drive Information: Model Name, Version, Communication protocol, IP ID, Capacity, Voltage
    - Operation Information: Communication status, Operation status, ACC/DEC time
    - Selectable Monitoring: Parameter monitoring by user convenience
    - Trend Function: 4 channel display and records in a graph
  - 2) Report Function: Parameter download function in excel format
  - 3) Parameter display and change function



*\* Compatible with XGT's download cable*

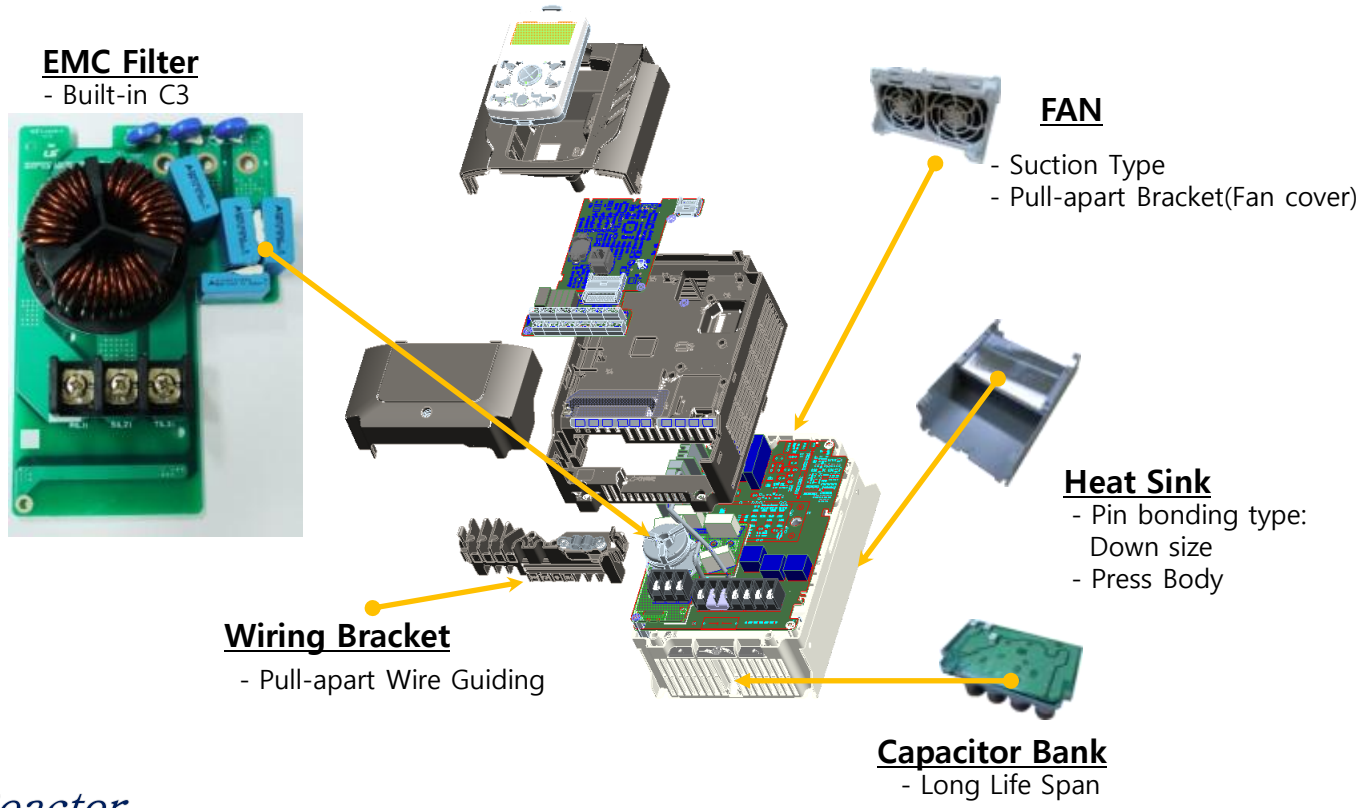
- H100**
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**General specifications**

*EMC Filter*

EMC Filter which is compatible with EMC Directive (EN6180-3 2<sup>nd</sup> Environment Category C3) is available in H100 0.75~90kW three-phase 400V class.

*\*Even though EMC filter is not inbuilt in 75~90kW, these models meet EMC Directive Category C3*



*DC Reactor*

DC Reactor is inbuilt in H100 37~90kW as standard in order to improve Power Factor and reduce THD(Total Harmonic Distortion).

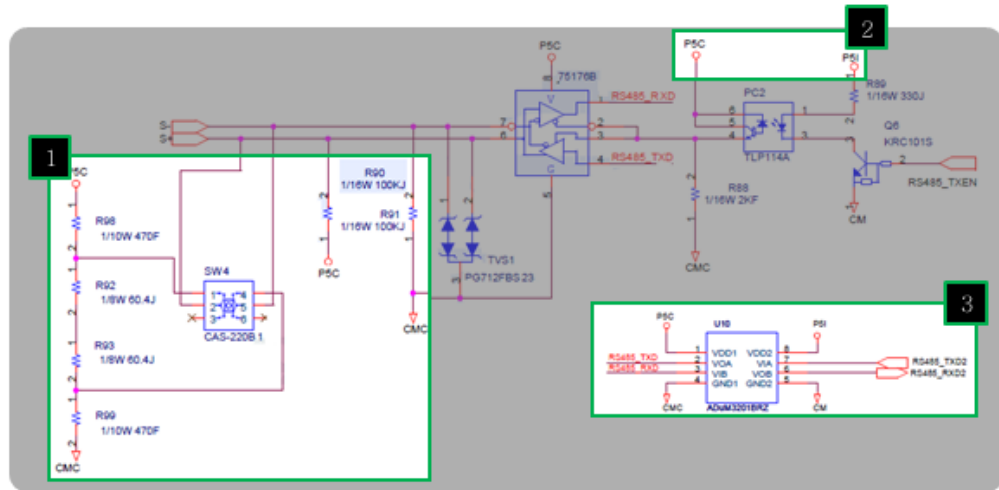
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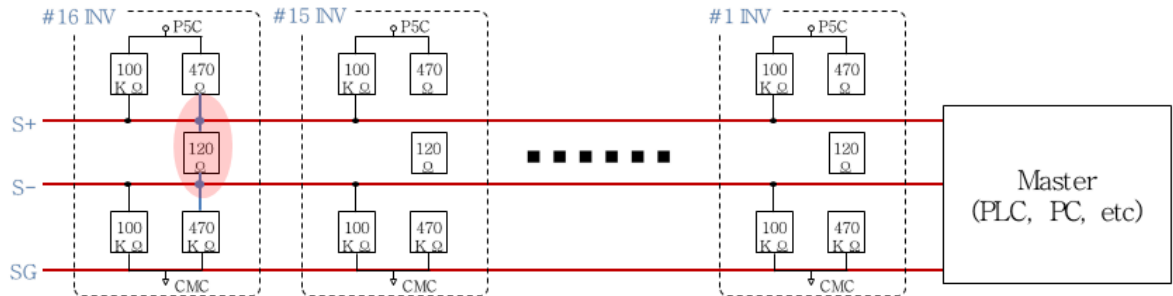
### Enhanced RS485 communication

Inbuilt RS485 communication (Modbus RTU & LS Bus) is faster than the previous models (Max. speed 115kbps) and its reliability has be improved. and Metasys N2 are embedded as standard also.



- 1 Stable communication signal levels
  - through improvement in the terminal resistor circuit even if several stations are communicated
- 2 Independent power source for RS485 communication
  - Not affected by electromagnetic noises from the drive or its surrounding environment
- 3 High communication speed
  - Approximately 6 times faster than previous model (IG5A: 19kbps → S100: 115kbps)

### Effect of Terminal resistor



# H100

## New features (Space-saving Design)

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### World best compact size

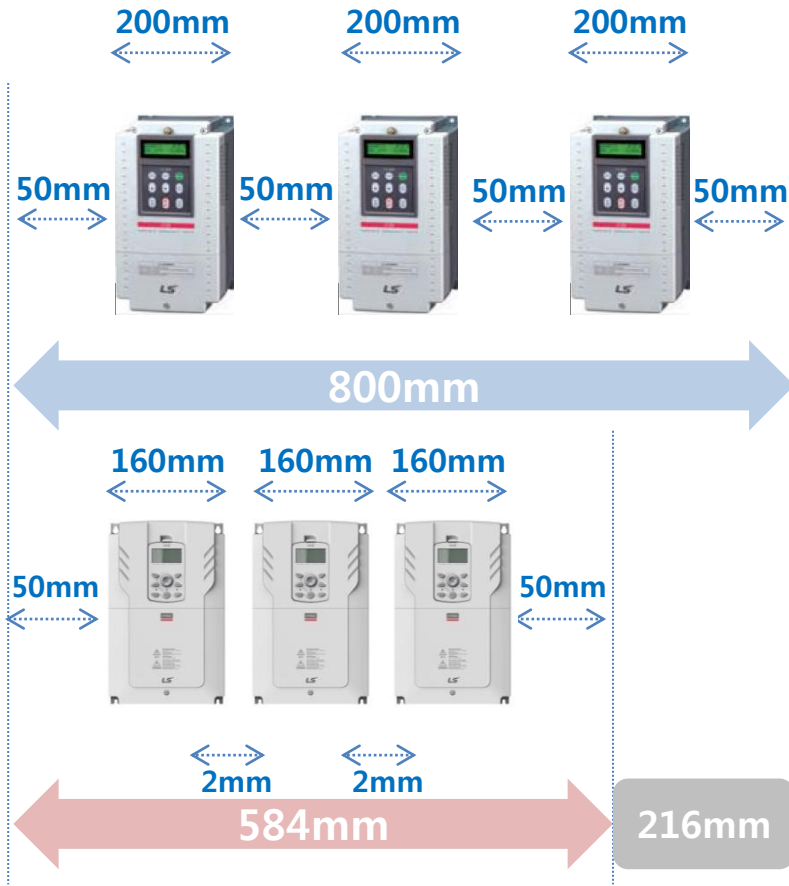


\* Size comparison between H100 and previous model based on 7.5kW 400V class

**Approximately  
34% Smaller**

Thanks to a state-of-the-art thermal simulation technology, LSIS creates the world smallest compact drive.

### Side by Side installation (Zero stack)



H100 allows OEMs or panel makers to save a installation space in their panels.



# H100

## New features

### Macro (Application preset)

H100 automatically sets parameters needed for most major HVAC/R applications. Simply selecting the appropriate application instantly optimizes the drive for top performance, saving enormous time setting up for a trial run.

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Selectable 7 Macros

|   |                 |
|---|-----------------|
| 0 | Basic           |
| 1 | Compressor      |
| 2 | Supply Fan      |
| 3 | Exhaust Fan     |
| 4 | Cooling Tower   |
| 5 | Circul. Pump    |
| 6 | Vacuum Pump     |
| 7 | Constant Torque |

Example of Compressor(MC1) Macro

| Macro Code | Code   | LCD            | Default                | Macro Code | Code   | LCD            | Default          |
|------------|--------|----------------|------------------------|------------|--------|----------------|------------------|
| 0          | -      | Jump Code      | 0 CODE                 | 1          | DRV 3  | Acc Time       | 10.0             |
| 2          | DRV 4  | Dec Time       | 20.0                   | 3          | DRV 7  | Freq Ref Src   | 1: Keypad-2      |
| 4          | DRV 9  | Control Mode   | 1: Slip Compen         | 5          | DRV 11 | JOG Frequency  | 20.00            |
| 6          | DRV 12 | JOG Acc Time   | 13.0                   | 7          | DRV 13 | JOG Dec Time   | 20.00            |
| 8          | DRV 15 | Torque Boost   | 1: Auto1               | 9          | BAS 70 | Acc Time-1     | 10.0             |
| 10         | BAS 71 | Dec Time-1     | 20.0                   | 11         | ADV 10 | Power-on Run   | 1: Yes           |
| 12         | ADV 65 | U/D Save Mode  | 1: Yes                 | 13         | CON 4  | Carrier Freq   | 3.0              |
| 14         | CON 70 | SS Mode        | 0: Flying Start-1      | 15         | CON 77 | KEB Select     | 1: Yes           |
| 16         | OUT 32 | Relay 2        | 14: Run                | 17         | PID 1  | PID Sel        | 1: Yes           |
| 18         | PID 3  | PID Output     | 0.00                   | 19         | PID 4  | PID Ref Value  | -                |
| 20         | PID 5  | PID Fdb Value  | -                      | 21         | PID 10 | PID Ref 1 Src  | 4: I2            |
| 22         | PID 11 | PID Ref 1 Set  | 0.5000                 | 23         | PID 25 | PID P-Gain 1   | 70.00            |
| 24         | PID 26 | PID I-Time 1   | 5.0                    | 25         | PID 50 | PID Unit Sel   | 5: inWC          |
| 26         | PID 51 | PID Unit Scale | 4: x0.01               | 27         | AP1 8  | PID Sleep1Freq | 5.00             |
| 28         | AP1 21 | Pre-PID Freq   | 30.00                  | 29         | AP1 22 | Pre-PID Delay  | 120.0            |
| 30         | PRT 8  | RST Restart    | 11                     | 31         | PRT 9  | Retry Number   | 3                |
| 32         | PRT 10 | Retry Delay    | 4.0                    | 33         | PRT 11 | Lost KPD Mode  | 3: Dec           |
| 34         | PRT 12 | Lost Cmd Mode  | 2: Dec                 | 35         | PRT 13 | Lost Cmd Time  | 4.0              |
| 36         | PRT 40 | ETH Trip Sel   | 1: Free Run            | 37         | PRT 42 | ETH 1min       | 120              |
| 38         | PRT 52 | Stall Level 1  | 130                    | 39         | PRT 66 | DB Warn %ED    | 10               |
| 40         | PRT 70 | LDT Sel        | 1: Warning             | 41         | PRT 72 | LDT Source     | 0:Output Current |
| 42         | PRT 75 | LDT Band Width | 10% of Max. LDT Source | 43         | PRT 76 | LDT Freq       | 20.00            |
| 44         | M2 4   | M2-Acc Time    | 10.0                   | 45         | M2 5   | M2-Dec Time    | 20.0             |
| 46         | M2 8   | M2-Ctrl Mode   | 1: Slip Compen         | 47         | M2 28  | M2-Stall Lev   | 125              |
| 48         | M2 29  | M2-ETH 1min    | 120                    |            |        |                |                  |



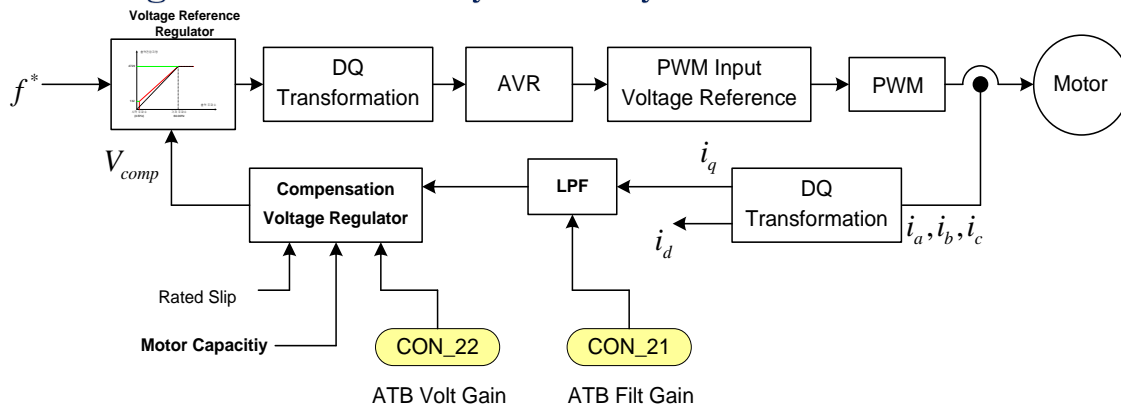
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## New features

### Enhanced Auto Torque Boost

Additionally Auto Torque Boost 2 was developed for better starting torque in V/f mode. Auto-tuning is not necessary basically.



✓ Performance comparison between ATB 1 and ATB 2

| Test condition | Cmd Freq. | Load Rate | ACC Time        | Auto torque boost 1 (Existing) |        | Auto torque boost 2 (New) |        |
|----------------|-----------|-----------|-----------------|--------------------------------|--------|---------------------------|--------|
|                |           |           |                 | 15kW-4                         | 75kW-4 | 15kW-4                    | 75kW-4 |
| Starting       | 3Hz       | 100%      | 0sec            | ○                              | ○      | ○                         | ○      |
|                |           |           | 10sec           | ○                              | ○      | ○                         | ○      |
|                |           | 120%      | 0sec            | ○                              | ○      | ○                         | ○      |
|                |           |           | 10sec           | ○                              | ○      | ○                         | ○      |
| adjust load    | 3Hz       | Variable  | -               | X<br>(50%->100%)               | ○      | ○                         | ○      |
|                | 5Hz       |           | X<br>(0%->120%) | X<br>(50%->100%)               | ○      | ○                         |        |
| Starting       | 60Hz      | 100%      | 10sec           | ○                              | X      | ○                         | ○      |
|                |           | 120%      | 10sec           | △(Unstable)                    | X      | ○                         | ○      |
| adjust load    | 60Hz      | Variable  | -               | ○                              | ○      | ○                         | ○      |

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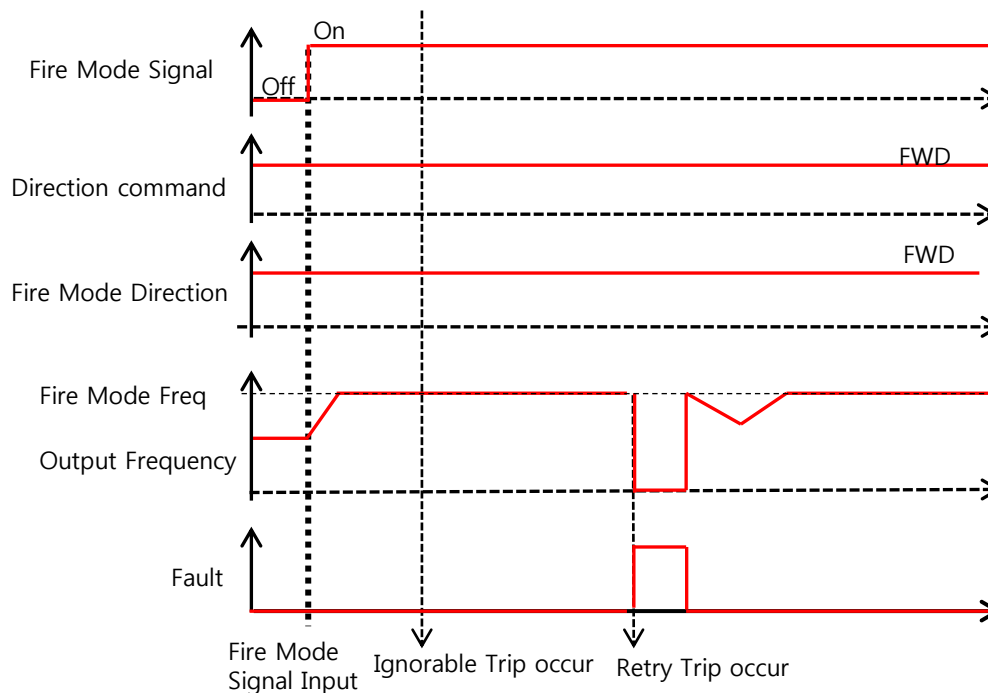
## New features

### *Fire Mode*

When an emergency such as fire occurs at suction/exhaust fans, the drive will be continuously operated as the set frequency and direction while ignoring any trips except for trips related to hardware such as Arm Short, Over Current1, Over Voltage, Ground Fault.

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**Fire mode sequence**



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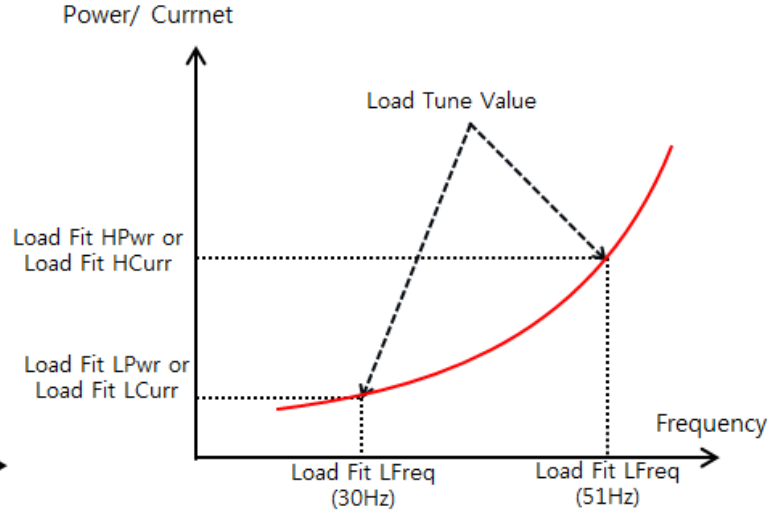
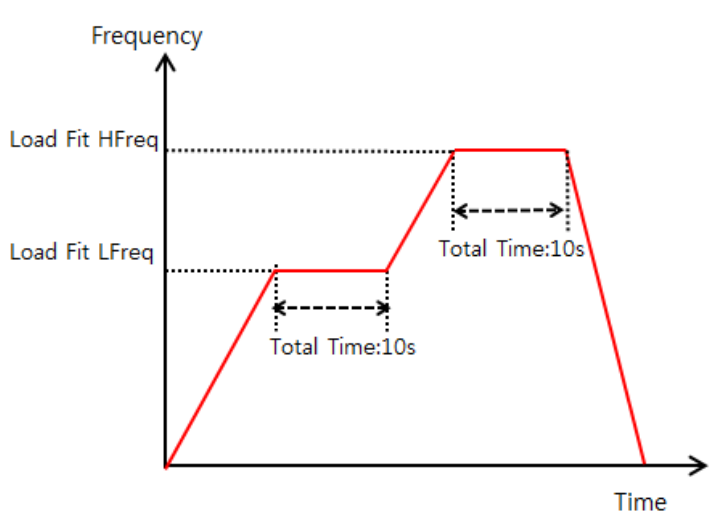
## New features

### Load Tuning

Tunes a load based on the drive's current, power and frequency so as to make load characteristics curve required for 'Under load protection and 'Pump clean' function.

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### Soft Fill sequence



$$\text{Current} = a \left( \frac{\text{Out Freq}}{\text{Base Freq}} \right)^2 + b$$

$$\text{Power} = a \left( \frac{\text{Out Freq}}{\text{Base Freq}} \right)^3 + b$$

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**New features**

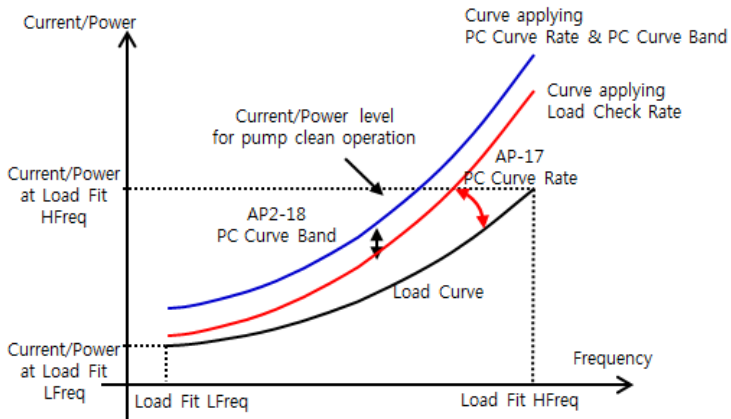
*Pump Clean*

Foreign substances stuck in impellers of pumps might make the pump efficiency decreased. Through the repeated FWD/REV or ACC/DEC operation, they will get eliminated and the pump's lifespan will extended.

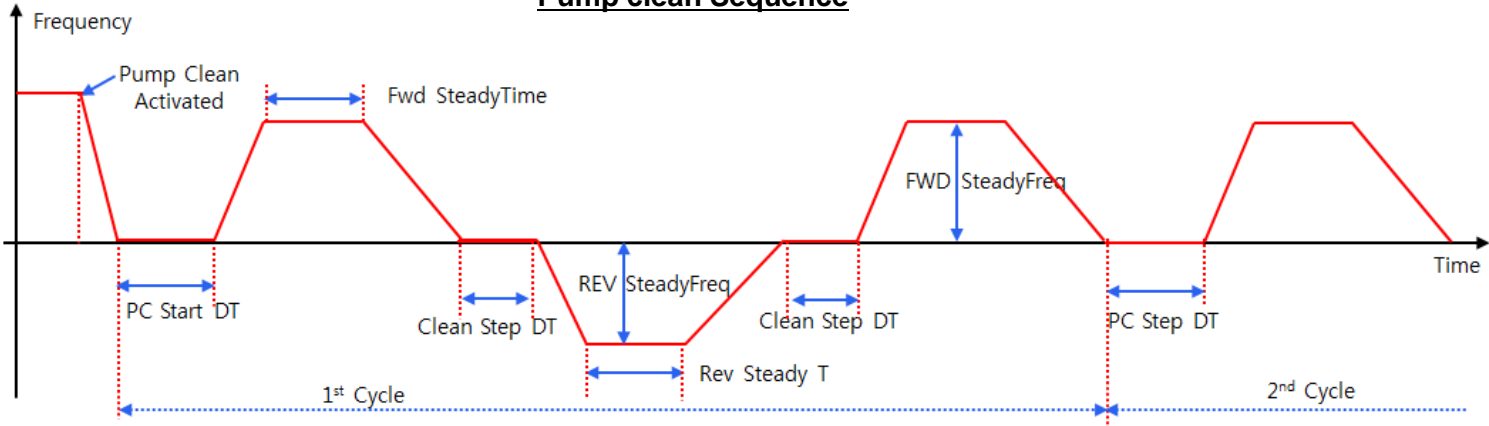
**Foreign substances stuck in impeller**



**Pump clean operation**



**Pump clean Sequence**



\*'Load tune' function should be conducted before activating 'Pump clean' function.

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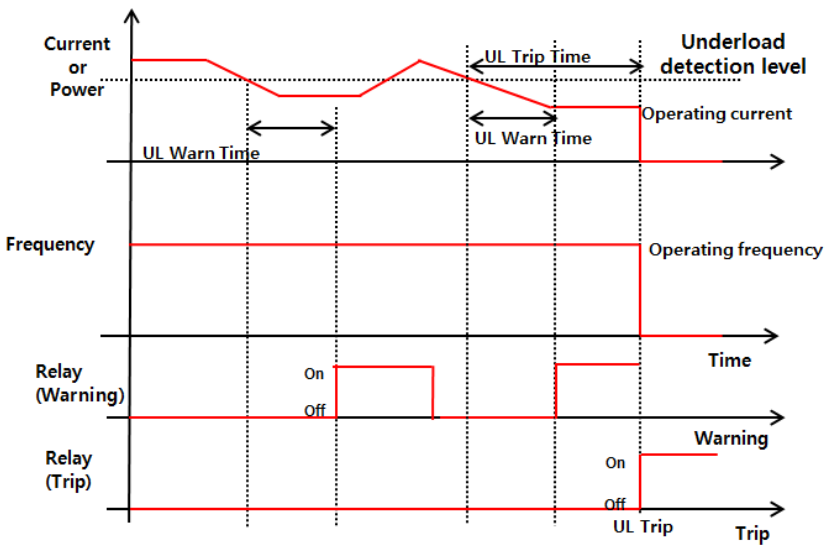
## New features

### Under Load Protection

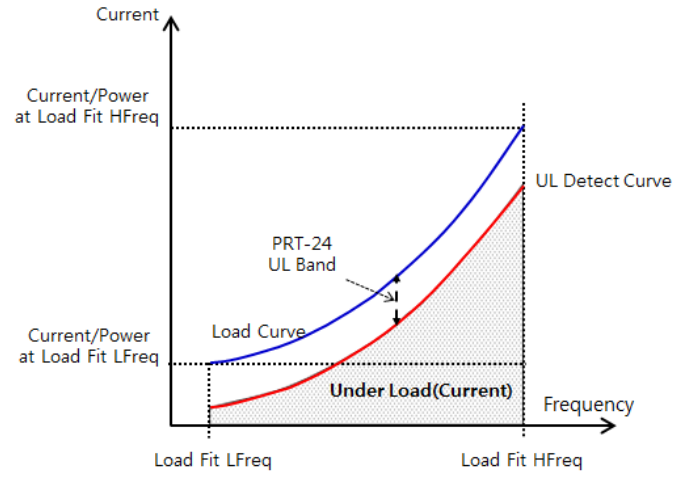
If there is a problem with pumping systems, the drive detects it and triggers Warning or Trip independently to protect its system. And in case of Trip status, Free-Run, deceleration, or stop can be selected by users

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Under load sequence



Under load operation



\*'Load tune' function should be conducted before activating 'Pump clean' function.

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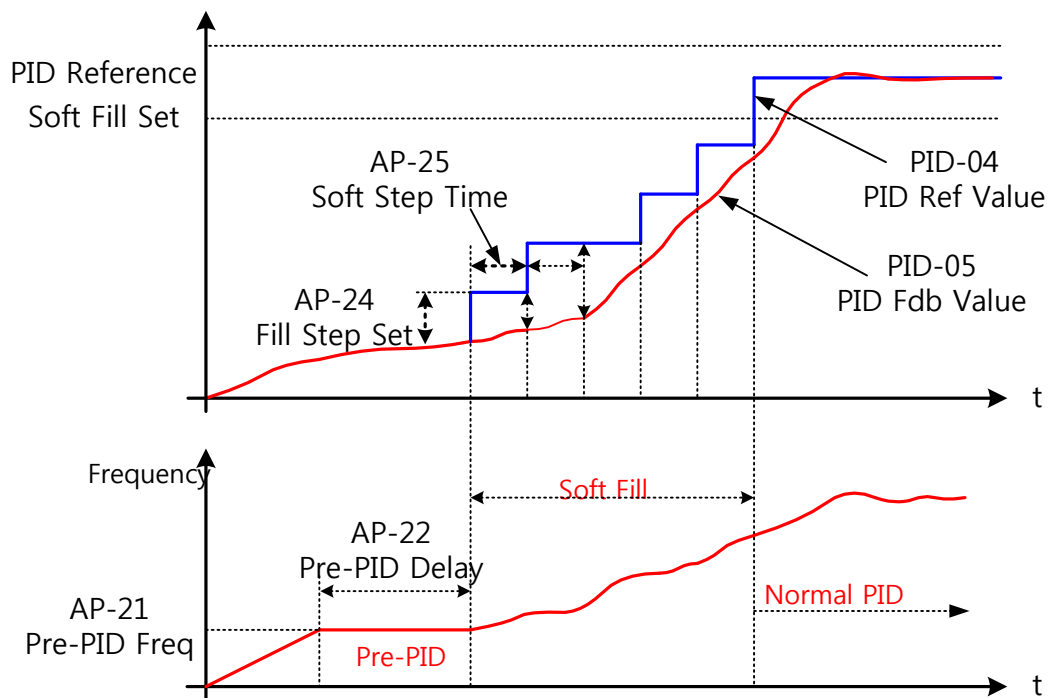
## New features

### Soft Fill

Function to prevent pump damages caused by dramatic pressure changes such as pressure surge, water hammering or hydraulic shock inside pump while H100 makes the pump operated with proper pressure at a initial stage smoothly.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

**Soft Fill sequence**





# H100

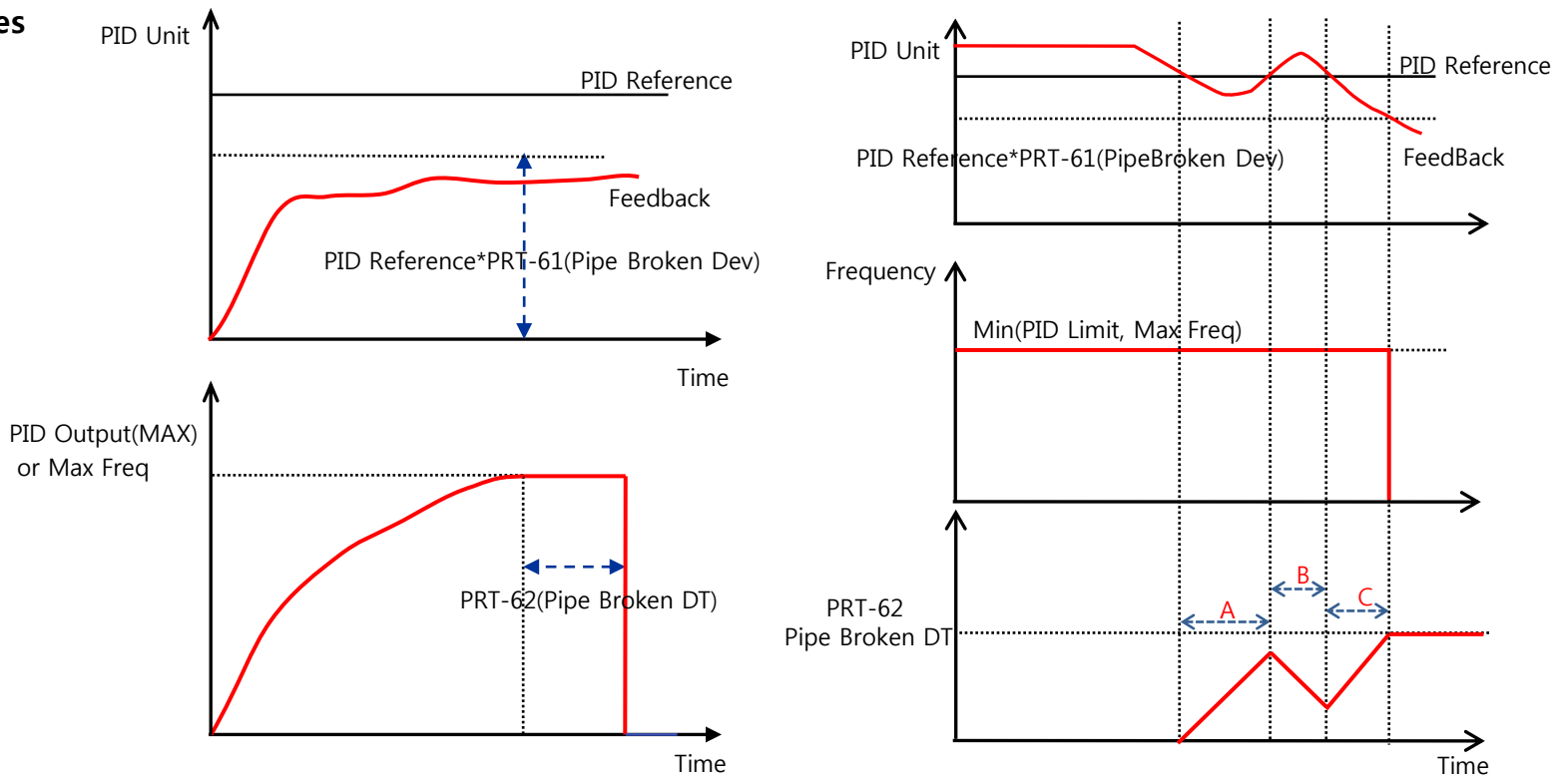
## New features

### Pipe Broken

Function that triggers a warning or trip when pipe or duct damage have been detected during PID operation.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

### Pipe broken operation



# H100

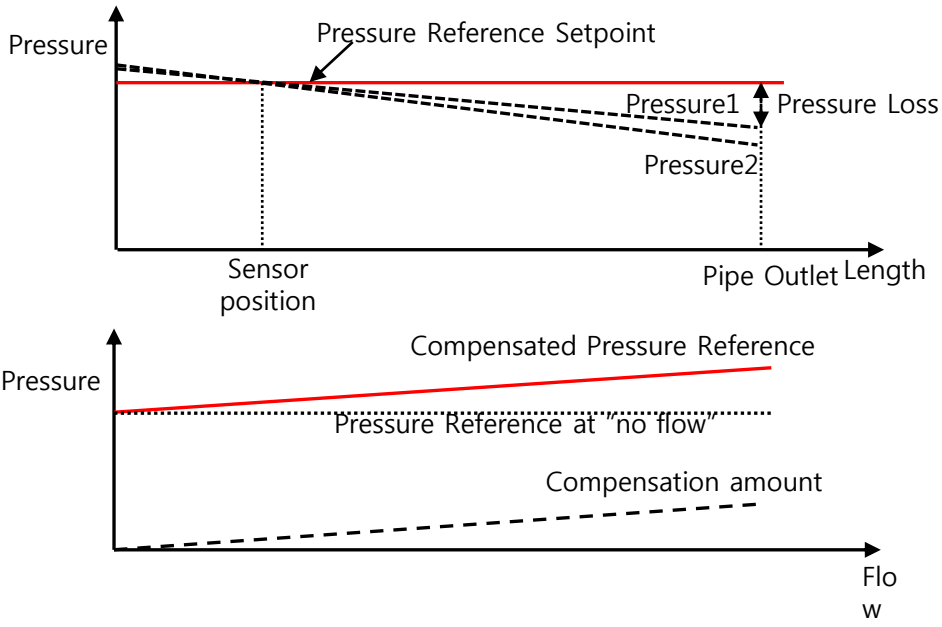
## New features

### Flow Compensation

The pressure loss might occur when a pipe tube is too long and too far from the pump. In order to compensate for this loss, the drive will increase its output frequency automatically as much as necessary.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

#### Flow compensation operation



#### Flow Compensation Value

$$\frac{\text{Out Freq} - \text{Start Freq}}{\text{MaxFreq} - \text{Start Freq}} * \text{Unit Reference Max} * \frac{\text{Max Comp Value \%}}{100\%}$$

# H100

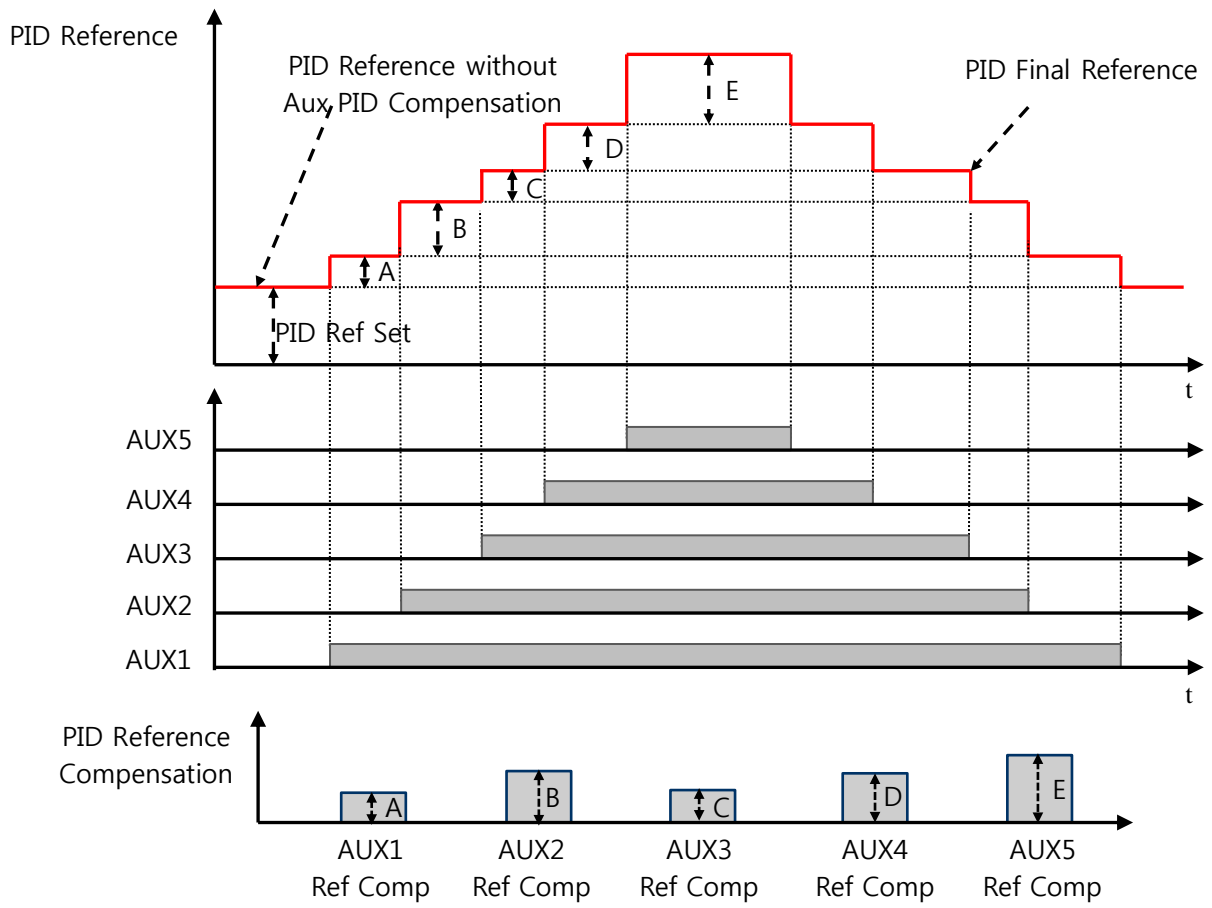
## New features

### Aux PID Compensation

Function that compensate for the pressure loss like Flow compensation in case of long pipe tubes when auxiliary motors are used for MMC. According to the number of auxiliary motors used, PID reference will be adjusted automatically by user setting.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

Aux PID compensation sequence



## H100

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

### New features

#### *Multi Master / Multi Follower*

Will be explained with another slide.

(Currently it is confidential and features might slightly be changed)

# H100

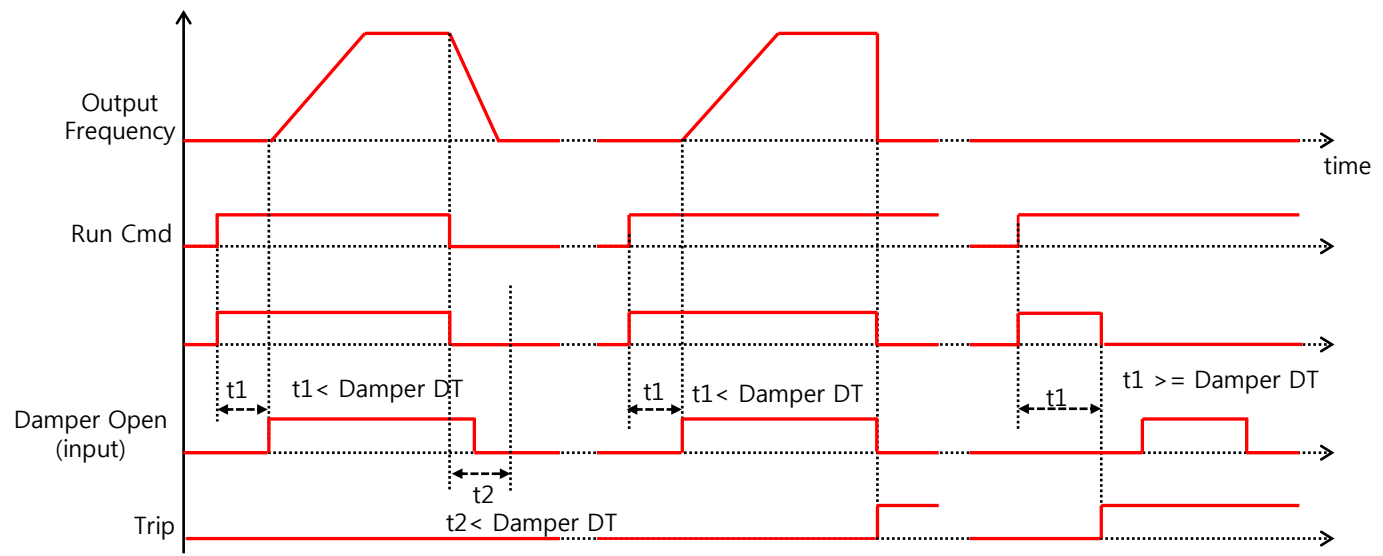
## New features

### *Damper Control*

When a Damper exists in the system configuration, the drive will command the Damper to open/close or receive feedback signals for protection.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

**Damper control sequence**

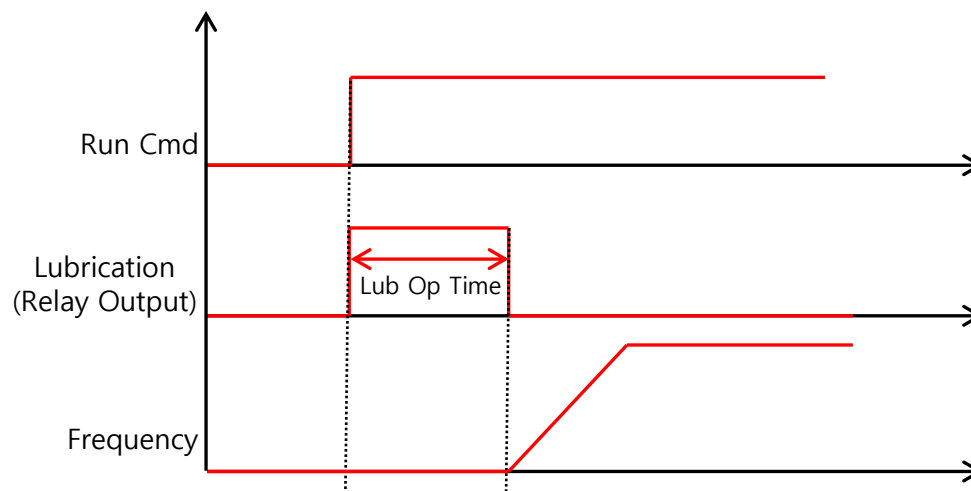


## H100

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

**■ New features***Lubrication Control*

There are some special pumping systems such as Mining or Oil applications, it might be essential to lubricate the machine before starting its operation. When Run command is activated, the drive will output lubrication signal, and then will start its operation after lubrication operation time.

**Lubrication control sequence**

# H100

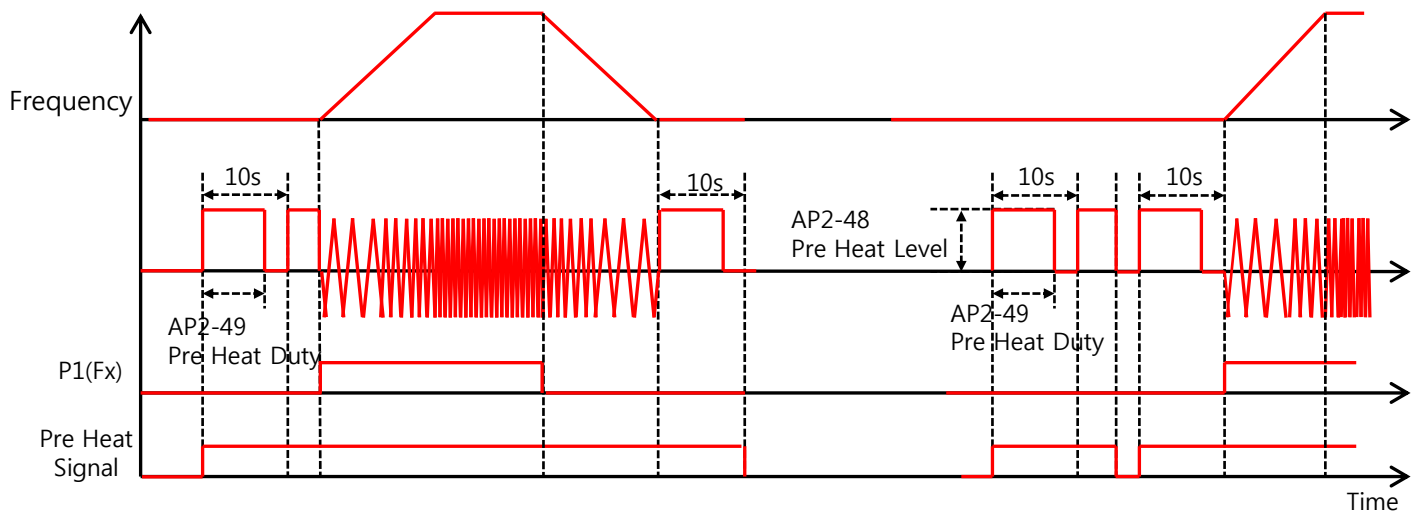
## New features

### Pre Heat

To control the motor with condensation located outdoor smoothly, the motor will be pre-heated by DC current from the drive in a certain time.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

Pre Heat sequence



# H100

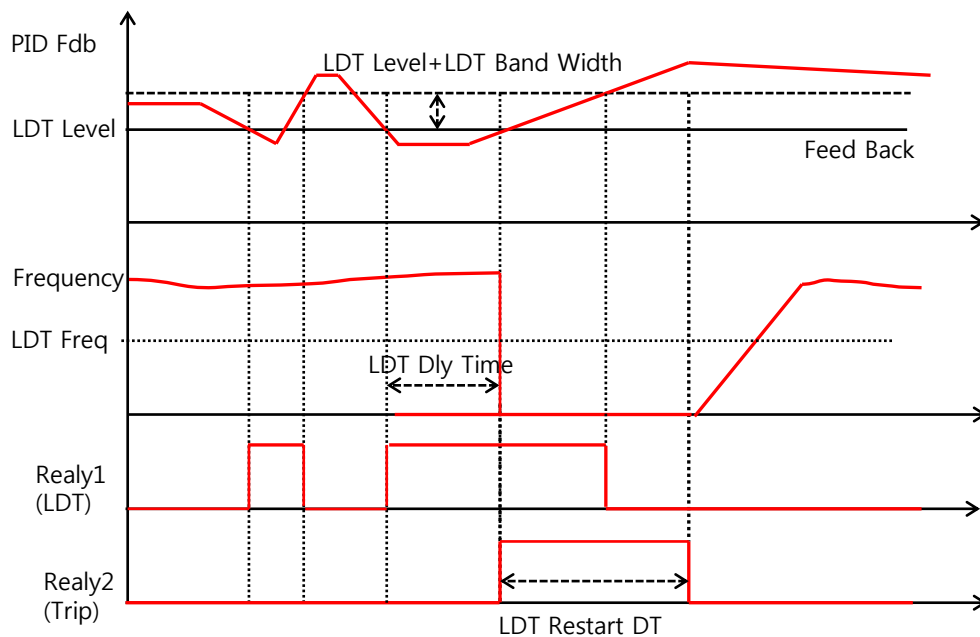
## New features

### Level Detection

As a kind of protective function, Warning or Trip will be triggered to a relay when Level detection level is either higher or lower than a preset value. There are 13 types of level detection sources.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

**Level detection sequence**



### Level Detect Source

- 0 : Output Current
- 1 : DCLink Voltage
- 2 : Output Voltage
- 3 : kW
- 4 : HP
- 5 : V1
- 6 : V2
- 7 : I2
- 8 : PID Ref Value
- 9 : PID Fdb Value
- 10 : PID Output
- 11 : EPID1 Fdb Val
- 12 : EPID2 Fdb Val



## H100

 **New features**
*Payback Count (Energy saving monitoring)*

H100 calculates the saved energy[kW], cost and CO2 emission and displays on LCD keypad. There is no need to install a power meter device additionally.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] **New features**
- 6] Enhanced features
- 7] Comparison

| CODE   | Keypad Display | Setting Range     | Factory Default | Units | Edit Mode |
|--------|----------------|-------------------|-----------------|-------|-----------|
| AP2-87 | M1 AVG PWR     | 0.1 ~ 90          | Inv Cap         | kW    | Δ         |
| AP2-88 | M2 AVG PWR     | 0.1 ~ 90          | Inv Cap         | kW    | Δ         |
| AP2-89 | Cost per kWh   | 0.0 ~ 1000.0      | 0               |       | ○         |
| AP2-90 | Saved kWh      | -999.9~999.9      | 0               | kWh   | X         |
| AP2-91 | Saved MWh      | -32000~32000      | 0               | MWh   | X         |
| AP2-92 | Saved Cost1    | -999.9~999.9      | 0               |       | X         |
| AP2-93 | Saved Cost2    | -32000~32000      | 0               |       | X         |
| AP2-94 | CO2 Factor     | 0.0 ~ 5.0         | 0.5             |       | ○         |
| AP2-95 | Saved CO2 - 1  | -999.9~999.9      | 0               | Ton   | X         |
| AP2-96 | Saved CO2 - 2  | -160~160          | 0               | kTon  | X         |
| AP2-97 | Reset Energy   | 0 : No<br>1 : YES | 0               | Msg   | ○         |

## H100

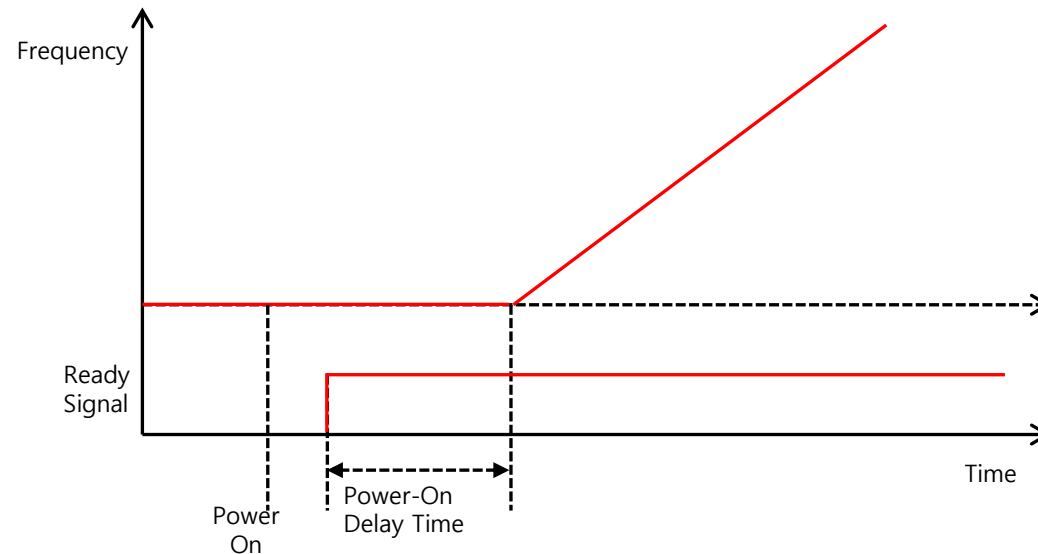
## ■ New features

### *Power On Run Delay Start*

When the drive restarts after power interruption, it will operate after the delay time set by users.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] **New features**
- 6] Enhanced features
- 7] Comparison

#### Power On Run Delay sequence



### *Power-On Resume*

When command source is Communication (BacNet, LonWorks, Modbus RTU, etc),, the drive keeps operating previous command after recovering from momentary power loss.

## H100

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

## Enhanced features

### *Enhanced PID*

There are Two kind of PID functions available such as Process PID, 2 External PID

- ✓ Process PID: 2 Reference Calculator, 8 Step Reference Selection, 1 Feedback Calculator.
- ✓ Process PID Mode: [PID out], [PID+Main Freq], [PID+EPID Out], [PID+EPID+Main].
  - Normal PID: [PID out]
  - Process PID: [PID+Main Freq]
  - Dual PID: [PID+EPID Out]
  - Process PID + Dual PID : [PID+EPID Out+Main Freq]
- ✓ External PID 1: +Process PID or Analog Output
- ✓ External PID 2: Analog Output Only

40 different units for PID are available as below

|          |          |                    |                     |           |
|----------|----------|--------------------|---------------------|-----------|
| 0 : CUST | 9 : Pa   | 18 : ft            | 27 : kg/m           | 40 : pps  |
| 1 : %    | 10 : kPa | 19 : m/s           | 28 : kg/h           | 36 : lb/s |
| 2 : PSI  | 11 : Hz  | 20 : m3/s (m3/S)   | 29 : gl/s           | 37 : lb/m |
| 3 : °F   | 12 : rpm | 21 : m3/m (m3/min) | 30 : gl/m           | 38 : lb/h |
| 4 : °C   | 13 : V   | 22 : m3/h (m3/h)   | 31 : gl/h           | 39 : ppm  |
| 5 : inWC | 14 : I   | 23 : l/s           | 32 : ft/s           |           |
| 6 : inM  | 15 : kW  | 24 : l/m           | 33 : f3/s (ft3/s)   |           |
| 7 : Bar  | 16 :HP   | 25 : l/h           | 34 : f3/m (ft3/min) |           |
| 8 : mBar | 17 : mpm | 26 : kg/s          | 35 : f3/h (ft3/h)   |           |

# H100

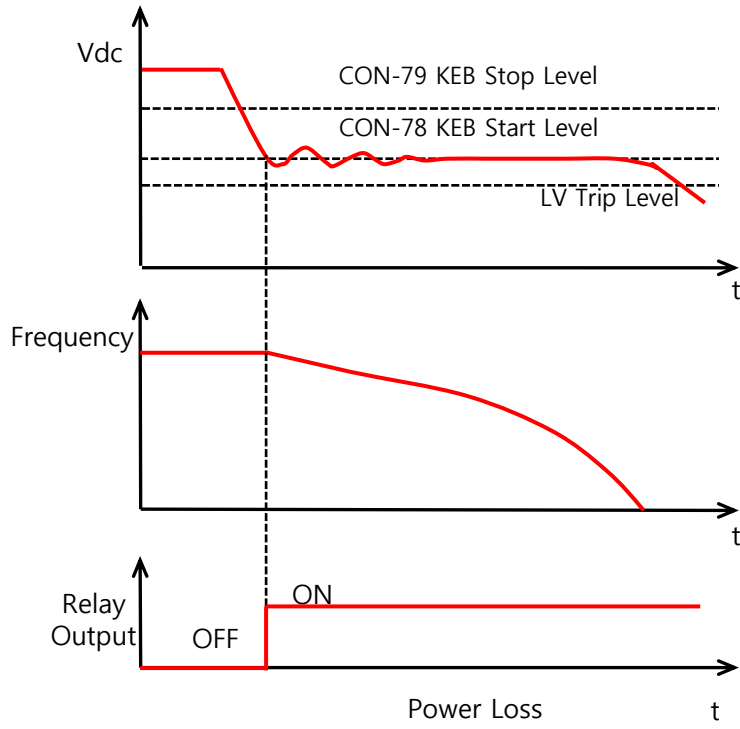
## Enhanced features

### Enhanced KEB (Kinetic Energy Buffering)

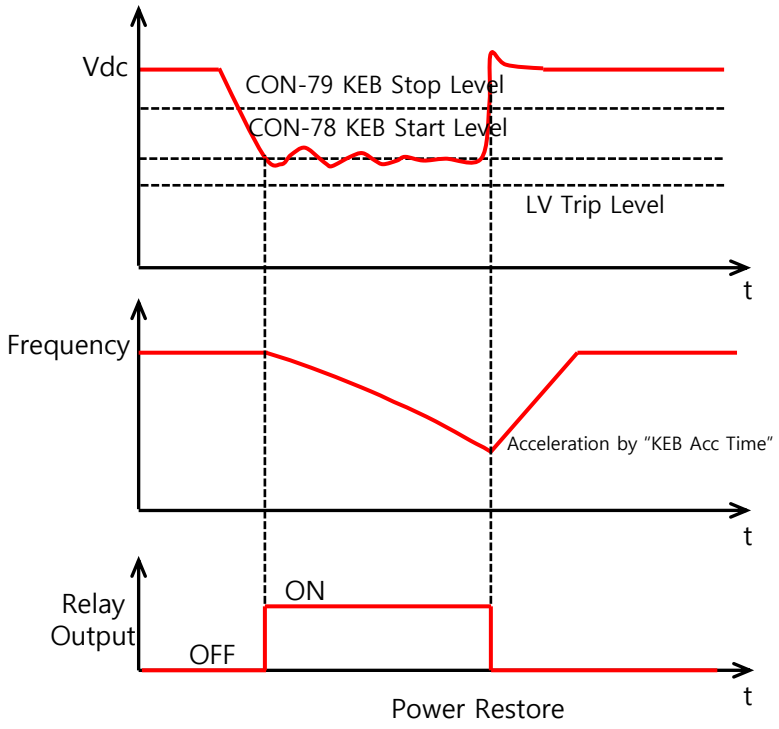
In case of a momentary power loss, the drive decelerates estably using the regenerative energy from the motor's inertia instead of triggering LV trip. In case the power is restored before DC link voltage drops until LV trip level, the drive will accelerate to the set command frequency.

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

Power loss case



Power recover case



# H100

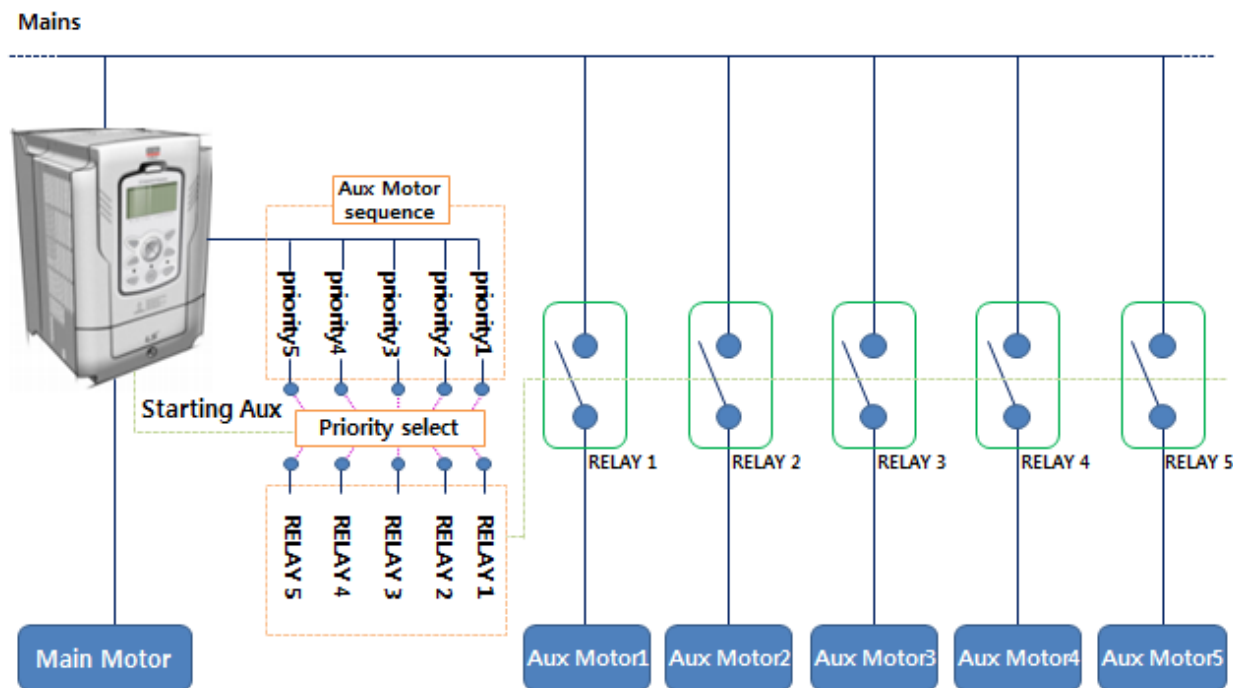
- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

## Enhanced features

### *Enhanced MMC (Multi Motor Control)*

MMC is used when a single drive is used to control multiple motors in pump systems. H100 can control 1 main motor and 5 auxiliary motors basically and this auxiliary motor can be extended up to 8 in case of installing a extension I/O card.

- ✓ Interlock, Auto Change(Main Exchange, Aux Exchange), Regular Bypass(with feedback value)
- ✓ Only Possible together with PID operation(except regular bypass)



# H100

## Enhanced features

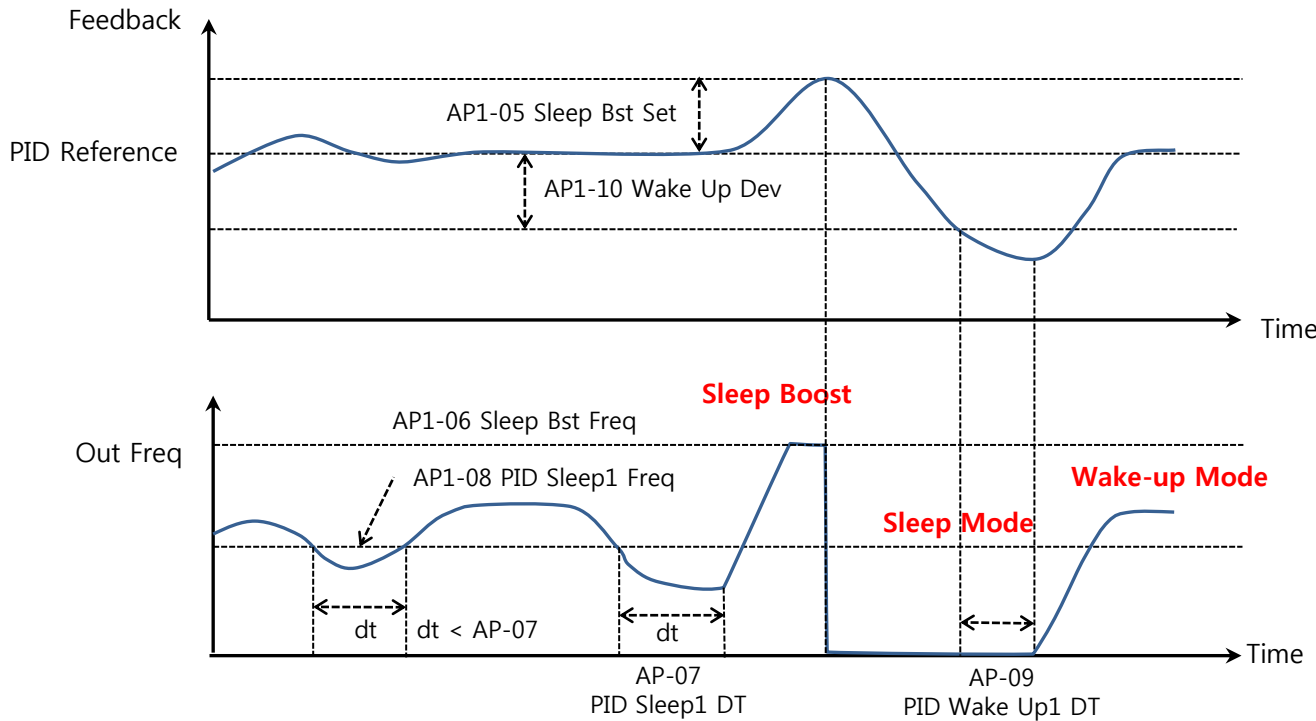
### *Enhanced Sleep & Wake-up*

Used to put the drive on standby and restart it automatically using PID operation so that the motor lifespan is extended and the energy consumption is reduced.

- ✓ Sleep boost, Sleep mode, Wake-up delay, Wake-up mode

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

**Sleep & Wake-up sequence**



# H100

## Enhanced features

*More options to select I/O source*

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

### Multi-functional Digital Input

| Value | Description   | Value | Description    |
|-------|---------------|-------|----------------|
| 0     | None          | 27    | PID Ref Change |
| 1     | Fx            | 28    | 2nd Motor      |
| 2     | Rx            | 29    | Interlock 1    |
| 3     | RST           | 30    | Interlock 2    |
| 4     | External Trip | 31    | Interlock 3    |
| 5     | BX            | 32    | Interlock 4    |
| 6     | JOG           | 33    | Interlock 5    |
| 7     | Speed-L       | 34    | Pre Excite     |
| 8     | Speed-M       | 35    | Timer In       |
| 9     | Speed-H       | 37    | dis Aux Ref    |
| 11    | XCEL-L        | 38    | FWD JOG        |
| 12    | XCEL-M        | 39    | REV JOG        |
| 13    | XCEL-H        | 40    | Fire Mode      |
| 14    | XCEL Stop     | 41    | EPID1 Run      |
| 15    | RUN Enable    | 42    | EPID1 ItemClr  |
| 16    | 3-Wire        | 43    | Time Event En  |
| 17    | 2nd Source    | 44    | Pre Heat       |
| 18    | Exchange      | 45    | Damper Open    |
| 19    | Up            | 46    | PumpClean      |
| 20    | Down          | 47    | EPID2 Run      |
| 22    | U/D Clear     | 48    | EPID2 ItemClr  |
| 23    | Analog Hold   | 49    | Sleep Wake Chg |
| 24    | I-Term Clear  | 50    | PID Step Ref L |
| 25    | PID Openloop  | 51    | PID Step Ref M |
| 26    | PID Gain2     | 52    | PID Step Ref H |

### Multi-functional Digital Output

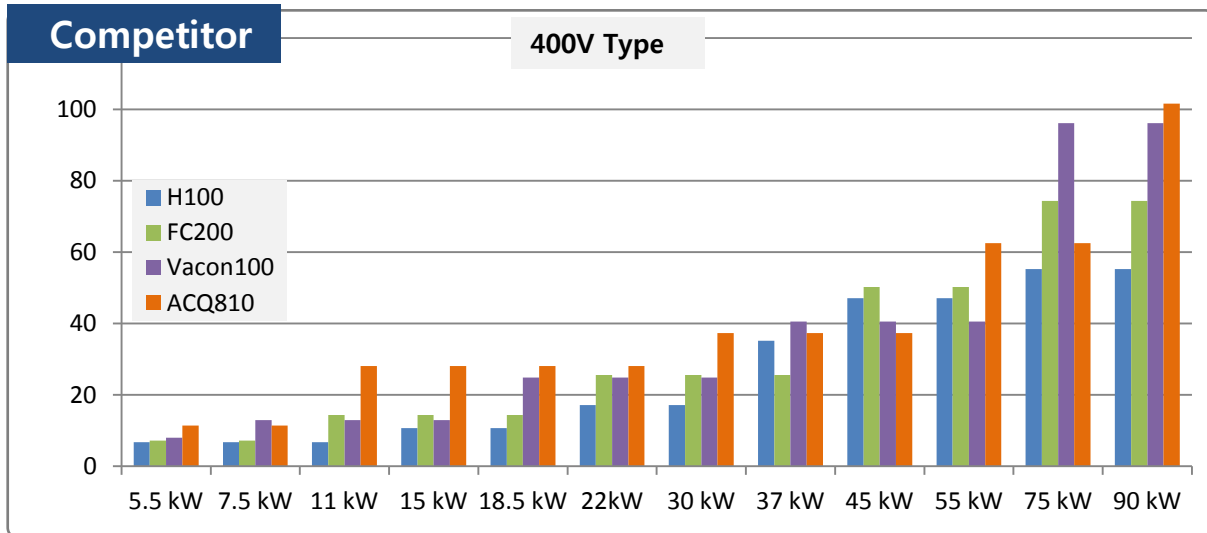
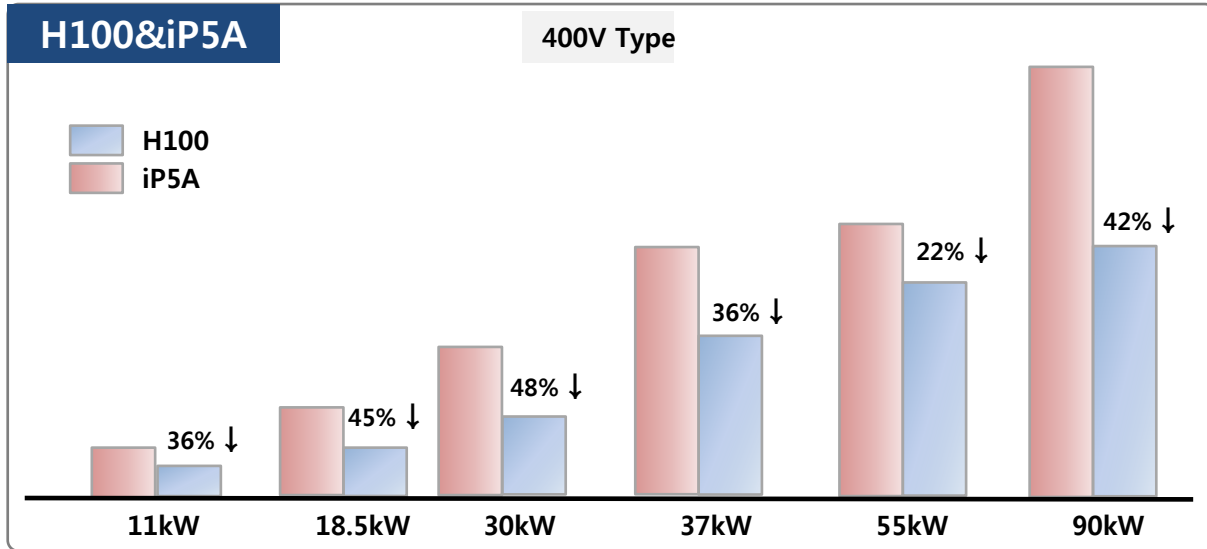
| Value | Description   | Value | Description    |
|-------|---------------|-------|----------------|
| 0     | None          | 20    | Ready          |
| 1     | FDT-1         | 21    | MMC            |
| 2     | FDT-2         | 22    | Timer Out      |
| 3     | FDT-3         | 23    | Trip           |
| 4     | FDT-4         | 25    | DB Warn%ED     |
| 5     | Over Load     | 26    | On/Off Control |
| 6     | IOL           | 27    | Fire Mode      |
| 7     | Under Load    | 28    | Pipe Broken    |
| 8     | Fan Warning   | 29    | Damper Err     |
| 9     | Stall         | 30    | Lubrication    |
| 10    | Over Voltage  | 31    | Pump Clean     |
| 11    | Low Voltage   | 32    | Level Detect   |
| 12    | Over Heat     | 33    | Damper Control |
| 13    | Lost Command  | 34    | CAP.Warning    |
| 14    | Run           | 35    | Fan Exchange   |
| 15    | Stop          | 36    | AUTO State     |
| 16    | Steady        | 37    | Hand State     |
| 17    | Inverter Line | 38    | TO             |
| 18    | Comm Line     | 39    | Except Date    |
| 19    | Speed Search  | 40    | KEB Operating  |

# H100

## Comparison

### Comparison of sizes

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison





# H100

## Comparison

### *Comparison of Functions*

- 1] LV Drive Line-up
- 2] Target application
- 3] frame design
- 4] General spec.
- 5] New features
- 6] Enhanced features
- 7] Comparison

| Functions                          | LSIS (H100) | LSIS (iP5A) | ABB (ACQ810) | Delta (CP2000) | Danfoss (FC200) | Vacon (100) |
|------------------------------------|-------------|-------------|--------------|----------------|-----------------|-------------|
| Real Time Clock                    | ○           | -           | ○            | ○              | ○               | ○           |
| Underload(No Flow, Dry Pump)       | ○           | ○           | ○            | ○              | ○               | ○           |
| Pipe Broken                        | ○           | ○           | -            | -              | ○               | ○           |
| Flow Compensation                  | ○           | -           | -            | -              | ○               | ○           |
| Payback Counter                    | ○           | -           | ○            | -              | ○               | ○           |
| Fire Mode                          | ○           | ○           | -            | ○              | -               | ○           |
| Soft Pipe-Fill                     | ○           | -           | ○            | -              | ○               | -           |
| Pump Clean Function                | ○           | -           | ○            | -              | ○               | -           |
| MMC                                | ○           | ○           | ○            | ○              | ○               | ○           |
| Check Valve Ramp                   | ○           | -           | -            | -              | ○               | -           |
| Sleep Boost/Wakeup                 | ○           | ○           | ○            | -              | ○               | ○           |
| USB Connectivity                   | ○           | -           | -            | -              | ○               | -           |
| Level Detection(Outlet Protection) | ○           | ○           | ○            | -              | ○               | ○           |
| Damper/Lubrication                 | ○           | ○           | ○            | -              | -               | -           |
| HAND/OFF/AUTO                      | ○           | -           | ○            | -              | ○               | ○           |
| Regular Bypass                     | ○           | ○           | ○            | -              | ○               | ○           |
| External PID                       | ○           | ○           | ○            |                | ○               | ○           |
| Start End Ramp                     | ○           | -           | -            | -              | ○               | -           |
| Dec Valve Ramp                     | ○           | -           | -            | -              | ○               | -           |