DATA SHEET

PLC Option

SV-iS7 Series

- When using LSIS equipment, thoroughly read this datasheet and associated manuals introduced in this datasheet. Also pay careful attention to safety and handle the module properly.
- Store this datasheet in a safe place so that you can take it out and read it whenever necessary.

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Safety Precautions

- Safety Precautions are for using the product safe and correct in order to prevent the accidents and danger, so please go by them.
- The precautions explained here only apply to the iS7 PLC Option. For safety precautions, refer to the iS7 user's manual.
- The precautions are divided into 2 sections, 'Warning' and 'Caution'. Each of the meanings is represented as follows.

Warning If violated instructions, it can cause death, fatal injury or considerable loss of property.

Caution If violated instructions, it can cause a slight injury or slight loss of products

- The symbols indicated in the PLC and datasheet mean as follows

This symbol means pay attention because of danger of injury, fire or malfunction.

This symbol means paying attention because of danger of electric shock.

- Store this datasheet in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

Warning

- **Do not contact the terminals while the power is applied.**
It can cause electric shock and malfunction.

- **Protect the product from being gone into by foreign metallic matter.**
It can cause fire, electric shock and malfunction.

Caution

- **Be sure to check the rated voltage and terminal arrangement for the module and observe them correctly.**
It can cause fire, electric shock and malfunction.

- **Tighten up the terminal screw firmly to defined torque when wiring.**
If the terminal screw looses, it can cause fire and electric shock.

- **Do not install around inflammable substances.**
It can cause fire.

- **Use in an environment that meets the general specifications contained in this datasheet.**
It can cause electrical shock, fire, erroneous operation and deterioration.

- **Be sure that external load does not exceed the rating of output module.**
It can cause fire and erroneous operation.

- **Do not use in the environment of direct vibration**
It can cause electrical shock, fire and erroneous operation.

- **Do not disassemble, repair or modify except A/S specialist.**
It can cause electrical shock, fire and erroneous operation.

- **When disposing, treat it as industrial waste.**
It can cause poisonous pollution or explosion.

Precautions for use

- This option card is for SV-iS7 only. Don't install it to any other device than SV-iS7.
- When using the product, use the inverter with grounded. For the method of GND, please refer to the instruction manual of inverter body.
- Be sure to connect inverter and option card exactly. For the method of connection,
Please refer to '6. How to install option in this instruction manual.
- Do not separating or remodeling the PCB of Option card.
- Turn off when install or uninstall the option.
- Use Mobile or Radio telegraph at 30cm away from the product.
- Input/output signal or communication wire should be 100mm away from high voltage cable or power line.

▸ Before handling the product

Before using the product, read the datasheet and the User's manual through to the end carefully in order to use the product efficiently.

Name	Item Code
KGLWIN User's Manual	10310000294
MASTER-K Instruction User's Manual	10310000271
IS7 PLC Option User's Manual	10310000904

* IS7 PLC option is supported in KGLWIN version 3.5 only.
* You can download each manual from http://www.lsis.biz.

1. Introduction

This data sheet provides brief information about usage of IS7 PLC option.

2. General Specifications

The following describes the general specification about IS7 PLC option.

No	Item	Specifications				Standard
1	Operating temperature	0 ~ 55℃ (32 ~ 131°F)				
2	Storage temperature	-25 ~ 70℃ (-13 ~ 158°F)				
3	Operating Humidity	5 ~ 95%RH, non-condensing				
4	Storage humidity	5 ~ 95%RH, non-condensing				
5	Vibration	Occasional vibration				IEC61131-2
		Frequency	Acceleration	Amplitude	Sweep count	
		10≤f＜57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
		57 ≤f≤150 Hz	9.8 ㎨ {1G}	-		
		Continuous vibration				
		Frequency	Acceleration	Amplitude		
		10≤f＜57 Hz	-	0.035 mm		
		57≤f≤150 Hz	4.9 ㎨{0.5G}	-		
6	Shocks	* Maximum shock acceleration: 147 ㎨ {15G} * Duration time :11 ms * Pulse wave: half sine wave pulse (3 times in each of X, Y and Z directions)				IEC61131-2
7	Noise immunity	Square wave impulse noise	±1,500 V			LSIS internal Standard
		Electrostatic discharge	Voltage :4kV(contact discharge)			IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m			IEC61131-2 IEC61000-4-3
		Fast transient & Burst noise	Severity Level	All power modules	Digital / Analog Input / Communication Interface	IEC61131-2 IEC61000-4-4
			Voltage	2 kV	1 kV	
8	Atmosphere	Free from corrosive gases and excessive dust				
9	Altitude for use	Up to 2,000m				
10	Pollution degree	2 or lower				
11	Cooling method	Self-cooling				

3. Performance Specifications

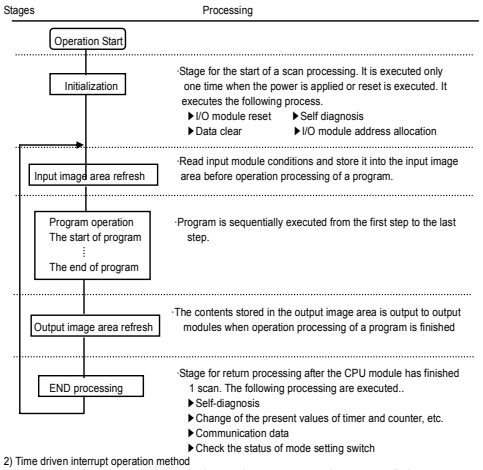
The performance specifications for IS7 PLC option are as follows.

Item		Specification(Economic Type)	Remark
Operating method		Cyclic operation of stored program Interrupt task operation	
I/O Control Method		Scan synchronized batch processing method (Refresh method) Direct method by instruction	
Program language		Ladder Diagram, Instruction List	
Number of Instruction	Basic	29	
	App.	223	
Processing Time		Basic Instruction : 0.4 ㎲/Step	
Program memory Cap.		2kstep	
I/O points		Digital Input 6 / Digital Output(Relay) 4	
Data Area	P	P000 ~ P0005 (External Input) P0040 ~ P0043 (External Output)	I/O Relay
	M	M000 ~ M191F	Internal Relay
	K	K000 ~ K31F	Keep Relay
	L	L000 ~ L63F	Link Relay
	F	F000 ~F63F	Special Relay
	T	100ms : T000 ~ T191(192) 10ms : T192 ~ T250(59) 1ms : T251 ~ T255(5) Adjustable boundary area by parameter setting	Timer
	C	C000 ~ C255	Counter
	S	S00.00 ~ S99.99	Step Relay
	D	D0000 ~ D4999	Data Register
Operating Mode		RUN, STOP, PAUSE	

Self-diagnostic functions	Watch dog timer, memory error detection, I/O error Detection, etc	
Memory backup at power down	In the case of the installation of mercury cell(CR2032), the latch or RTC area setting by basic parameter.	
PID Control Function	Function block control, auto tuning, PWM, auto tuning by PWM, forced output, adjustable operation scan-time, Anti-windup, SV-Ramp,	
RS485 Function	MODBUS protocol support	
External Interrupt	6	
Input filter	0 ~ 1000 ms (setting by basic parameter)	
RTC	year/month/day/hour/minute/second setting by using KGLWIN	

4. Operation Processing Method

1) Cyclic operation
A PLC program is sequentially executed from the first step to the last step, which is called scan. This sequential processing is called cyclic operation. Cyclic operation of the PLC continues as long as conditions do not change for interrupt processing during program execution.

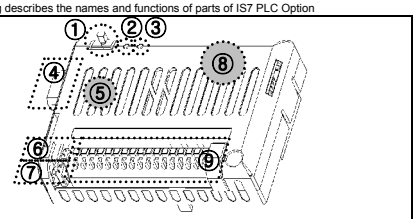


2) Time driven interrupt operation method
In time driven interrupt operation method, operations are processed not repeatedly but at every preset interval. In the GM6 CPU module, interval can be set to between 0.01 ~ 4294967.29 second. This operation is used to process operation with a constant cycle

3) Event driven interrupt operation method
If a situation occurs which is requested to be urgently processed during execution of a PLC program, this operation method processes immediately the operation which corresponds to interrupt program. The signal which informs those urgent conditions to the CPU module is called interrupt signal. The GM6 CPU module has two kinds of interrupt operation methods, which are internal and external interrupt signal methods.

5. Parts Name and Descriptions

The following describes the names and functions of parts of IS7 PLC Option



No.	Name		Function
①	SW1	Mode setting switch	1) RUN : Program operation is executed. 2) PAU/REM : PAUSE : Program operation is temporarily stopped. REMOTE: Used for the remote operation 3)STOP : Program operation is temporarily stopped.
②	LED1	RUN LED	Indicates the operating status of basic unit • On: When the basic unit operates with the mode setting switch in the local or remote RUN. • Off : When the following occurs - the voltage is not normally supplied to the CPU - the mode setting switch is in the stop - When detecting error that stops operation
③	LED2	ERR LED	Indicates the operating status of basic units •Flicker: When detecting error by self-diagnosis during operation • Off : When the CPU is normal state
④	CON1	RS232C connector	Connector for KGLWIN

No.	Name		Application	
⑤	J1	PLC OS Download Jumper	BM 5G NON	1) General Use Mode Jumper is set as default value from the factory. The default value as below can be changed by our company's A/S staff only. Please always maintain the following jumper settings as it is.
			BM 5G NON	2) User of internal software download mode cannot use this. Please enquire to our company's A/S center.
⑥	J3	NPN/PNP Selection Jumper	P N	1) NPN Mode: Connect terminal block input (P00~P05) and 24G.
			P N	2) PNP Mode: Connect terminal block input (P00~P05) and 24P.
⑦	J2	Terminating Select Jumper	1) ON: Select RS485 Communication Terminating Resistance (120ohm Resistance built in). 2) OFF: Not select RS485 Communication Terminating Resistance	
⑧	Battery	Battery Insert	1) Function : Maintain latch field data and RTC time data of PLC option when power is failed 2) Battery Type: Coin-type Lithium Ion Dry Battery (Specification: CR2032) 3) Duration : Maintain approx. 4 years with power off (Assuming normal temperature with 220mAh capacity)	
⑨	TB1	External Terminal Block	1: S+(RS485)	2: S-(RS485)
			3: 24G	4: terminal block input P00
			5: terminal block input P01	6: terminal block input P02
			7: terminal block input P03	8: terminal block input P04
			9: terminal block input P05	10: 24G
			11: 24P (24V output to outside)	-
			12: terminal block output P40	13: terminal block output P40C
			14: terminal block output P41	15: terminal block output P41C
			16: terminal block output P42	17: terminal block output P42C
			18: terminal block output P43	19: terminal block output P43C

6. Installation Method of Option

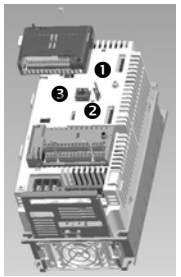
6.1 How to install option on the inverter body

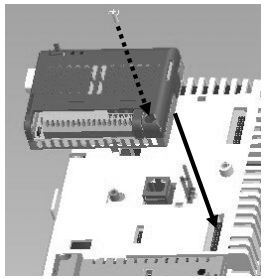
1) Turn Off power supply.

2) Remove the front cover of iS7, and then connect the connector as in the Figure as below.

3) Fasten it to the body using the screws enclosed.

4) Turn On the power of inverter, and check if PLC option is recognized in "CNF 31: Option-2 Type"





Caution

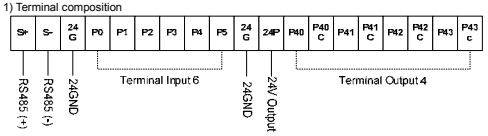
- **Don't install PLC options of Option 1 and Option 2 simultaneously.**
- **When using encoder option, be sure to connect it to Option 2 connector.**

Note

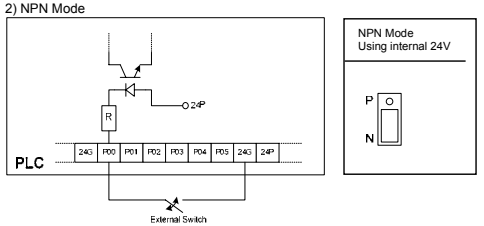
1) iS7 has three (3) connectors for option-use located at front upper part, front lower part and left side. They are divided into Option ❶ ❷ and ❸ as shown in the figure.
2) In case of PLC option, use it by connecting with Option ❶ connector.

7. Terminal Specification.

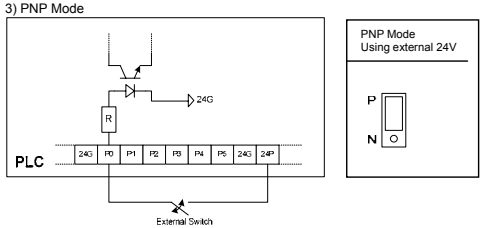
1) Terminal composition



2) NPN Mode



3) PNP Mode



8. Other Internal Functions

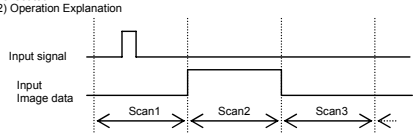
8.1 Pulse Catch Function

In the iS7 PLC Option, Pulse catch input contact points(P000 ~ P005) are built in. Through using this contact point, short pulse signal, min 150㎲, can be taken which can not be executed by general digital input.

1) Usage

When narrow width of pulse signal is input, a trouble occurs which can not be executed by general digital input, so the operation does not perform as user's intention. But in this case through pulse catch function even narrow interval of pulse signal as 10us Min. can be executed..

2) Operation Explanation



Step	Execution contents
Scan1	CPU senses input when pulse signal, min 150㎲, is input, then saves the status.
Scan 2	Used to turn on the region of input image.
Scan 3	Used to turn off the region of input image

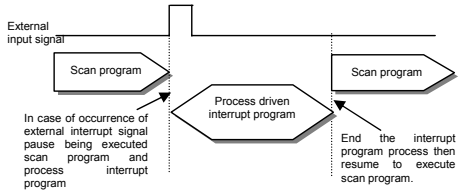
8.2 External interrupts function

IS7 PLC Option can perform max 6 points of external contact task by using basic input Without special interrupt module

1) Usage

This function is useful to execute a task program with high speed that has been set to an external input without reference to scan time

2) Operation Explanation



3) Function

- Maximum 6 points can be used to external interrupt input within P000~P005.
- Max, 6points of external contact point task are available to use. But the no. of them is decreased by using other task.(Time driven interrupt)

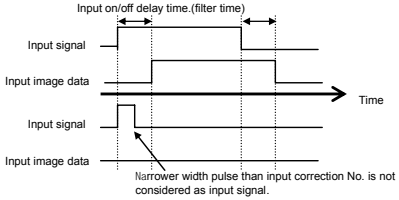
8.3 Input Filter Function

External input of IS7 PLC Option selects input correction number at the range of 0-1000ms of KGLWIN. Credibility secured system may be established by adjustment of input correction no. through using environment.

1) Usage

Input signal status affects to the credibility of system in where noise occurs frequently or pulse width of input signal affects as a crucial factor. In this case the user sets up the proper input on/off delay time, then the trouble by miss operation of input signal may be prevented because the signal which is shorter than set up value is not adopted

2) Operation Explanation



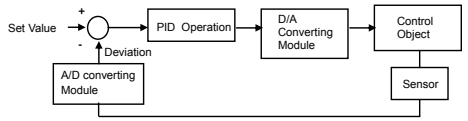
9. PID Control Function

9.1 The built-in PID control function outline

The chapter describes information about the built-in PID(Proportional Integral Derivative) function of IS7 PLC Option. (Max. 8 loops)

1) The characteristics of PID function of IS7 PLC Option as following

① The PID function is integrated into the CPU module. Therefore, all PID control action can be performed with instructions and parameter without any separated PID module.
② Velocity form and Positioning form are available.
③ P operation, PI operation, PID operation and On/Off operation can be selected easily..
④ The manual output (the user-defined forced output) is available.
⑤ By proper parameter setting, stable operation can be achieved regardless of external disturbance.
⑥ The operation scan time (the internal that PID controller gets a sampling data from actuator) is changeable for optimizing to the system characteristics.
⑦ PWM operation is supported
⑧ SV-Ramp, Delta-MV function is supported



PID Control system block diagram

2) Instruction for PID control

For the PID Operation of IS7 PLC Option, there are two instructions, as follows.

No.	Instruction	Function
1	PID8	Perform the PID operation
2	PID8AT	Perform the auto Tuning operation

10. MODBUS Communication Function

10.1 MODBUS Communication Function

In the iS7 inverter-use PLC option card with build-in communication function, Modbus that is the communication protocol of Modicon PLC is supported.
This supports the ASCII mode where communication is conducted using ASCII data and RTU mode using Hexa. data.
Function code used in the Mode Bus is supported by the function block. In this case 01, 02, 03, 04, 05, 06, 15, 16 are supported only out of function codes.
For further detail on protocol, please refer to 'Modicon Modbus Protocol Reference Guide'.

1) ASCII Mode

Carry out communication using ASCII data. Each frame uses ':(Colon) : H3A)', and CR LF(Carriage Return-Line Feed) : HOD HOA) at the tail.
It allows max. 1 sec.interval between characters. Check for the error using LRC.

* ASCII Mode Frame Structure

2) RTU Mode

Carry out communication using Hexa. data. There are no head and tail. It starts from Station Address, closing the frame with CRC
It has the interval of minimum 3.5 character time between frames. When it lapses 1.5 Character Time between characters, you may neglect the frame concerned. Check error using 16-bit CRC.

* RTU Mode Frame Structure

Note

1) For further communication function, please refer to the Chapter 8 'MODBUS Communication' in the instruction manual of iS7 PLC Option.

11. Special Function of Inverter

11.1 Summary of inverter's Special Function

Using the relevant special D register and inverter parameter, you may control the common area of the inverter, and thereby operating or monitoring the inverter.

* Table of iS7 inverter control/monitoring-use special D register

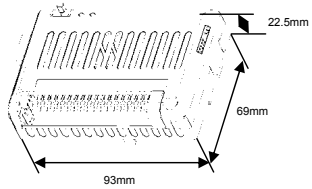
Division	Range	Detailed Function
Control	D4454	Register the address of the common field parameter (Max. 8) of APO60~67(PLC Wr Data 1~8) of inverter that is to be controlled by PLC option card using the digital loader of the inverter. The parameters of inverter that fall under these registered addresses (Max. 8) can be changed by writing the specific value in each PLC special field registers (D4454:APO60,D4455:APO61,D4456:APO62, D4457:APO63,D4458:APO64,D4459:APO65, D4460:APO66,D4461:APO67)
	D4455	
	D4456	
	D4457	
	D4458	
	D4459	
	D4460	
	D4461	
Monitoring	D4474	Register the address of the common field parameter (Max. 8) of the inverter that is to be read from PLC option card in APO76~83(PLC Rd Data 1~8) using the digital loader of the inverter. Read the parameter of the inverter that falls under these registered addresses (Max. 8) and then write PLC special field registers allotted to individual (D4474:APO76,D4475:APO77,D4476:APO78, D4477:APO79,D4478:APO80,D4479:APO81, D4480:APO82,D4481:APO83).
	D4475	
	D4476	
	D4477	
	D4478	
	D4479	
	D4480	
	D4481	
	D4490	iS7 inverter trip information -1
	D4491	iS7 inverter trip information -2
	D4492	iS7 inverter trip information -3
	D4493	iS7 inverter trip information -4

Note

1) For further functions in detail, please refer to 'Exclusive Function of Inverter', Chapter 7 in iS7 PLC Option Manual.

12. Dimension (mm)

* Option Size



13. Warranty

13.1 Warranty period

LSIS provides an 18-month-warranty from the date of the production.

13.2 Warranty conditions

For troubles within the warranty period, LSIS will replace or repair troubled Parts free of charge except the following cases.

(1) The trouble caused by improper condition, environment or treatment except the Instruction of LSIS
(2) The trouble caused by external devices
(3) The trouble caused by remodeling or repairing based on the user own description
(4) The trouble caused by improper usage of the product
(5) The trouble caused by the reason which exceeded the expectation from science and Technology level when LSIS manufactured the product
(6) The troubles caused by natural disaster

13.3 This warranty is limited to PLC option itself only. Use carefully considering safety With the application of inverter or whole system.