L7S exchange procedures

for VS users

2015.01.23

LS Mecapion

Technology Support Department

Table of Contents

1. Selection

1-1. Notes on capacity selection

1-1-1　Check to select Drive capacity

1)　There is a possibility that the existing applied motor has not been mixed because rated current of L7S is lower than VS.

1-1-2　To select servo

1)　To select servo, Please refer to the product characteristics on Chapter 7 of Manual and combination table on catalog

VS is lower than the rated current of the L7S you need to check it applied to existing motor cannot be mixed

Rated current of L7S is lower than VS, there is a possibility that the existing applied motor has not been mixed, you will need to make sure that

Ex) The comparative table of Rated current & Max current

VS Drive Capacitor	Rated current[A]	Max current[A]	L7S Drive Capacitor	Rated current[A]	Max current[A]
R5	1.2	3.6			
VS01	1.65	4.95	L7SA001	1.4	4.2
VS02	1.65	4.95	L7SA002	1.7	5.1
VS04	3.2	9.6	L7SA004	3.0	9.0
VS05	4.3	12.9	L7SA008	5.2	15.6
VS10	6.4	19.2	L7SA010	6.75	20.25
VS15	11	33			
VS20	16	48	L7SA020	13.5	40.5
VS35	21	63	L7SA035	16.7	50.1
VS50	32	96	L7SA050	32	96

Note1) In the case of APD-VSR5~04, Main power and control power is integrated

But, In the case of L7S drive, main power and control power is separated for the stabilization of the control characteristics

1-1-3 The comparison of servo drive format

VS	L7S
■ Servo drive Type Designation APD – VS 04 N A4 **LS MECAPION Series** Servo Drive **Type** VS : Standard type VP : Controller- Embedded type VT : Tension Control type **Drive Capacity** R5 : 50W　35 : 3.5kW 01 : 100W　50 : 5.0kW 02 : 200W　75 : 7.5kW 04 : 400W　110: 11.0 kW 05 : 500W　150: 15.0 kW 10 : 1.0kW　220 : 22.0kW 15 : 1.5kw　300 : 30.0kW 20 : 2.0kW　370 : 37.0kW **Encoder Type** N : Incremental A : Absolute **Exclusive Option Code**	■ Servo Drive Product Format L7 S A 004 A AA **Series Name** Servo Series **Communication Type** S: Standard I/O type N: Network type **Input Voltage** A: 220 VAC B: 400 VAC **Capacity** 001: 100 W　050: 5.0 kW 002: 200 W　075: 7.5 kW 004: 400 W　110: 11.0kW 008: 750 W　150: 15.0kW 010: 1.0 kW 020: 2.0 kW 035: 3.5 kW **Encoder Type** A: Quadrature (Pulse type) B: Serial (communication type) **Option** Exclusive Option

Note1) L7S : It is developed by 100W ~5KW for 200V

It is developed by 1KW ~15KW for 400V

Note2) Please refer to Chapter 7 of Manual and the product characteristics of catalog for more information

1-2 The comparison of regenerative braking resistance

1)　Regenerative braking resistor case of L7S is the basic built in up to 5KW

2)　Depending on the product, check the basic provide regenerative braking resistance of VS and the basic built-in regenerative braking resistance of L7S. And, when using external regenerative braking resistance, Please make sure to check the regenerative braking resistance terminal

3)　Depending on the product, check the basic built-in regenerative resistor built-in and L7S of VS, please be sure to check the regenerative resistor when an external regenerative resistor use terminal.
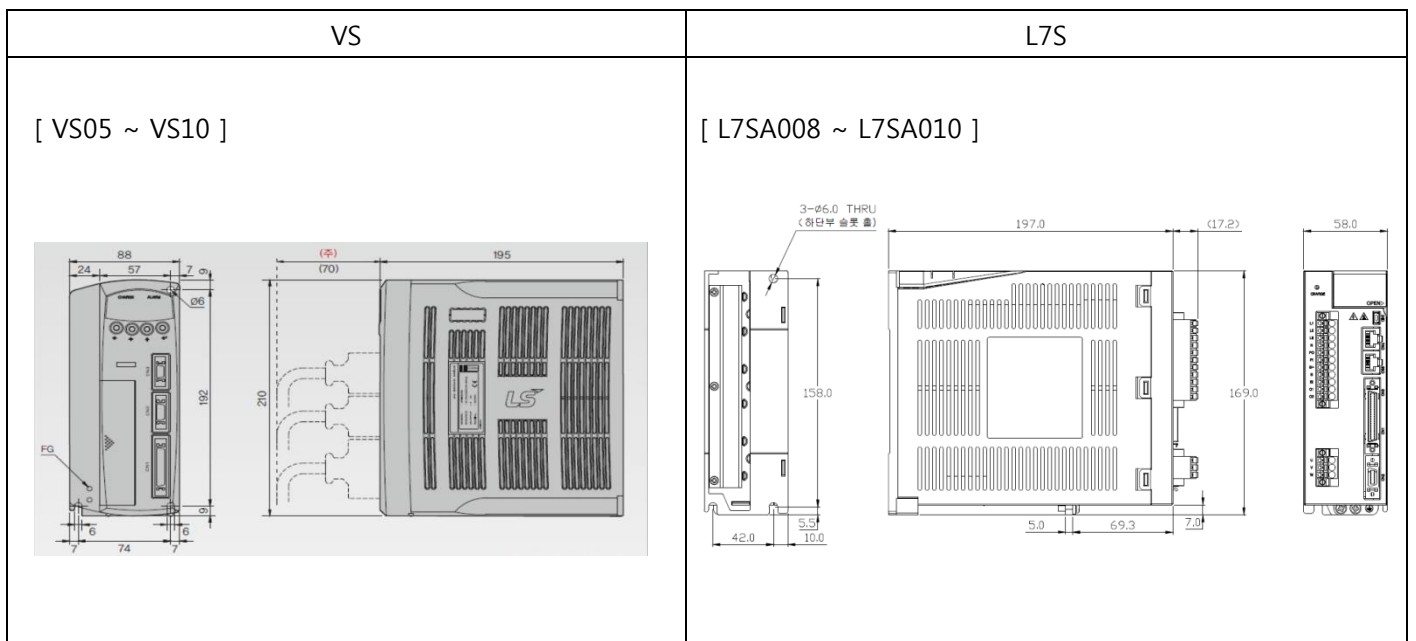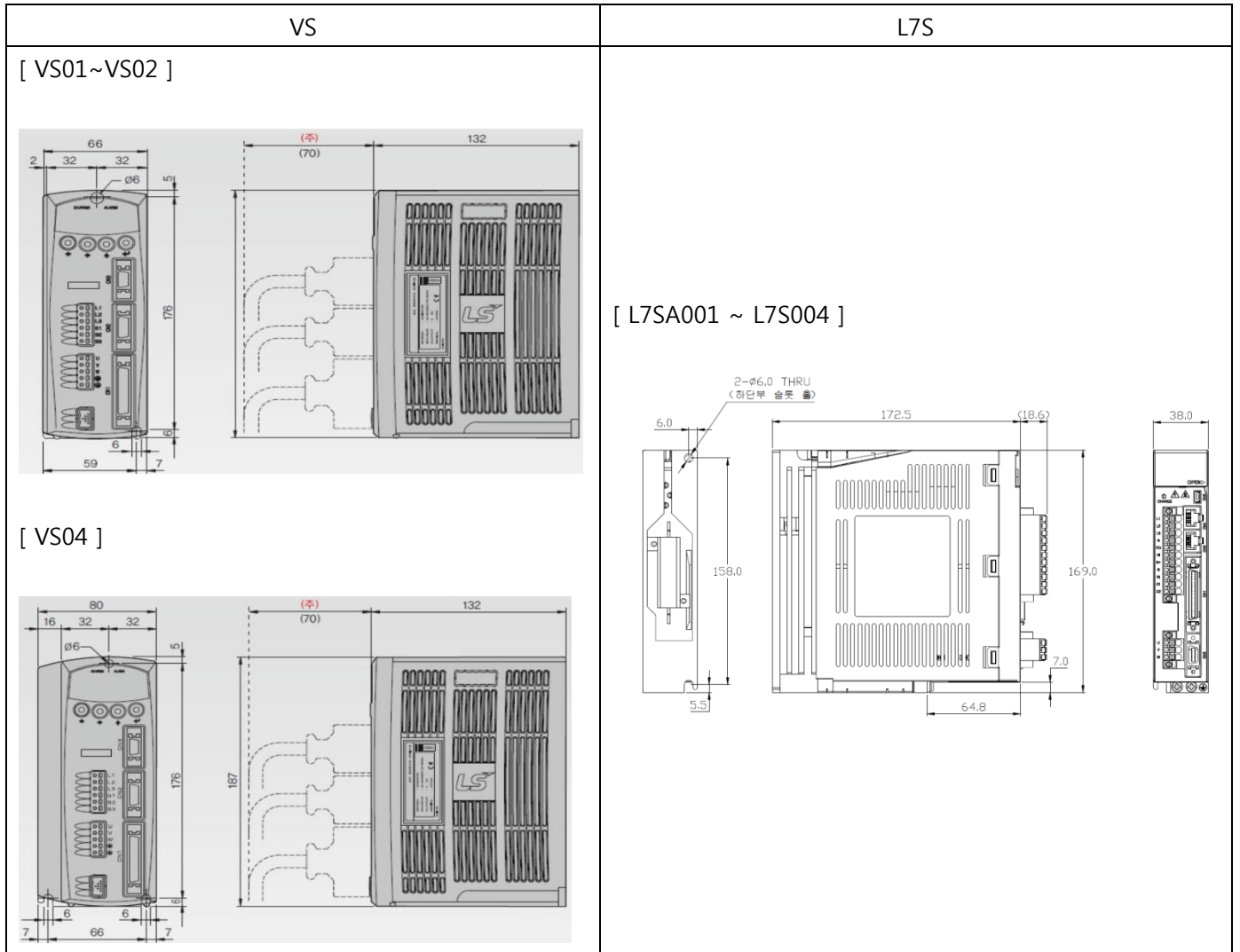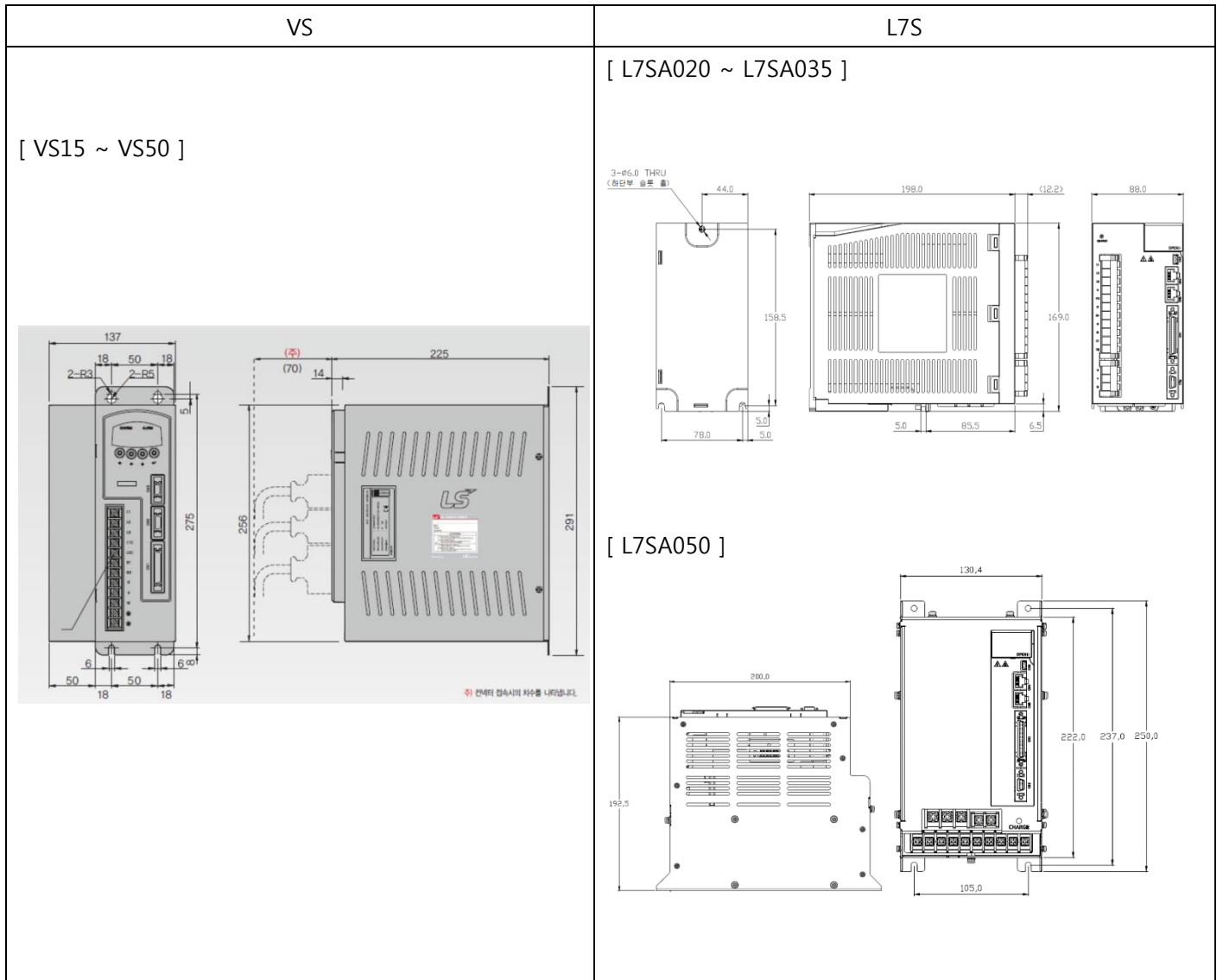
- **Basic regenerative braking resistance**

	Capacity(Basic provide)	VS	Capacity(Built in)	L7S
Braking resistance	Built in : 50W 100Ω	APD-VS02~04	Built in : 50W 100Ω	L7SA001~004
	External : 140W 40Ω	APD-VS05~10	Built in : 100W 40Ω	L7SA008~010
	External : 300W 23Ω	APD-VS15~20	Built in : 150W 13Ω	L7SA020~035
	External :300x2W 11.5Ω	APD-VS35~75	Built in : 120W 6.8Ω	L7SA050

Note1) When extending the regenerative capacity, please refer to option specification description on manual and check regenerative braking resistance terminal of signal description on manual chapter 1 .

2. Product Features

2-1. The comparison of external size according to capaicity

VS	L7S
[VS01~VS02] [VS04]	[L7SA001 ~ L7S004]

VS	L7S
[VS05 ~ VS10]	[L7SA008 ~ L7SA010]

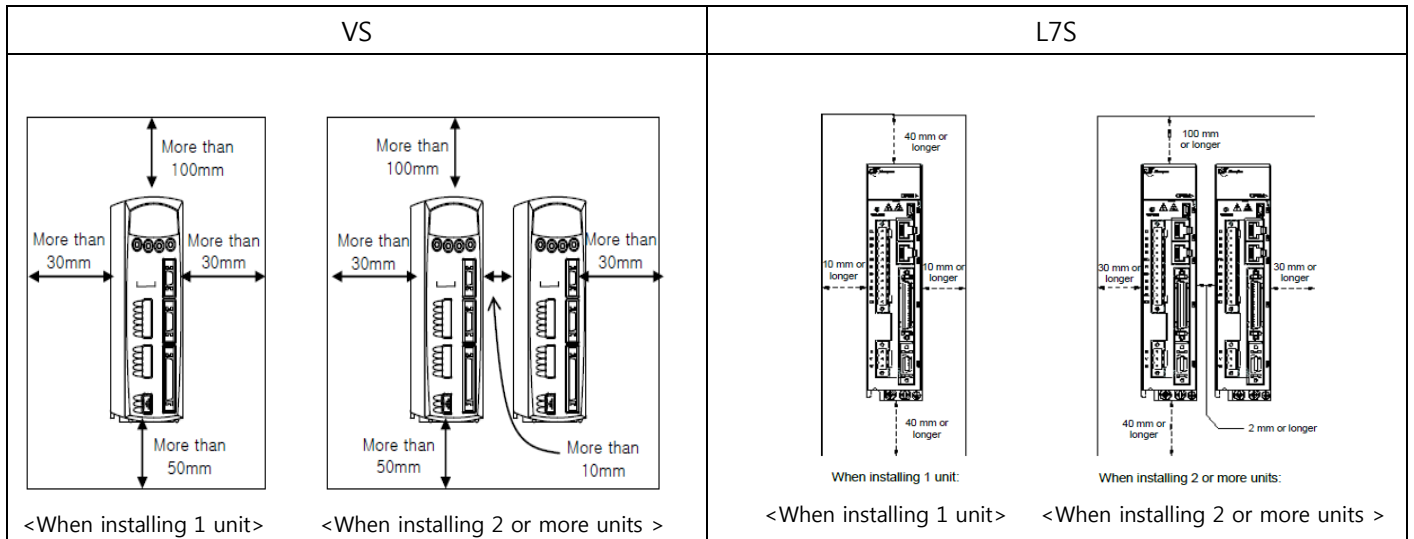| VS	L7S
[VS15 ~ VS50] 	[L7SA020 ~ L7SA035] [L7SA050]

Note) Please refer to Manual(outline drawing) and the catalog(outline drawing) for detail information

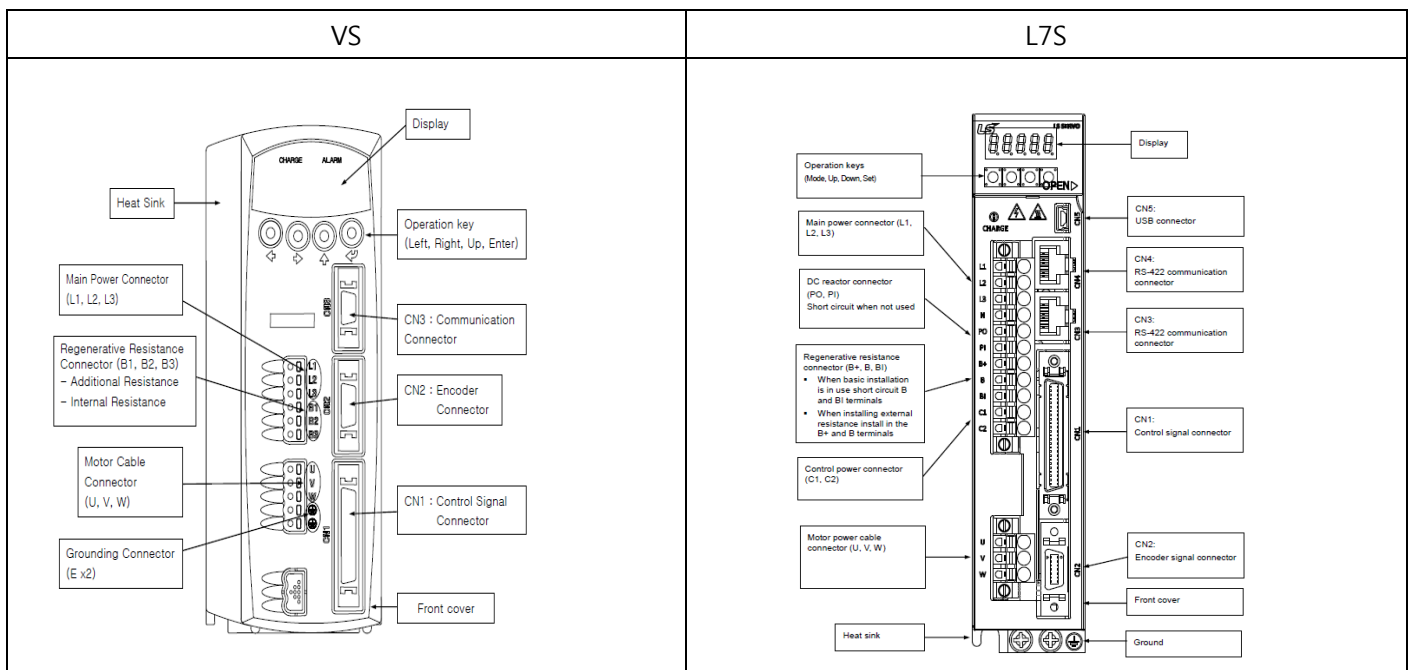## 2-2. The gaps when installing drives inside control panel

1) Although drive size is generally smaller, In the case of 100W~400W of L7S, please make sure to consider of cable fastening part because 100W~400W of L7S drive is able to be restricted by cable fastening part.

VS	L7S
More than 100mm / More than 30mm / More than 30mm / More than 50mm	40 mm or longer / 10 mm or longer / 10 mm or longer / 40 mm or longer
More than 100mm / More than 30mm / More than 30mm / More than 50mm / More than 10mm	100 mm or longer / 30 mm or longer / 30 mm or longer / 40 mm or longer / 2 mm or longer
<When installing 1 unit>	<When installing 2 or more units >	When installing 1 unit:	When installing 2 or more units:
	<When installing 1 unit>	<When installing 2 or more units >

Note1) Make sure that heat does not affect the drive during the installation of external regenerative

2-3. Position comparison of cables on the front side (The standard 400W)

1) Check the name of each part and then check the position between cables according to capacity

VS	L7S

VS labels:
- Display
- CHARGE ALARM
- Heat Sink
- Operation key (Left, Right, Up, Enter)
- Main Power Connector (L1, L2, L3)
- CN3 : Communication Connector
- Regenerative Resistance Connector (B1, B2, B3) – Additional Resistance – Internal Resistance
- CN2 : Encoder Connector
- Motor Cable Connector (U, V, W)
- CN1 : Control Signal Connector
- Grounding Connector (E x2)
- Front cover

L7S labels:
- Display
- Operation keys (Mode, Up, Down, Set)
- CN5: USB connector
- Main power connector (L1, L2, L3)
- CN4: RS-422 communication connector
- DC reactor connector (PO, PI) Short circuit when not used
- CN3: RS-422 communication connector
- Regenerative resistance connector (B+, B, BI) • When basic installation is in use short circuit B and BI terminals • When installing external resistance install in the B+ and B terminals
- CN1: Control signal connector
- Control power connector (C1, C2)
- Motor power cable connector (U, V, W)
- CN2: Encoder signal connector
- Front cover
- Heat sink
- Ground

Note1) Please refer to Manual (Product components and signals) for detail information

3. Cable

3-1. CN1 Cable

1) CN1 Cable : using same cable (VS drive and L7S drive)

   - The specification of CASE : 10350-52A0-008 (3M company)
   - The specification of CONNECTOR : 10150-3000VE (3M company)

3-2. Power & Encoder Cable

- Encoder cable

- The encoder cable is not compatible because it was changed into 14PIN(L7S) from 20PIN(VS)

   Note) Please refer to Manual Chapter 7(Option and Peripheral Devices) for detail information

   Note) Purchase CN2 Connector (APC-CN3NNA), and then, after referring to "Encoder signaling unit (CN2)

      Wiring" on L7S Manual, Change connector to use.

- Power cable

1) Ground type : changed into ring type in L7S drive (Up to 1KW)

2) Please note that different applicable motor in accordance with the cable model name.

Ex)

Power Cable	Drive	VS	L7S
	name	APC - □□□□GS	APCS - □□□□GS
	Applied motor	SF, SG Series	SA, SB, SC, HB Series

Note) Please refer to Manual Chapter 7(Option and Peripheral Devices) for detail information

3.3 Power (Main power & Control power)

1) Main power : 3 phase AC 220~230[V](-15~10%), 50~60Hz

2) Control power : single phase AC 200~230[V](-15~10%), 50~60Hz

   Note) In the case of APD-VSR5~04, Main power and control power is integrated

      But, In the case of L7S drive, main power and control power is separated for the stabilization of the control characteristics

4. The compassion of I/O signals

4-1. The comparative table of I/O PinMap (Standard: Velocity operation)

1) I/O PinMap is same as below

2) I / O PinMap through the wiring example is you need to make sure the same thing.

VS	L7S
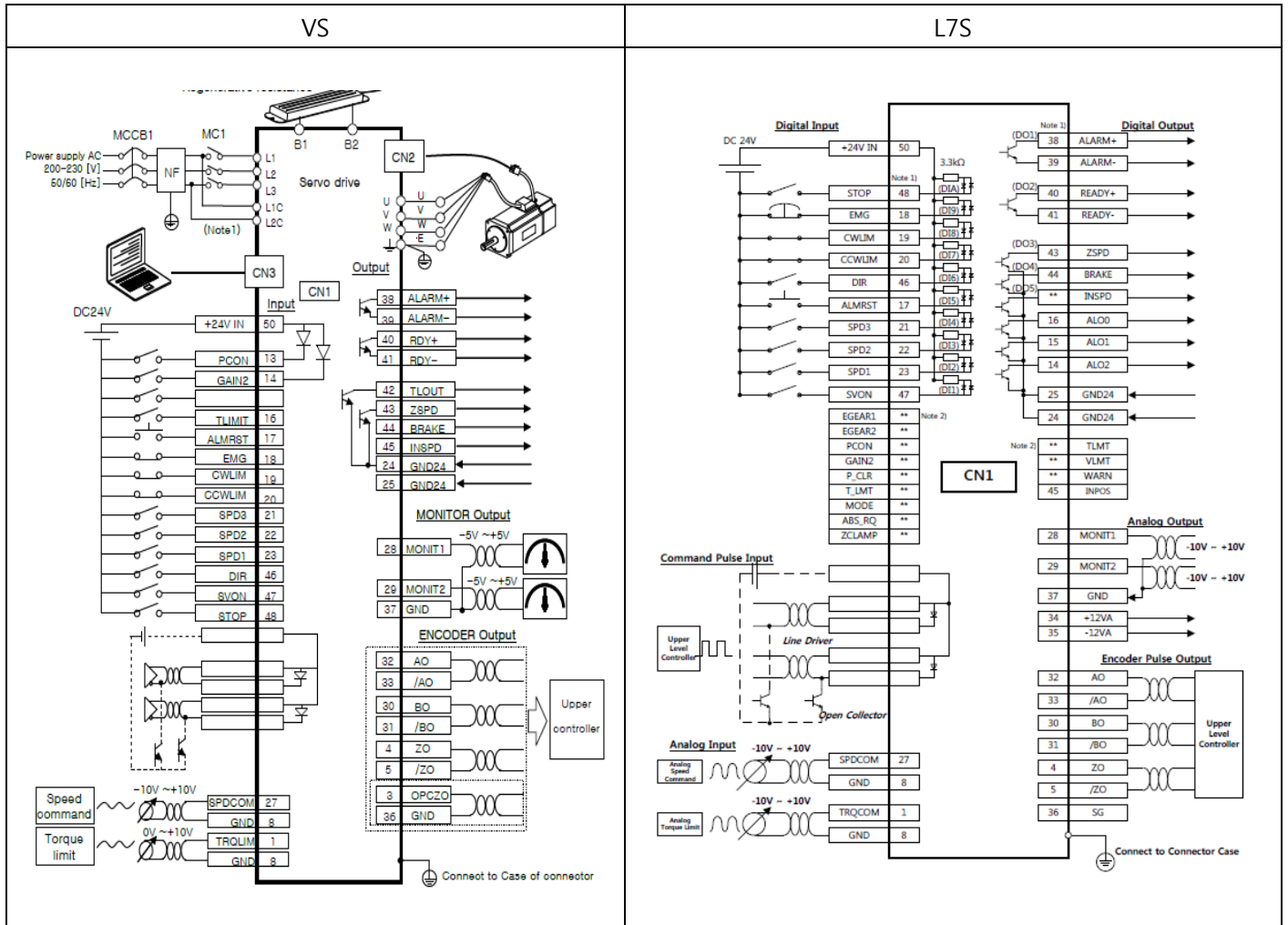
< **Notes on L7S** >

Note1) Input signals and output signals of L7S drive are default signals allocated by the factory

Note2) **These are non-allocated signals. You can change their allocation by setting parameters.

Note3) Input contact MODE=ON : Position control mode, MODE=OFF : Torque control mode

4-2. Detailed information of Control (CN1)

4-2-1 Input contact

1) VS : Input contact no.13 Pin(PCON), L7S : Not use the Input contact

2) VS : Pin no 14~16(Input contacts : Gain2, PCLEAR,TLIMIT), L7S : Pin no 14~16 (Output contact AL0~AL2)

3) Bi-photocoupler is used in input contact. Therefore, users can use any polarity

4) Using two functions with one contact(same Cn1 Pin umber) in VS. But, to use another function in same contact in L7S, you have allocate the function in the contact.(Refer to the table as below),

VS		L7S		Remark
PIN	Name	PIN	Name	
50	+24 IN	50	+24 IN	
48	STOP	48	STOP	
47	SVON	47	SVON	
46	DIR	46	DIR	
23	SPD1	23	SPD1	
	EGEAR1	**	EGEAR1	L7S : Additional allocation
22	SPD2	22	SPD2	
	EGEAR2	**	EGEAR2	L7S : Additional allocation
21	SPD3	21	SPD3	
	MODE	**	MODE	L7S : Additional allocation
20	CCWLIM	20	CCWLIM	
19	CWLIM	19	CWLIM	
18	EMG	18	EMG	
17	ALMRST	17	ALMRST	
16	TLIMIT	16	AL0	L7S : changed into output contact
15	PCLEAR	15	AL1	L7S : changed into output contact
14	GAIN2	14	AL2	L7S : changed into output contact
13	PCON	-	-	L7S : Not use
		Allocation	EGEAR1	
		Allocation	EGEAR2	
		Allocation	PCON	
		Allocation	GAIN2	
		Allocation	P_CLR	
		Allocation	T-LMT	
		Allocation	MODE	
		Allocation	ABS_RQ	
		Allocation	ZCLAMP	
		Allocation	ABS_RST	

Note) **These are non-allocated signals. You can change their allocation by setting parameters.

4-2-2 Output contacts

1) Pin no. 42 (TLOUT) in VS, Not used in L7S

2) Using two functions with one contact(same Cn1 Pin umber) in VS. But, to use another function in same contact in L7S, you have allocate the function in the contact.(Refer to the table as below),

VS		L7S		Remark
PIN	Name	PIN	Name	
45	INSPD	**	INSPD	L7S : Additional allocation
	INPOS	45	INPOS	
44	BRAKE	44	BRAKE	
43	ZSPD	43	ZSPD	
42	TLOUT	-	-	L7S : Not use
41	RDY-	41	RDY-	
40	RDY+	40	RDY+	
39	ALARM-	39	ALARM-	
38	ALARM+	38	ALARM+	
25	GND24	24	GND24	
24	GND24	25	GND24	
		16	AL0	
		15	AL1	
		14	AL2	
		Allocation	TLMT	
		Allocation	VLMT	
		Allocation	INSPD	
		Allocation	WARN	

Note) ** is not allocated signal. You can allocate the signal by parameter setting

4.2.3 Analog input signals

VS		L7S	
PIN	Name	PIN	Name
27	SPDCOM	27	SPDCOM
1	TRQCOM	1	TRQCOM
8	GND	8	GND
		37	GND

4.2.4 Pulse train input signal

PIN	Name	PIN	Name
VS		L7S	

VS		L7S	
PIN	Name	PIN	Name
9	PF+	9	PF+
10	PF-	10	PF-
11	PR+	11	PR+
12	PR-	12	PR-
49	PULCOM	49	PULCOM

Note1) In accordance with Line drive, Open collector, check pulse train input

4.2.5 Encoder output signals

1) L7S drive basically does not provide Open collector

2) Open collector pulse output: When setting P0-17(Basic function bit) Digit3, 0->1, Open collector A, B, Z are output through AL0, AL1, AL2(output contact), (Output current : Under 40mA, Max frequency : 100KHz)

VS		L7S	
PIN	Name	PIN	Name
32	AO	32	AO
33	/AO	33	/AO
30	BO	30	BO
31	/BO	31	/BO
4	ZO	4	ZO
5	/ZO	5	/ZO
3	OPCZO		
36	GND		

4.2.6 Monitor output signals and output voltage

1) VS : Monitor output voltage : ±5V, L7S : Monitor output voltage : ±10V (Utilizing as 5V by analog scale)

VS : Pin no.34 (+15V), Pin no.35(-15V), L7S : ±12V (Different voltage output)

| VS		L7S		Remark
PIN	Name	PIN	Name	
28	MONIT1	28	MONIT1	L7S : -10~+10V
29	MONIT2	29	MONIT2	L7S : -10~+10V
37	GND	8/37	GND	
34	+15V	34	+12V	L7S : Changed voltage
35	-15V	35	-12V	L7S : Changed voltage

Note1) Please refer to Manual Chapter 1(Signals) for detail information of CN1 I/O Pin Map

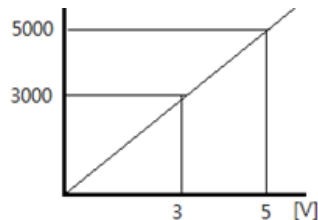Note2) Please refer to Manual Chapter 4 and explanation as below in accordance with monitor output

1) VS : Monitor output voltage : ±5V, L7S : Monitor output voltage : ±10V (Utilizing as 5V by analog scale)

Ex) APM-SB04ADK　　　Max speed(5000rpm)

<VS monitor output: ±5V>　　　<L7S monitor output: ±10V>
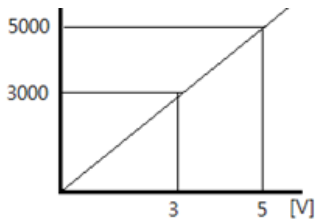
* L7S : To enter same output voltage as VS, Set DAC output sale value '1000' in P0-23

Set to 1000 P0-23 DAC output scale factor to provide the same input voltage as L7S side VS
That is to say) If setting value '1000', when reached at 1000rpm, as 1V is out, utilizing as 5V like VS

Note 3) When using analog voltage, refer to the table as below and refer to Chapter 3 on Manual for

detailed information.
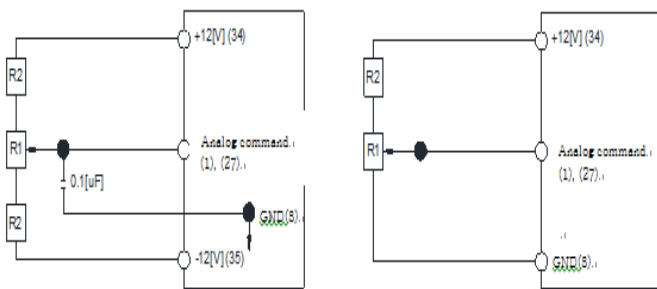
Selection	R1	R2
Selection 1	10K ohm	660 ohm
Selection 2	5K ohm	330 ohm
Selection 3	2K ohm	132 ohm

* Adjust voltage with Resistance because input voltage is ±10V

5. Setting value

5-1 Comparative table of Main parameters

1) L7S Single-turn serial encoder: Reading Motor ID, encoder type and encoder resolution automatically.

Input Pulse value in Incremental type (L7S), Input Bit value of Serial Singl-turn and Multi-turn(L7S)Ex) Inc 3000 → P0-01 : 3000,   Serial 19bit S-turn, Multi-turn → P0-01 : 19.

2) For Encoder Type setting in VS, standard mode value no '0' (A phase leads in CCW state), Value no '1' (B phase lead in CCW state), Value no '6' (Serial). In L7S, standard mode value no '0' (Inc), Value no '1' (Single-Turn), Value no '3' (Multi-Turn).

Note) Please refer to Manual Chapter 4 and explanation as below for detailed information

VS	L7S
[PE-201] Motor ID	[P0-00] Motor ID
[PE-203] Encoder Type	[P0-01] Encoder type
[PE-204] Encoder Pulse	[P0-02] Encoder Resolution
[PE-601] Operation Mode	[P0-03] Operation Mode

5-2 Setting parameters according to operation mode

According to operation mode, setting parameter comparison	VS	L7S
Speed operation setting parameter	[PE-601 ~ PE-611]	[P3-00 ~ P3-20]
Position operation setting parameter	[PE-701 ~ PE-711]	[P4-00 ~ P4-14]
Input/Output setting parameter	[PE-501 ~ PE-516]	[P2-00 ~ P2-22]
Control setting parameter	[PE-301 ~ PE-320]	[P1-00 ~ P1-27]

Note) Please refer to Manual Chapter for parameter setting according to operation mode

5-3. How to set parameters

Ex 1) The comparing of VS and L7S when setting encoder output scaling to 12000 from 600

- VS : When setting the value '2' in PE-510, The encoder output scaling is 6000.

- L7S : When setting the value '6000' in P0-14, The encoder output scaling is 6000.

Note1) The encoder scaling ratio setting in VS. The encoder scaling value setting in L7S

Note2) When setting encoder scaling value, you have to set in Servo off state.

Ex 2) Using external regenerative braking resistance

- If you use external regenerative resistance, Remove short pin between B and BI. And then, after setting parameters (P0-09~P0-11), connect the external regenerative resistance to B+, B

1) P0-09 : Regenerative overload derating [The overload alarm triggers quickly when the derating value is set to 100% or below]

2) P0-10 : Regenerative resistance value [external regenerative braking resistance setting, If set to 0, using the default resistance embedded in the drive]

3) P0-11 : Regenerative resistance capacity [Sets the capacity for the current regenerative resistance,   If set to 0, using the default resistance capacity embedded in the drive]

Note) Please refer to Manual Chapter 4 (Parameter) for detail information

5-4. The comparison of gain setting parameter

1) Inertia ratio is based on the no-load state. VS is expressed by times. L7S is expressed as a percentage.
   ex) VS : Increased by times at 2.0 times basis
   L7S : Increase by % at 100% basis.

Note) Please refer to Manual Chapter 4(Parameters) for detail information
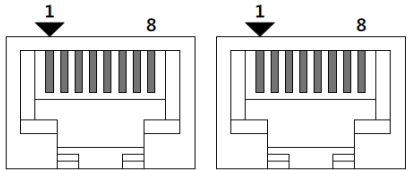
6. Communication Specifications
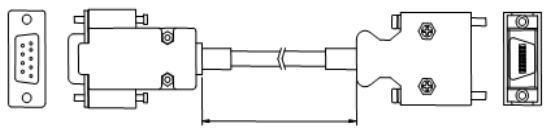
1) VS : RS-232 (Communication 485) Dedicated protocol of LS Mecapion.

2) L7S : RS-422 (Communication 485) Modbus-RTU

3) VS : To communication with PC, using with dedicated communication and download cable.

L7S : Using with mini USB cable

6-1. The comparison of communication specification.

Item		VS_ Specification	L7S_ Specification
Communication standard		RS-232C standard	ANSI/TIA/EIA-422
Communication protocol		Dedicated protocol (LS mecapion)	MODBUS-RTU
Data type	Data bit	8bit	8bit
	Stop bit	1bit	1bit
	Parity	None	None
Synchronous method		ASynchronous	ASynchronous
Transmission speed		9600/19200/38400/57600[bps] [PE-202] Possible to select	9600/19200/38400/57600[bps] [P0-04] Possible to select
Transmission distance		Max 15[M]	Max 200[M]
		Below 100[mA]	Below 100[mA]

6-2. Communication cable wiring diagram

1) Make sure to use Twist pair shield cable for communication cable

2) In the case of multi access connection in L7S, apply terminating resistance (120Ω) by connecting Pin 2 of the last drive to Pin (RXD-)
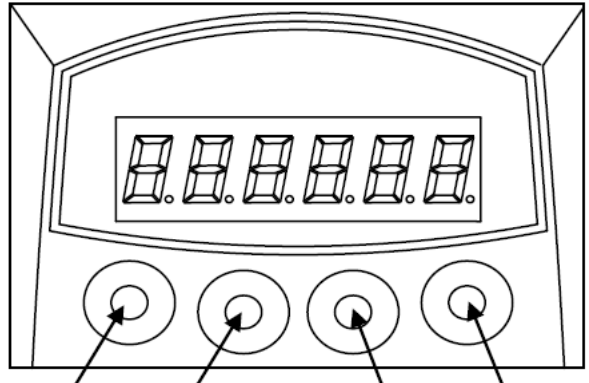
VS_Servo Drive	L7S_ Servo Drive
[PC- Serial Port] [Servo drive- CN3]	CN 3 CN 4

VS_Servo Drive

contents	PC-Serial Port	Servo drive-CN3
Connector name	HDEB-9S	10114-3000VE
Name of case	3600-09-G-L	10314-52A0-008
wiring	No. 2(RXD)	No. 6(TXD)
	No. 3(TXD)	No. 5(RXD)
	No. 5(GND)	No. 11,12(GND)
	Do not connect	Case(Shield)
Cable length	1,2,3,5[m]	

L7S_ Servo Drive

Pin Number	Pin Function
1	Not for use.
2	Terminating resistance connection note 1)
3	RXD+
4	TXD-
5	TXD+
6	RXD-
7	Not for use.
8	GND

Note) The TXD and RXD in the above table are based on the servo drive. Please refer to Manual Chapter 4 for detail information

7. Appendix

7-1. How to operate loader

VS	L7S

VS

Move Menu

- Editing Menu

- Shift to the menu for editing in the same method of ①
- After above, press[Enter] Key, then data of menu is displayed "13"

  And, the last digit is blinking ; you can change the value where blink is located.
- For moving the blinking position, press [Left] or [Right].
- For changing value, press [Up] Key, then value is increased. At this time, the numerical value turns back to "0" when it exceeds "9".
- When editing is completed, press [Enter] Key, then value is saved and return to menu.
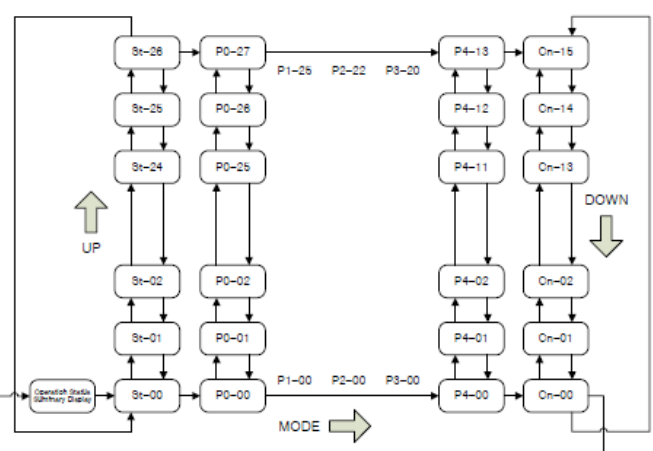
L7S

Display 5-digit FND data.

Digit 5 Digit 4 Digit 3 Digit 2 Digit 1

Displays the decimal point.

E.g.) 123.4

In the case of 16 bits, the minus symbol is used.
In the case of 32 bits, a dot is used.

E.g.) -123.4

[MODE]: Change display mode.
[/LEFT]: Move to another data digit.
[UP]: Increase displayed data.
[DOWN]: Decrease displayed data.
[SET]: Confirm displayed data.
[/RIGHT]: Move to another data digit.

Example of changing speed control mode to position control mode ([P0-03]: 00001 -> 00002)

Order	Loader Displays	Keys to Use	What to Do
1	5⁻. bb		Displays the speed control mode with main power and control power permitted.
2	P0-00		Press [MODE] to move to [P0-00].
3	P0-03		Press [UP] or [DOWN] to move to [P0-03].
4	00001		Press [SET] to go to the parameter edit window. The parameter is displayed as 00001.
5	00002		Press [UP] or [DOWN] at the blinking cursor to change the number to 00002.
6	00002		Press and hold [SET] for approximately one second. After two flickers, the number will be saved as 00002 in the parameter.
7	P0-03		Press and hold [MODE] for approximately one second to return to the P0-03 parameter.
8	P⁻.bb		Press [MODE] to change status to position operation [P= bb] status which is the summary display of the current status.

NOTE 1)   indicates flickering.
NOTE 2)   If you hold down [UP] / [DOWN] at the current cursor in the parameter window, the number continues to increase/decrease.

7-2. Parameters comparative table

1) Operation Status Display Parameter

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Status Menu	[Pd-001]Current State	[St-00] Oparation Status	
	[Pd-002]Current Speed	[St-01] Current Speed	
	[Pd-003]Command Speed	[St-02] Command Speed	
	[Pd-004]Current Pulse	[St-03] Feadback Pulse	
	[Pd-005]Feedback Pulse	[St-04] Command Pulse	
	[Pd-006]Pulse Error	[St-05] Pulse Error	
	[Pd-007]E-Gear N0	Not supported in L7S	
	[Pd-008]Command Torque	[St-08] Command Torque	
	[Pd-009]Torque Limit	[St-11] Torque Limit [St-27] Analog Tq CMD	
	[Pd-010]Current Load	[St-07] Current Torque	
	[Pd-011]Average Load	Not supported in L7S	
	[Pd-012]Maximum Load	[St-10] Maximum Load	
	[Pd-013]DC Link Voltage	[St-12] DC Link Voltage	
	[Pd-014]I/O SET	[St-14] Input Status [St-15] Output Status	
	[Pd-015]Input EXT SET	[St-14] Input Status	
	[Pd-016]I/O State	[St-14] Input Status	
	[Pd-017]Input Logic Set	Not supported in L7S	This parameter is supported in communication address (No another table)
	[Pd-018]Input Logic Save	Not supported in L7S	This parameter is supported in communication address (No another table)
	[Pd-019]Alarm bit	Not supported in L7S	This parameter is supported in communication address.(No another table)
	[Pd-020]Software Version	[St-25] Software Version	

2) Alarm parameters

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Alarm Menu	[PA-101]Alarm History01 ~ [PA-120]Alarm History20	[Cn-03] Alarm history read	

3) System Setting Parameter

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
System Menu	[PE-201] Motor ID	[P0-00] Motor ID	
	[PE-202] Baud Rate Set	[P0-04] RS422 BoudRate	
	[PE-203] Encoder Type	[P0-01] Encoder type	

	[PE-204] Encoder Pulse	[P0-02] Encoder Resolution	
	[PE-205] CCW TRQ Limit[%]	[P1-13] Positive Torque Limit	
	[PE-206] CW TRQ Limit[%]	[P1-14] Negative Torque Limit	
	[PE-207] System ID	[P0-05] System ID	
	[PE-208] System Group ID	Not supported in L7S	
	[PE-209] Start Menu No.	[P0-08] Start Up Parameter	

4) Parameter setting related control

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Control Menu	[PE-301] Inertia Ratio	[P1-00] Inertia Ratio	
	[PE-302] Position P Gain	[P1-01] Position P Gain 1	
	[PE-303] Position P Gain2	[P1-02] Position P Gain 2	
	[PE-304] P Feedforward[%]	[P1-04] Pos.Feedforward Gain	
	[PE-305] P FF FLT TC[ms]	[P1-05] Pos.FeedForward Time Constant	
	[PE-306] P CMD FLT TC[ms]	[P1-03] Pos.Command Filter Time Constant	
	[PE-307] Speed P Gain	[P1-06] Speed P Gain 1	
	[PE-308] Speed P Gain2	[P1-07] Speed P Gain 2	
	[PE-309] Speed I TC [ms]	[P1-08] Speed Time Conatant 1	
	[PE-310] Speed I TC2[ms]	[P1-09] Speed Time Constant 2	
	[PE-311] Speed IN FT[ms]	[P1-10] Speed Command Filter Time Constant	
	[PE-312] Speed FB FT[ms]	[P1-11] Speed feedback Filter Time Constant	
	[PE-313] Zero Speed Gain	Not supported in L7S	
	[PE-314] TORQ. CMD FT[ms]	[P1-12] Torque Command Filter Time Constant	
	[PE-315] DE-RESONANCE	[P1-17] Notch Filter Use	
	[PE-316] Notch Frequency	[P1-18] Notch Frequency	
	[PE-317] Notch BandWidth	[P1-19] Notch Bandwidth	
	[PE-318] Overload Offset	[P0-12] Overload Check Base	
	[PE-319] Speed P Control	Not supported in L7S	
	[PE-320] Zero Speed Lock	[P0-17] Function Select Bit	

5) Parameter setting related analog

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Analog Menu	[PE-401] Analog Spd[RPM]	[P2-17] Analog Speed Command Scale	
	[PE-402] Speed Offset[mV]	[P2-18] Analog Speed Command Offset	
	[PE-403] SClamp Mode	Not supported in L7S	[P2-19] Zero Speed Clamp Voltage. In L7S, it is automatically activated
	[PE-404] SClamp VOLT[mV]	[P2-19] Zero Speed Clamp Voltage	
	[PE-405] Speed Override	Not supported in L7S	

	[PE-406] Analog Torque	[P2-20] Analog Torque Command Scale	
	[PE-407] Torq Offset[mv]	[P2-21] Analog Torque Command Offset	
	[PE-408] TClamp Mode	Not supported in L7S	[P2-22] Zero Torque Clamp Voltage : In L7S, it is automatically activated
	[PE-409] TClamp VOLT[mV]	[P2-22] Zero Torque Clamp Voltage	
	[PE-410] Monitor Type1	[P0-18] DAC Mode	
	[PE-411] Monitor Mode1	[P0-17] Function Select Bit	
	[PE-412] Monitor Scale1	[P0-23] DAC Scale 1	
	[PE-413] Monitor offset1	[P0-19] DAC Offset 1	
	[PE-414] Monitor Type2	[P0-18] DAC Mode	
	[PE-415] Monitor Mode2	[P0-17] Function Select Bit	
	[PE-416] Monitor Scale2	[P0-24] DAC Scale 2	
	[PE-417] Monitor offset2	[P0-20] DAC Offset 2	
	[PE-418] Torque Com Dir	[P0-17] Function Select Bit	

6) Input/Output Setting Parameter

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
InOut Menu	[PE-501] InPosition[PLS]	[P2-11] In Position Range	
	[PE-502] Follow ERR[PLS]	[P4-11] Following Error Range	
	[PE-503] 0 Speed RNG[rpm]	[P2-12] Zero Speed Range	
	[PE-504] Inspeed[rpm]	[P2-13] In Speed Range	
	[PE-505] Brake SPD[rpm]	[P2-14] Brake Output Speed	
	[PE-506] Brake Time[ms]	[P2-15] Brake Output Delay Time	
	[PE-507] PowerFail Mode	[P0-06] Power Fail Mode	
	[PE-508] DB Control	[P0-16] DB Control Mode	
	[PE-509] Pulse Clear Mode	[P2-16] PCLR Mode	
	[PE-510] Pulse Out Rate	[P0-14] Pules Out Per, Rotate	
	[PE-512] Emergency Reset	Not supported in L7S	. When input EMG, W-80 occurs. When reset EMG, The alarm is cleared.
	[PE-513] RB Time Set	[P0-09] Regeneraion Derating	
	[PE-514] Dir Select Mode	Not supported in L7S	
	[PE-515] Output Logic	[P2-10] Output Logic Set	
	[PE-516] PWM OFF DELAY	[P0-15] PWM OFF Delay	
	[PE-517] Gain2 Sel Mode	Not supported in L7S	Both GAIN2 and ABS_RST have input contact
	[PE-519] Zero Spd Gain[%]	Not supported in L7S	
	[PE-520] Gain Conv Mode	[P1-15]Gain Conversion Mode	

7) Speed Operation Setting Parameter

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Speed Operation Menu	[PE-601] Operation Mode	[P0-03] Operation Mode	
	[PE-602] Speed Command1	[P3-00] Speed Command 1	
	[PE-603] Speed Command2	[P3-01] Speed Command 2	
	[PE-604] Speed Command3	[P3-02] Speed Command 3	

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
	[PE-605] Speed Command4	[P3-03] Speed Command 4	
	[PE-606] Speed Command5	[P3-04] Speed Command 5	
	[PE-607] Speed Command6	[P3-05] Speed Command 6	
	[PE-608] Speed Command7	[P3-06] Speed Command 7	
	[PE-609] Accel Time[ms]	[P3-08] Speed Command Acc. Time	
	[PE-610] Decel Time[ms]	[P3-09] Speed Command Dec. Time	
	[PE-611] S TYPE Control	[P3-10] Speed Command S-Curve Time [P3-11] Acc.Dec. Pattern	
	[PE-612] Test Run Speed0	[P3-13] Program Jog Speed 1	
	[PE-613] Test Run Speed1	[P3-14] Program Jog Speed 2	
	[PE-614] Test Run Speed2	[P3-15] Program Jog Speed 3	
	[PE-615] Test Run Speed3	[P3-16] Program Jog Speed 4	
	[PE-616] Test Run Time0	[P3-17] Program Jog Time 1	
	[PE-617] Test Run Time1	[P3-18] Program Jog Time 2	
	[PE-618] Test Run Time2	[P3-19] Program Jog Time 3	
	[PE-619] Test Run Time3	[P3-20] Program Jog Time 4	

8) Position Operation Setting Parameter

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Pulse Operation Menu	[PE-701] Pulse Logic	[P4-00] Pulse Input Logic	
	[PE-702] Electric gear N0	[P4-01] Electric Gear Numerator 1	
	[PE-703] Electric gear D0	[P4-05] Electric Gear Denominator 1	
	[PE-704] Electric gear N1	[P4-02] Electric Gear Numerator 2	
	[PE-705] Electric gear D1	[P4-06] Electric Gear Denominator 2	
	[PE-706] Electric gear N2	[P4-03] Electric Gear Numerator 3	
	[PE-707] Electric gear D2	[P4-07] Electric Gear Denominator 3	
	[PE-708] Electric gear N3	[P4-04] Electric Gear Numerator 4	
	[PE-709] Electric gear D3	[P4-08] Electric Gear Denominator 4	
	[PE-710] Backlash	[P4-13] Backlash Compensation	
	[PE-711] Elec gear mode	[P4-09] Electric Gear Mode	
	[PE-712] Elec gear offset	[P4-10] Erectric Gear Num. Offset	
	[PE-713] Pulse direction	[P0-17] Function Select Bit	
	[PE-719] ABS Multi Turn	[St-18] Multi Turn Data	
	[PE-720] ABS Single Turn	[St-16] Single Turn Data	

9) Operation handling parameters

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
Command Menu	[PC-801]Alarm Reset	[Cn-02] Alarm reset	
	[PC-802]Alarm His Clear	[Cn-04] Alarm history clear	

	[PC-803]Manual Test Run	[Cn-00] Manual JOG operation	
	[PC-804]Auto Test Run	[Cn-01] Program JOG operation	
	[PC-805]Gain Tune Run	[Cn-05] Auto gain tuning [P1-20] Auto Gain Tuning Speed	
	[PC-806]Z POS Search	[Cn-06] Z search	
	[PC-807]IN Logic Set	[P2-08] Input Logic Set 1 [P2-09] Input Logic Set 2	
	[PC-808]EXT Input Set	[Cn-07] Input contact forced ON/OFF	
	[PC-809]Menu date Init	[Cn-09] Parameter initialization	
	[PC-810]Menu date Lock	[Cn-16] Parameter lock	
	[PC-811]ABS Encoder set	[Cn-14] Absolute encoder reset	
	[PC-812]Current Offset	[Cn-17] Current offset [St-23] U Phase Current Offset [St-24] V Phase Current Offset	
	[PC-815]Peak Load	[Cn-15] Max load clear	
	[PC-816]Feedback pulse	Not supported in L7S	

10) Functions added to L7S

Menu summary (Standard VS)	VS (PARAMETER)	L7S (PARAMETER)	Remark
The functions added to L7S	Not supported functions in VS	[St-06] Input Pulse Frequency	
		[St-09] Accumulated OverLoad Rate	
		[St-13] Regeneration Overload	
		[St-17] Single Turn Data(Degree)	
		[St-19] Room Temperrature	
		[St-26] FPGA Version	
		[P0-07] RST checking time[ms]	
		[P0-10] Regeneraion Brake Resistor	
		[P0-11] Regeneraion Brake Capacity	
		[P0-13] Overload Warning Level	
		[P0-26] Encoder Function Bit	
		[P1-16] Gain Conversion Time	
		[P1-21] Auto Gain Tuning Distance	
		[P1-22] Velocity Limit Switch (Torque Control)	
		[P1-23] Velocity Limit Value (P Control Conversion)	
		[P1-24] Torque Switch Value (P Control Conversion)	
		[P1-25] Speed Switch Value (P Control Conversion)	
		[P1-26] Acc.Switch Value (P Controrl Conversion)	
		[P1-27] Pos.Error Switch Value (P Control Conversion)	
		[P2-00] Input Port Define 1	
		[P2-01] Input Port Define 2	
		[P2-02] Input Port Define 3	

		[P2-03] Input Port Define 4	
		[P2-04] Input Port Define 5	
		[P2-05] Output Port Define 1	
		[P2-06] Output Port Define 2	
		[P2-07] Output Port Define 3	
		[P3-07] Zsearch Operation Speed	
		[P3-12] JOG Operation Speed	
		[P4-12] Position Limit Pulse Clear	
		[P4-14] Pulse Input Filter	
		[Cn-08] Output contacted forced ON/OFF	
		[Cn-10] Auto speed command offset correction	
		[Cn-11] Auto torque command offset correction	
		[Cn-12] Manual speed command offset correction	
		[Cn-13] Manual torque command offset correction	

7-3. Summary

1. Selection

1) Rated current of L7S is lower than VS, there is a possibility that the existing applied motor has not been mixed, you will need to make sure that

2) In the case of APD-VSR5~04, Main power and control power is integrated. But, In the case of L7S drive, main power and control power is separated for the stabilization of the control characteristics

3) Regenerative braking resistor case of L7S is the basic built in up to 5KW

2. Product features

1) Although drive size is generally smaller, In the case of 100W~400W of L7S, please make sure to consider of cable fastening part because 100W~400W of L7S drive is able to be restricted by cable fastening part.

3. Cables

- **CN1 cable**

    1) using same cable (VS drive and L7S drive)

- **Encoder cable**

    1) The encoder cable is not compatible because it was changed into 14PIN from 20PIN

      Note) Purchase CN2 Connector(APC-CN3NNA) and then change connector to use

- **Power (Power & Encoder)**

1) Main Power : 3 phase AC 220~230[V](-15~10%), 50~60Hz

2) Control Power : Single phase AC 200~230[V](-15~10%), 50~60Hz

4. The comparison of I/O

- **Input contacts**

  1) VS : Input contact no.13 Pin(PCON), L7S : Not use the Input contact

  2) VS : Pin no 14~16(Input contacts : Gain2, PCLEAR,TLIMIT), L7S : Pin no 14~16 (Output contact AL0~AL2)

  3) Bi-photocoupler is used in input contact. Therefore, users can use any polarity

- **Output contacts**

  VS : Output contact Pin no.42(TLOUT), L7S : Not use the output contact

- **Monitor output signal and output voltage**

  1) VS : Monitor output voltage : ±5V, L7S : Monitor output voltage : ±10V (Utilizing as 5V by analog scale)

  2) VS : Pin no.34 (+15V), Pin no.35(-15V), L7S : ±12V