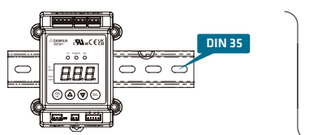
SANHUA

SEC6XX-R6 Series EEV Controller

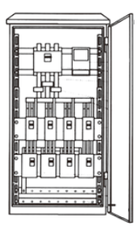
Installation Instructions

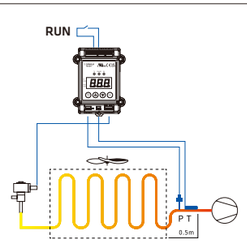
II-SEC61x-CN-R2404

1. Installation Notes



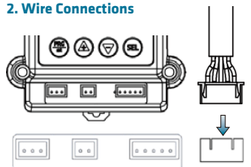
4x M4

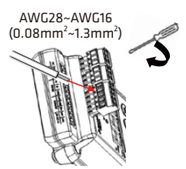




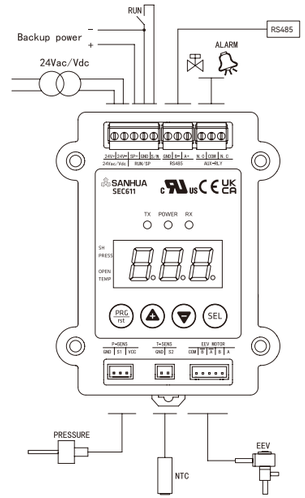
We recommend to install the temperature and pressure sensors within 0.5m from the evaporator to prevent ambient temperature and pressure drop interference for the superheat calculation.

2. Wire Connections





Type	Function	Label		Description	
Pluggable terminal	Power input, Backup power & Compressor Start/Stop signal	24Vac/Vdc	24V+	AC24V / DC24V+	
			24V-	AC24V / DC24V-	
		RUN/SP	SP+	The backup power port, connect with GND to form the backup power input	
			GND	GND, connect with SP+ or S/W	
			S/W	Compressor start/stop signal - RUN, passive switching signal, connected or disconnected synchronously with the compressor or other equivalent signals. It should be connected when you are in manual mode or drive mode	
	Communication	RS485	GND	GND	
			B-	TRX-(B)	
			A+	TRX+(A)	
	Auxiliary relay output	AUX-RLY	N.O	Normal Open contact	
			COM	Common	
			N.C	Normal Close contact	
XHP terminal	Pressure transmitter Voltage type: (0~20) bar; Current type: (-1~12) bar; If you choose other ranges, please set the maximum and minimum values in parameter table 2.	P-SENS	Vcc	Power	YCQB: +5V (SEC611) / YCQC: (10~30)Vdc (SEC612)
			S1	S1	YCQB: (0.5~3.5)V 或 (0.5~4.5)V (SEC611) / YCQC: (4~20)mA (SEC612)
			GND	GND	YCQB: GND (SEC611) / YCQC: N/A (SEC612)
	Temp. sensor	T-SENS	S2	Temp. sensor : NTC 5K (β=3970) or NTC 10K (β=3977) or NTC 10K (β=3435)	
			GND		
	EEV	EEV MOTOR	A		
			B		
			$\overline{A}$		
			$\overline{B}$		
			COM		

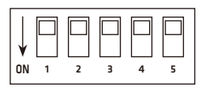


Safety Tips:

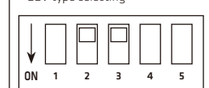
1. Do not turn on the power before completing the wiring, cut off the power before changing the wiring;
2. The RUN port (compressor signal) is a passive port. Adding a voltage may cause the controller burn out;
3. If backup power is used, please connect it to SP+ and GND according to the figure;
4. While selecting a transformer or switching power supply, ensure that the minimum power (for 1 controller + 1 expansion valve) is as follows:
   24Vdc 10W w/ DPF-TS/LPF valve and 13W w/ DPF(S03) valve;
   24Vac 15VA w/ DPF-TS/LPT valve and 19VA w/ DPF(S03) valve.

3. DIP SW Setting

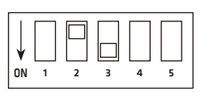
All DIP switches are OFF in default mode (suitable for most applications). There are 5 DIP switches, 2 and 3 are used as a group for selecting EEV type, 1 and 4 are used as a group for selecting controller operating mode. (No. 5 is reserved and not-functional with this model).



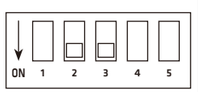
EEV type selecting



(Default mode)
DIP SW2: OFF, DIP SW3: OFF
1-2 phase excitation,
500 steps, 30pps



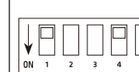
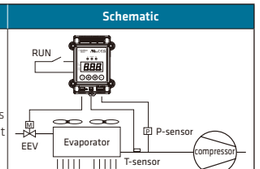
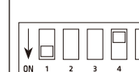
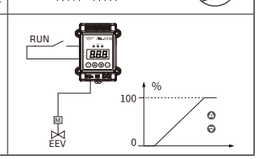
DIP SW2: OFF, DIP SW3: ON
2-2 phase excitation, 2000 steps, 100pps

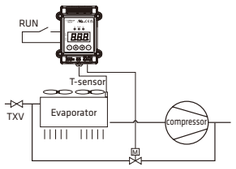
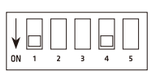
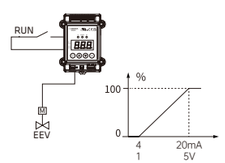
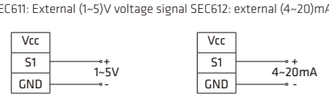


DIP SW2: ON, DIP SW3: ON
Custom mode, set by parameter table 3

Control method selecting

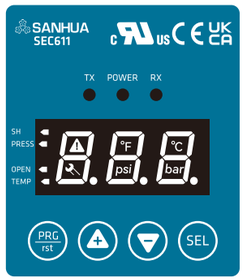
Control method determined by the DIP SW1, 4

DIP SW position	Description	Schematic
	**Automatic Superheat Control (Default mode)** - DIP SW1: OFF, DIP SW4: OFF - Collect evaporator outlet pressure and temperature signals to calculate the suction superheat and then to control the opening of the electronic expansion valve.	
	**Manual Operation** - DIP SW1: ON, DIP SW4: OFF - Press button to directly control the valve opening ratio.	

DIP SW position	Description	Schematic
	**Temperature Control Mode** - DIP SW 1:OFF, DIP SW 4:ON The opening of the electronic expansion valve is controlled by temperature, when the parameter [Temperature Control Mode] is is set to 0: hot gas bypass (default), once the current temperature is higher than the target temperature, valve will be in closing direction, and vice versa be opened. When the parameter [Temperature Control Mode] is set to 1: Liquid injection cooling, the current temperature is higher than the target temperature valve will be opened, and vice versa be closed.	
	**Drive Mode** - DIP SW 1:ON, DIP SW 4:ON Parameter [485 Communication control opening] 1, Set to -1, the external analog signal drive mode, through the external analog signal (1~5)V or (4~20)mA to drive the valve in percentage. 2, set to any other value than -1, it is RS485 control opening mode, set 0~1000 to control the valve opening from 0%~100%	
SEC611: External (1~5)V voltage signal SEC612: external (4~20)mA current signal  Analog signal wiring mode: In drive mode, pressure transmitter is not installed, and the analog signal wire is connected to the pressure transmitter port.		

Note: While using the above modes, please keep the compressor start/stop signal RUN connected.

4. Buttons and operation



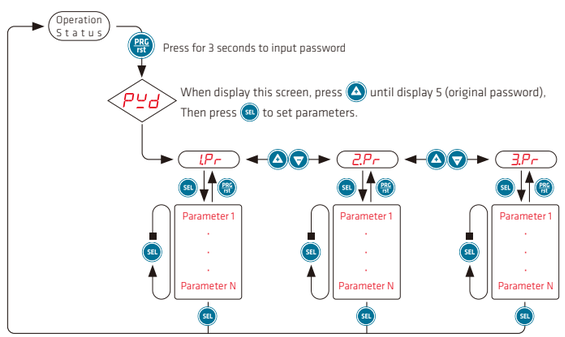
LED	Description
SH	Display current superheat
PRESS	Display pressure sensor value
OPEN	Display current EEV opening (%)
TEMP	Display temperature sensor value
°C /bar	A metric unit of temperature/pressure
°F /psi	A Imperial unit of temperature/pressure
▲	Lighting while alarming
🔧	Flickering with forced open valve ratio
POWER	Lighting at power up
TX，RX	Flickering at communication

Press button to switch the display on screen among superheat/pressure/valve opening/temperature (current display is indicated by the cursor pointer).

PRG Enter the parameter setting interface / return parameter list

Switch screen display parameters, increase/decrease value of parameters

SEL Confirm key, parameter switch in parameter table, long press to save parameter



a. During operating status, long press PRG for more than 3s, enter parameter setting mode;
b. When screen show PWd, press until screen display 5 (original password ,you forget the password you can use the alternate password 913 to enter the), then press SEL enter parameters table list;
c. 1Pr means parameters table1, press can select 2Pr or 3Pr (switching parameter table);
d. After selected parameters table, press SEL enter the table, if you want to switch other parameter tables, press PRG return to the parameter table select list;
e. In parameters table, screen will directly display the parameter code, press SEL to switch the code in parameters table;
f. When the screen displays the parameter code you want to modify, press to modify parameters directly, and press SEL to next parameter or press PRG return to the parameter table select list;
g. After finishing the modification, long press SEL for 3s to save all settings and return to the operating interface.

5.Main parameter setting

5.1 Refrigerant selection

Refrigerant setting is in 2.Pr , pree SEL toswitch the parameter and find rFG.

Add.	Code	Description	Default	Range
40062	rFG	Refrigerant	12（R449A）	-1~35

Now 36 different refrigerants are available in the controller as below:

NO.	Refrigerant	NO.	Refrigerant	NO.	Refrigerant	NO.	Refrigerant	NO.	Refrigerant
-1(OFF)	Custom	7	R1234yf	15	R744A(N_2O)	23	R407H	31	R1270
0	R22	8	R290	16	R32	24	R454C	32	R1233zd(E)
1	R404A	9	R450A	17	R245fa	25	R455A	33	R1234ze(Z)
2	R410A	10	R513A	18	R23	26	R454B	34	R452C
3	R134a	11	R448A	19	R407A	27	R452B	35	R457A
4	R407C	12	R449A	20	R407F	28	R600a		
5	R507	13	R452A	21	R124	29	R600		
6	R1234ze(E)	14	R744(CO_2)	22	R717	30	R454A		

5.2 Target superheat setting or target temperature setting

Target superheat setting or target temperature setting is in 1.Pr , press SEL to switch the parameter and find SH.

Add.	Code	Description	Default	Unit	Range	Remark
40001	SH	Target superheat	M:6.0 US:10.8	K	M:0.5~30.0 US:0.9~54.0	Superheat automatic control
		Target temperature	M:6.0 US:10.8	M:°C US: °F	M:-50~150 US:-58~302	Temperature control mode

If the target SH is too low, it may result in incomplete refrigerant evaporation; If the target value is too high, the evaporator energy efficiency will be very low.

5.3 Start opening ratio and duration time

You can find it in 1.Pr

Add.	Code	Description	Default	Unit	Range
40003	bir	Start opening ratio	40	%	0~100
40004	Sdt	Start opening ratio duration time	10	S	0~999

1) After powering on, the electronic expansion valve returns to the fully closed position. Once the compressor start/stop signal (RUN) is connected, the controller will firstly open the electronic expansion valve to the start opening ratio and maintain this opening for start open ratio duration time. After that, the controller will adjust the valve according to the selected control mode.
2) Once the controller is set to the forced valve opening ratio for the expansion valve (40073, default -1 for closed state), after the start open ratio duration time is reached, the controller will forcibly open the electronic expansion valve to the set value of 40073 and keep it unchanged. It has higher priority than the set values of 40036, 40070, 40071, and the valve opening control under various alarm modes.
3) Start opening ratio and Start opening ratio duration time are not working in manual mode and drive mode.

5.4 Auxiliary relay output (AUX-RLY, normally open or normally closed port is optional)

1) Alarm output (default state, 40025 value is -1).
2) Pump down function (used for low-pressure cut-off)：If 40025 value is not -1, pump down function is ON

Add.	Code	Description	Default
40025	Pd	Select pump down function and delay time	-1（OFF）
40026	PdP	Pressure set-point for stopping pump down	0.5

Once the compressor start/stop signal (RUN) is disconnected, the controller will firstly close the electronic expansion valve completely. When the system suction pressure is lower than the pressure set-point for stopping pump down (address 40026) or exceeds the set value for the delay time (address 40025), the auxiliary relay output signal switches to stop the compressor.

5.5 Reset to factory settings

Add.	Code	Description	Default	Range
40080	rSt	Reset	0	0~999

Reset is in 2.Pr , press SEL to find the parameter rSt, input the password (default 5, if changed enter the changed password or alternate password 913) and long press SEL , all parameters are reset to the default from factory.

6. Alarm mode

Code	Description	Code	Description
StP	RUN signal disconnected	noP	MOP high pressure alarm
PoP	Pressure transmitter disconnected	LoP	LOP Low pressure alarm
PSt	Pressure transmitter short circuit	HSH	High superheat alarm
toP	Temperature sensor disconnected	LSH	Low superheat alarm
tSt	Temperature sensor short circuit	FrE	Low temperature freezing alarm

Note: `SLP` May not be an alarm, maybe the compressor RUN signal is disconnected.
`noP` Alarm when suction pressure higher than setting value and exceeds the delay time, EEV will be forced to close at the same time.

7.Parameters table

7.1 `1.Pr` (Parameter table 1)

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40001	Superheat set point	`SH`	K	0.1	M:0.5 US:0.9	M:30.0 US:54.0	M:6.0 US:10.8
40003	Start opening ratio	`bIr`	%	1	0	100	40
40004	Start opening ratio duration time	`Sdt`	Sec	1	0	600	10
40005	P: Proportional gain	`dFr`	%	0.1	0.1	99.9	1.0
40006	I: Integral time	`Irt`	Sec	1	0	999	50
40007	D: Derivative time	`drt`	Sec	1	0	999	30
40008	Low SH alarm mode	`LS`	0=No use 1=automatic return 2=manual return				0
40009	Low SH alarm value	`LSH`	K	0.1	M:0.5 US:0.9	M:30.0 US:54.0	M:0.5 US:0.9
40010	Low SH alarm delay time	`LSd`	Sec	1	1	300	15
40011	Clear low SH alarm	`LSF`	K	0.1	M:1 US:1.8	M:30.5 US:54.9	M:3.0 US:5.4
40012	MOP alarm mode	`nP`	0=No use 1=automatic return				1
40013	MOP alarm pressure	`noP`	M:bar US:psi	M:0.1 US:1	M:-1.0 US:-15	M:50.0 US:725	M:9.0 US:130
40014	MOP alarm delay time	`nPd`	Sec	1	0	999	1
40015	Clear MOP alarm	`nPF`	M:bar US:psi	M:0.1 US:1	M:-1.0 US:-15	M:50.0 US:725	M:8.0 US:116
40016	High SH alarm mode	`HS`	0=No use 1=automatic return 2=manual return				0
40017	High SH alarm value	`HSH`	K	1	M:10 US:18	M:40 US:72	M:30 US:54
40018	High SH alarm delay time	`HSd`	Min	1	1	600	3
40019	Clear high SH alarm	`HSF`	K	1	M:7 US:13	M:37 US:67	M:27 US:49
40020	MOP coefficient for close valve	`nPP`	/	1	0	800	200
40021	Freeze prevention alarm mode	`Fr`	0=No use 1=automatic return 2=manual return				0
40022	Freeze prevention alarm value	`FrE`	M:°C US: °F	1	M:-40 US:-40	M:40 US:104	M:0 US:32
40023	Freeze prevention alarm delay time	`Frd`	Sec	1	5	200	30

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40024	Clear freeze prevention alarm	`FrF`	M:°C US: °F	1	M:-37 US:-34	M:43 US:109	M:3 US:37
40025	Select pump down function and delay time	`Pd`	Sec	1	-1	180	-1(OFF)
40026	Pressure set-point for stopping pump down	`PdP`	M:bar US:psi	M:0.1 US:1	M:-0.5 US:-7	M:18.0 US:261	M:0.5 US:7
40027	Pressure low limit alarm mode	`LP`	0=No use 1=automatic return 2=manual return				0
40028	Pressure low limit alarm value	`LoP`	M:bar US:psi	M:0.1 US:1	M:-0.8 US:-12	M:17.7 US:256	M:0.0 US:0
40029	Low limit pressure alarm delay time	`LPd`	Sec	1	5	200	5
40030	Clear low limit pressure alarm	`LPF`	M:bar US:psi	M:0.1 US:1	M:-0.5 US:-7	M:18.0 US:261	M:0.3 US:4
40031	Pressure transmitter type	`PrU`	0=(0.5~3.5)V 1=(0.5~4.5)V				0
40032	Pressure and temperature unit	`PtU`	0(M)= metric bar/°C 1(US)= imperial psi/ °F Celsius (°C)=(Fahrenheit (°F)-32)/1.8 1bar≈14.5psi				0(M)
40033	Pressure transmitter short circuit alarm	`PSR`	0=close 1=open				0
40034	Shutdown delay	`SdL`	0~999s After the compressor start/stop signal (RUN) is disconnected, the valve action will be executed after a certain delay time.				0
40035	Temperature control mode	`tCd`	0=Hot gas bypass, Valve closes down when current temperature > target temperature 1=Liquid injection cooling, Valve opens up when current temperature > target temperature				0
40036	Valve opening management with sensor failure	`ERo`	This parameter is valid for pressure transmitter open circuit, pressure transmitter short circuit, temperature sensor open circuit and temperature sensor short circuit alarms. -1= maintain the current opening of EEV unchanged 0= valve closed 1~100= valve stays at the pre-defined opening in %				-1

① Alarm setting:
Valve opening management with sensor failure: When the pressure transmitter is open or short-circuited, or when the temperature sensor is open or short-circuited, the controller will generate the corresponding alarm. The controller will then take action based on the pre-defined value.
When the corresponding alarm settings for `LoP` (Low Pressure), `LSH` (Low Superheat), `HSH` (Hight SUperheat), and `FrE` (Anti-freeze) are activated, and once the respective thresholds are exceeded and maintained for the corresponding duration, the controller will generate the corresponding alarm, and the valve will be fully closed.
② Integral coefficient for valve closing at MOP alarm:
When the [MOP Alarm Mode] `nP` is set to 0, there is no MOP alarm or MOP integral valve closing function; ;

When the [MOP Alarm Mode] `nP` is set to 1 and the [MOP Valve Closing Coefficient] `nPP` is set to 0, there is an MOP alarm function, but the valve does not close after the alarm;
When the [MOP Alarm Mode] `nP` is set to 1 and the [MOP Valve Closing Coefficient] `nPP` is not 0, once the real-time pressure exceeds the [MOP Alarm Value] `noP`, the MOP protection function will be activated, taking over the superheat control. The valve closes at a certain rate to control the pressure. Since the valve closing action is an integral effect, it depends on the difference between real-time pressure and 40013, and the [MOP Valve Closing Coefficient] `nPP` setting. The higher the pressure is above the [MOP Alarm Value] `noP`, the smaller the [MOP Valve Closing Coefficient] `nPP` setting, and the faster the valve closes. Conversely, the larger the [MOP Valve Closing Coefficient] `nPP`, the smaller the excess difference between real-time pressure and [MOP Alarm Value], and the slower the valve closes.
During the valve closing process, once the real-time pressure drops below the [MOP Alarm Value], the MOP integral valve closing function is canceled, and the superheat automatic adjustment function is restored.
Example: 1. If the [MOP Alarm Value] is set to 90, and the [MOP Valve Closing Coefficient] is set to 800, and the current pressure remains at 91, then the valve closing rate 10% by every 60 seconds.
2. If the [MOP Alarm Value] is set to 90, and the [MOP Valve Closing Coefficient] is set to 1, and the current pressure remains at 91, then the controller will close the valve to 0 immediately.
Example: 1. If the [MOP Alarm Value] `noP` is set to 90, and the [MOP Valve Closing Coefficient] is set to 800, and the current pressure remains at 91, then the valve closing rate 10% by every 60 seconds.
2. If the [MOP Alarm Value] `noP` is set to 90, and the [MOP Valve Closing Coefficient] is set to 1, and the current pressure remains at 91, then the controller will close the valve to 0 immediately.

7.1 `2.Pr` (Parameter table 2)

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40062	Refrigerant	`rFY`	-1=Customized 0=R22 1=R404A 2=R410A 3=R134a 4=R407C 5=R507 6=R1234ze(E) 7=R1234yf 8=R290 9=R450A 10=R513A 11=R448A 12=R449A 13=R452A 14=R744(CO_2) 15=R744A(N_2O) 16=R32 17=R245fa 18=R23 19=R407A 20=R407F 21=R124 22=R717 23=R407H 24=R454C 25=R455A 26=R454B 27=R452B 28=R600a 29 =R600 30=R454A 31=R1270 32=R1233zd(E) 33=R1234ze(Z) 34=R452C 35=R457A				12
40063	Pressure sensor MAX. value	`PSH`	M:bar US:psi	1	M:-1 US:-19	M:99 US:999	M: 20 (SEC611) 12 (SEC612) US: 290 (SEC611) 174 (SEC612)
40064	Pressure sensor MIN. value	`PSL`	M:bar US:psi	1	M:-1 US:-19	M:99 US:999	M: 0 (SEC611) -1 (SEC612) US: 0 (SEC611) -14 (SEC612)

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40065	Pressure sensor offset correction	`PCr`	M:bar US:psi	0.1	M:-9.9 US:-9.9	M:9.9 US:9.9	0.0
40066	Temp. sensor offset correction	`tCr`	M:K US: °F	0.1	M:-19.9 US:-19.9	M:19.9 US:19.9	0.0
40067	Password	`PCd`	/	1	0	999	5
40069	Coil excitation speed upper limit	`JEY`	/	0.1	0.1	100	100
40070	EEV opening ratio upper limit	`oPH`	%	1	0	100	100
40071	EEV opening ratio lower limit	`oPL`	%	1	0	100	0
40072	Sensor input filter time	`oIt`	/	0.1	0.1	10	1.0
40073	EEV compulsory opening ratio	`UCr`	%	0.1	0	100	-1(OFF)
40074	Temperature sensor type	`ntc`	0=5K(-55°C ~105°C), β=3970K 1=10K(-40°C ~200°C), β=3977K 2=10K(-50°C ~110°C), β=3435K				0
40075	EEV reset mode	`rSd`	0 = Fully close 1 = Fully open to fully close				0
40076	Display mode	`dIS`	0=1~4 rotation / 1= Superheat 2=Evaporator outlet pressure / 3= Expansion valve open ratio 4= Evaporator outlet temperature / 5= Saturation temperature				1
40077	Run/stop method	`rnt`	0= Always run / 1= Digital input / 2= Communication Run				1
40078	Communication ID setup	`Id`	/	1	1	250	1
40079	Communication setup	`bdr`	0=4800 8 NONE 1 1=9600 8 NONE 1 2=19200 8 NONE 1 3=38400 8 NONE 1 4=2400 8 NONE 1 5=4800 8 EVEN 1 6=9600 8 EVEN 1 7=19200 8 EVEN 1 8=38400 8 EVEN 1 9=2400 8 EVEN 1 10=4800 8 ODD 1 11=9600 8 ODD 1 12=19200 8 ODD 1 13=38400 8 ODD 1 14=2400 8 ODD 1 15=4800 8 NONE 2 16=9600 8 NONE 2				1

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40079	Communication setup	`bdr`	17=19200 8 NONE 2 18=38400 8 NONE 2 19=2400 8 NONE 2 20=4800 8 EVEN 2 21=9600 8 EVEN 2 22=19200 8 EVEN 2 23=38400 8 EVEN 2 24=2400 8 EVEN 2 25=4800 8 ODD 2 26=9600 8 ODD 2 27=19200 8 ODD 2 28=38400 8 ODD 2 29=2400 8 ODD 2				1
40080	Reset	`rSt`	/	1	0	999	0

① While restoring to the factory settings, change the corresponding parameter to the password value(the default value is 5 or the standby password is 913), long press the key SEL and then the controller will restart and restore successfully.
② By modifying the communication settings through RS485, the changes will only take effect after power off and restart. While modifying the communication settings using buttons, the changes take effect immediately.
③ Address 40073 EEV compulsory open ratio is valid in the automatic superheat control mode and temperature control mode。 EEV compulsory open ratio.

3. 3.Pr(Parameter table 3)

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40041	Hold current	`EbH`	0=OFF No hold current		1=ON		0
40042	Expansion valve excitation type	`Ebd`	1-2(0)=1-2 phase excitation		2-2(1)=2-2 phase excitation		1-2 (0)
40043	Expansion valve total pulse	`EbP`	x10 pulse	1	0	999	50
40044	Expansion valve open pulse	`Ebo`	pulse	1	0	999	30
40045	EEV drive speed (PPS)	`EbS`	10(0)=10PPS 20(1)=20PPS 30(2)=30PPS 50(3)=50PPS 80(4)=80PPS 100(5)=100PPS 200(6)=200PPS 250(7)=250PPS 500(8)=500PPS 90(9)=90PPS				30 (2)
40046	Over-driver steps to close the EEV	`EEt`	pulse	1	0	999	8
40047	Over-drive steps to reset the EEV	`EEr`	%	1	0	100	10
40048	EEV closing speed when power off	`ESS`	10(0)=10PPS 20(1)=20PPS 30(2)=30PPS 50(3)=50PPS 80(4)=80PPS 100(5)=100PPS 200(6)=200PPS 250(7)=250PPS 500(8)=500PPS 90(9)=90PPS				90(9)

Add.	Description	Code	Unit	Step	Min.	Max.	Default
40054	Drive mode zero point	`drO`	%	0.1	0	5	1.0
40055	Drive mode full scale point	`drI`	%	0.1	95	100	99.0
40056	RS485 Communication control opening ratio	`,`	In drive mode: -1(OFF) indicates the external analog control mode (1~5)V or (4~20)mA corresponds to valve opening from 0%~100%. 0~1000 corresponds to communication control opening ratio, representing valve opening from 0% ~ 100% .Only supports RS485 communication settings				-1 (OFF)
40057	Refrigerant User-defined parameter A1	`,`	A1 (-20000~20000) A2 (-20000~20000) A3 (-20000~20000) When 40062 refrigerant is set to -1, customized mode is activated. A1, A2, A3 are customized parameters, only support RS485 communication settings				(R449A) A1:9975 A2:-2020 A3:2424
40058	Refrigerant User-defined parameter A2	`,`					
40059	Refrigerant User-defined parameter A3	`,`					

① Parameter Table 3 (40041~40059) is usually not used, SANHUA standard EEV can directly set by the DIP SW. If you want modify parameters table 3, please change DIP SW firstly (See page4), after setting this table, the controller need to cut off power and restart again.
② Because the maximum value of the controller screen display is 999, so 40043 EEV total steps pulse 50 means 500 steps.
③ When the customized parameters (40041~40048) in `3.Pr` are set according to the specification of the selected electronic expansion valve and please follow them strictly.
④ Valve opening control in drive mode has nothing to do with the setting values of 40070, 40071 and 40073.

8.Communication setting

8.1 RS485 communication logic

The communication hardware using RS485 module, and the protocol is Modbus RTU. SEC61X-R6 controller as a slave device;
For Modbus communication ID, when the Master computer ID = 255 or ID = [40078], communication can be realized with the SEC6XX controller.
For the communication baud rate, 4 seconds after power-on, the controller operates at 9600bps baud rate; If the controller receives 9600bps data and parses it correctly within this time period, the controller operates at 9600bps after 4 seconds; if the controller does not receive 9600bps data or receives the data incorrectly within this time period, the controller operates at the baud rate set by [40079] after 4 seconds.

8.2 Communication specification

Item	Description
Transmission line connection	Multiple line
Communication method	RS485 (2-wire, half-duplex)

Item	Description
Baud-rate	Default 9600BPS, range(2400~38400)bps
Parity, Data, Stop bit	No parity/even parity /odd parity, 8 data, 1 stop bit/2 stop bits Default: no parity, 8 data, 1 stop bit
Protocol Type	Modbus RTU
Function Code	0x03、0x06、0x10
Max. Read Word	32
Media Type	Belden 9841/9842, LG LIREV-AMESB
Poll interval	≥100ms

Function Code description: 0x03 is used for reading data, 0x06 is used for writing a single parameter and 0x10 is used for writing multiple consecutive parameters at a time (up to 100 parameters).

8.3 Status of Communication table

Add.	Function	Unit	Type	Byte	SEC6xx display	RS485
40073	EEV compulsory open ratio	-	Analog	INT 16	0.0~100.0	×10
40099	Reset command	-	Analog	INT 16	0=OFF 1=ON	
40101	Run/Stop input	-	Analog	INT 16	0=Stop 1=Run	
40102	Operation status	-	Analog	INT 16	Refer to below bit	
Bit0	Aux. relay output	-	Digital	bit	0=OFF 1=ON	
Bit2	Operation status of EEV	-	Digital	bit	0=OFF 1=ON	
Bit8	DIP SW 1	-	Digital	bit	0=OFF 1=ON	
Bit9	DIP SW 2	-	Digital	bit	0=OFF 1=ON	
Bit10	DIP SW 3	-	Digital	bit	0=OFF 1=ON	
Bit11	DIP SW 4	-	Digital	bit	0=OFF 1=ON	
Bit12	DIP SW 5	-	Digital	bit	0=OFF 1=ON	
Bit15	Master alarm	-	Digital	bit	0=OFF 1=ON	
40110	Alarm status	-	Analog	INT 16	Refer to below bit	
Bit0	Pressure sensor disconnection	-	Digital	bit	0=OFF 1=ON	
Bit1	Press. sensor short circuit	-	Digital	bit	0=OFF 1=ON	
Bit2	Temp. sensor disconnection	-	Digital	bit	0=OFF 1=ON	
Bit3	Temp. sensor short circuit	-	Digital	bit	0=OFF 1=ON	
Bit6	MOP alarm	-	Digital	bit	0=OFF 1=ON	

Add.	Function	Unit	Type	Byte	SEC6xx display	RS485
Bit7	LOP Low limit pressure alarm	-	Digital	bit	0=OFF 1=ON	
Bit8	HSH High superheat alarm	-	Digital	bit	0=OFF 1=ON	
Bit9	LSH Low superheat alarm	-	Digital	bit	0=OFF 1=ON	
Bit10	FrE Freezing Protection alarm	-	Digital	bit	0=OFF 1=ON	
40111	Present Superheat	K	Analog	INT 16	-55.0~200.0	×10
40112	Present saturation temperature	M: °C US: °F	Analog	INT 16	M:-55.0~200.0 US:-67.0~392.0	×10
40113	Present pressure	M: bar US: psi	Analog	INT 16	M:-1.0~99.0 US:-14~1435	×10
40114	Present temperature	M: °C US: °F	Analog	INT 16	M:-55.0~200.0 US:-167.0~392.0	×10
40116	EEV opening ratio	%	Analog	INT 16	0.0~100.0	×10