TH-EC259
Hardware Specification

Model: TH-EC259

Version: V1.0

Compiler: Sherry	Reviser: Ethan	Ratify: Gary
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Revision History			
Date	**Revision version**	**Revision Notes**	**Reviser**
2025-8-29	V1.0	New formulation	Sherry

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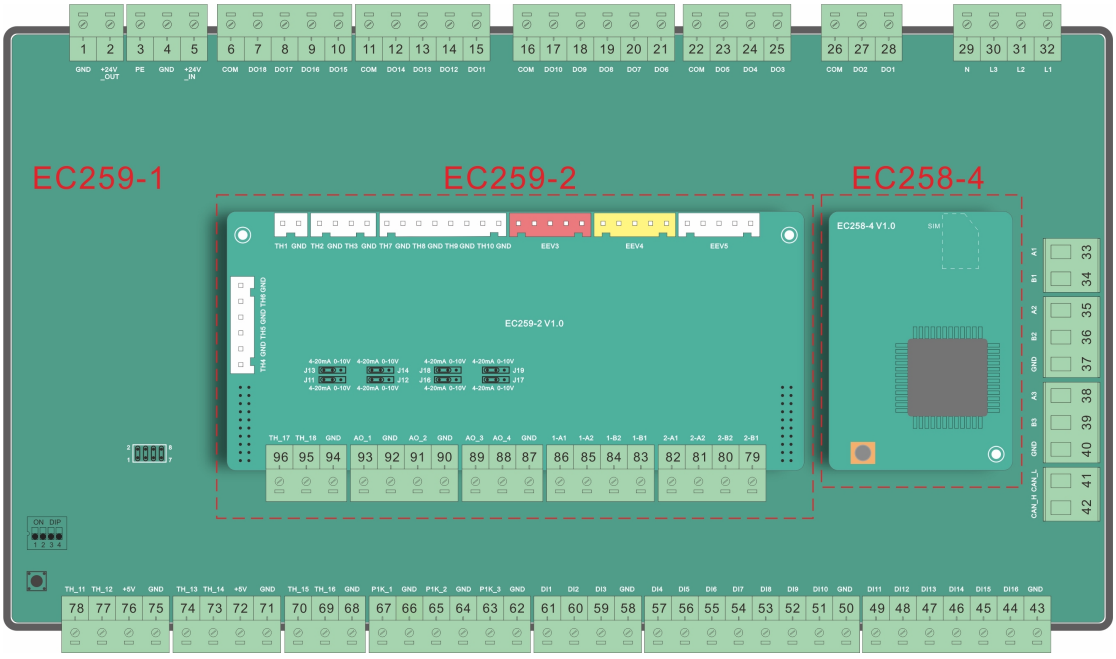
1. Overview of the solution

1.1. Introduction

TH-EC259 is a highly integrated controller specifically designed for the HVAC industry.

The controller consists of three parts: the main controller EC259-1, the analog signal control board EC259-2, and the 4G module expansion board EC258-4. It is equipped with extensive control resources and I/O points, and is widely used in VRF systems, modular chillers, heat pump air conditioners, screw chillers, and other diversified application scenarios.The product features high protection performance, wide operating voltage range, and strong anti-interference capability, fully meeting the requirements of complex operating conditions across the HVAC industry.



1.2. Application environment

Index item	Parameter&Description
Use ambient temperature range	-30℃～60℃
Storage environment temperature range	-40℃～70℃
Use ambient humidity range	5～95（45℃±2℃）%RH(non-condensing)
Storage environment humidity range	≤95（45℃±2℃）%RH(non-condensing)
Atmospheric pressure	76～106 Kpa
Altitude	Up to 5,000 m above sea level (power derating applies above 1,000 m: power output is reduced by 1% for every additional 100 m increase in altitude)

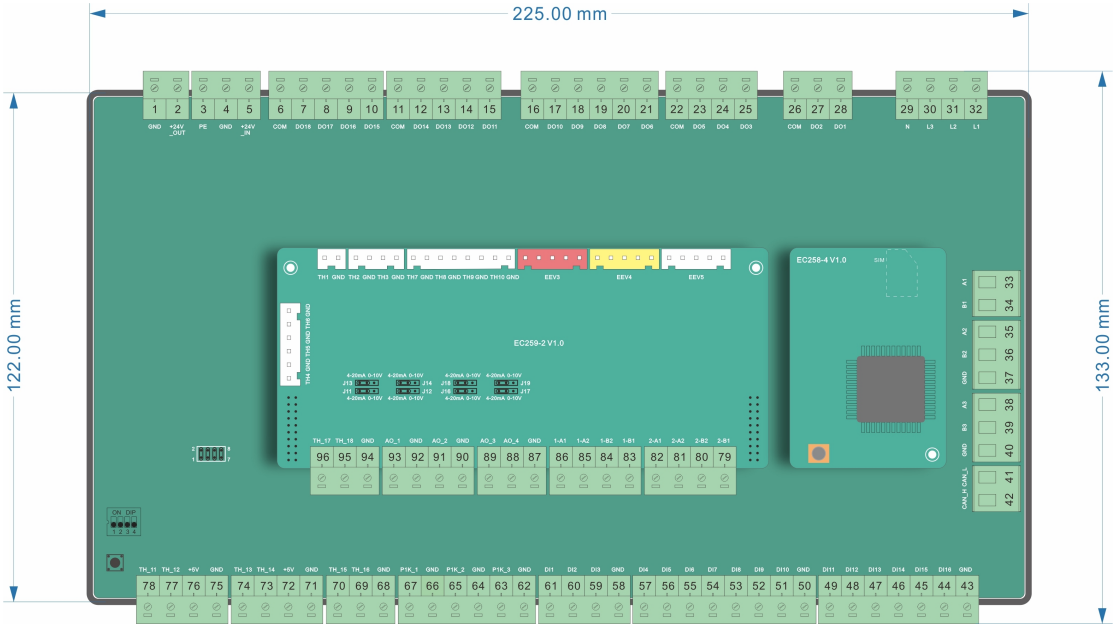
Heat dissipation mode	Natural heat dissipation
IP rating	IP20

2. Overview of product

2.1. Technical Specifications

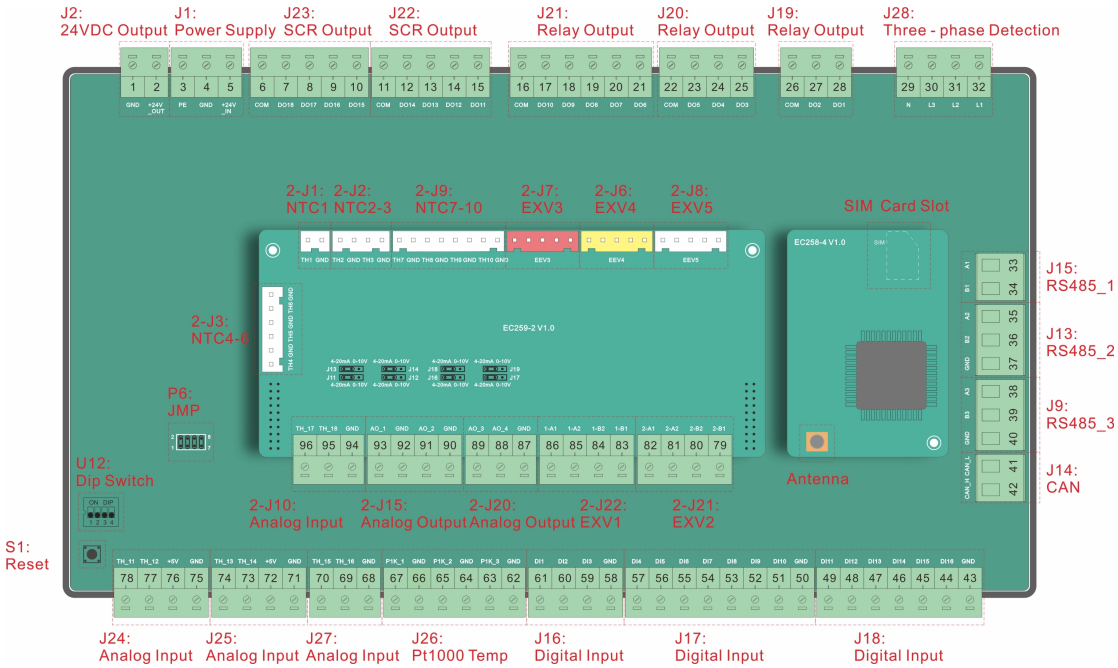
Parameter Item	Specification / Description
Controller Dimensions	225 × 133 mm
Operating Voltage	220 VAC
Operating Frequency	50 Hz / 60 Hz
Controller Power Supply	24 VDC
Digital Inputs	16 channels (dry contact)
Digital Outputs	18 channels (10 relay outputs with physical contacts, max load per channel / total: 250 V / 5 A resistive + 8 SCR outputs)
Analog Inputs	21 channels (10 × NTC inputs + 4 channels 0–10 V / 4–20 mA inputs(Optional) + 4 ×4–20 mA inputs + 3 × PT1000 inputs)
Analog Outputs	4 channels 0–10 V / 4–20 mA(Optional)
Electronic Expansion Valve Outputs	5 channels (2 bipolar EEV outputs + 3 unipolar EEV outputs)
Onboard Phase Sequence Detection	1 channel (L1 / L2 / L3 / N)
Communication Interfaces	RS485 × 3, CAN × 1, TTL × 1 (for 4G module)
Status Indicators	Power / Run / Communication (CAN / RS485) / Relay Output
RTC (Real-Time Clock)	1
Reset Button	1 reset key
DIP Switch	1 set (4-position DIP switch)

2.2. Main board dimension



3. Port function

1.1. Main board port function diagram



3.1. Main board Port Definition

No.	Position	Function Description	Port Type
24DC Output（J2）			
1	GND	Output: 24V ±15% DC, Max. Output Current: 500mA. Can be used to connect a touch display.	Green Terminal Block KF2EDGR_5.08-2P (RoHS)
2	+24V_OUT		
Power supply（J1）			
3	PE	Input: 24V ±15% DC. Includes PE terminal. Max. Input Current: 2A.	Green Terminal Block KF2EDGR_5.08-3P (RoHS)
4	GND		
5	+24V_IN		
SCR Output（J23）			
6	COM5	Driving Optocoupler Spec: 1.2A 600V	Green Terminal Block KF2EDGR_5.08-5P(RoHS)
7	DO18		
8	DO17		
9	DO16		
10	DO15		
SCR Output（J22）			
11	COM4	Driving Optocoupler Spec: 1.2A 600V	Green Terminal Block KF2EDGR_5.08-5P(RoHS)
12	DO14		
13	DO13		
14	DO12		
15	DO11		
Relay Output（J21）			
16	COM3	Relay Spec: 5A 250V AC; Derate to 70% for resistive loads.	Green Terminal Block KF2EDGR_5.08-6P(RoHS)
17	DO10		
18	DO9		
19	DO8		
20	DO7		
21	DO6		
Relay Output（J20）			
22	COM2	Relay Spec: 5A 250V AC; Derate to 70% for resistive	Green Terminal Block

No.	Position	Function Description	Port Type
23	DO5	loads.	KF2EDGR_5.08-4P(RoHS)
24	DO4		
25	DO3		
Relay Output（J19）			
26	COM1	Relay Spec: 5A 250V AC; Derate to 70% for resistive loads.	Green Terminal Block KF2EDGR_5.08-3P(RoHS)
27	DO2		
28	DO1		
Three phase Detection（J28）			
29	N	Onboard Phase Sequence Protection. 3-Phase 4-Wire Input. Supports protection against phase reversal, phase loss, over/under voltage, and voltage imbalance.	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
30	L3		
31	L2		
32	L1		
RS485_1（J15）			
33	A1	RS485_1 Communication	Green Terminal Block KF2EDGR_5.08-2P(RoHS)
34	B1		
RS485_2（J13）			
35	A2	RS485_2 Communication	Green Terminal Block KF2EDGR_5.08-3P(RoHS)
36	B2		
37	GND		
RS485_3（J9）			
38	A3	RS485_3Communication	Green Terminal Block KF2EDGR_5.08-3P(RoHS)
39	B3		
40	GND		
CAN Communication（J14）			
41	CAN_L	CAN Communication	Green Terminal Block KF2EDGR_5.08-2P(RoHS)
42	CAN_H		
Digital input（J18）			
43	GND	**Digital input**	Green Terminal Block KF2EDGR_5.08-7P(RoHS)
44	DI16		

No.	Position	Function Description	Port Type
45	DI15		
46	DI14		
47	DI13		
48	DI12		
49	DI11		
Digital input（J17）			
50	GND	**Digital input**	Green Terminal Block KF2EDGR_5.08-8P(RoHS)
51	DI10		
52	DI9		
53	DI8		
54	DI7		
55	DI6		
56	DI5		
57	DI4		
Digital input（J16）			
58	GND	**Digital input**	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
59	DI3		
60	DI2		
61	DI1		
PT1000 Temperature Sensor Input （J26）			
62	GND	PT1000 input	Green Terminal Block KF2EDGR_5.08-6P(RoHS)
63	P1K_3		
64	GND		
65	P1K_2		
66	GND		
67	P1K_1		
Analog input（J27）			
68	GND	4~20mA input	Green Terminal Block KF2EDGR_5.08-3P(RoHS)
69	TH_16		

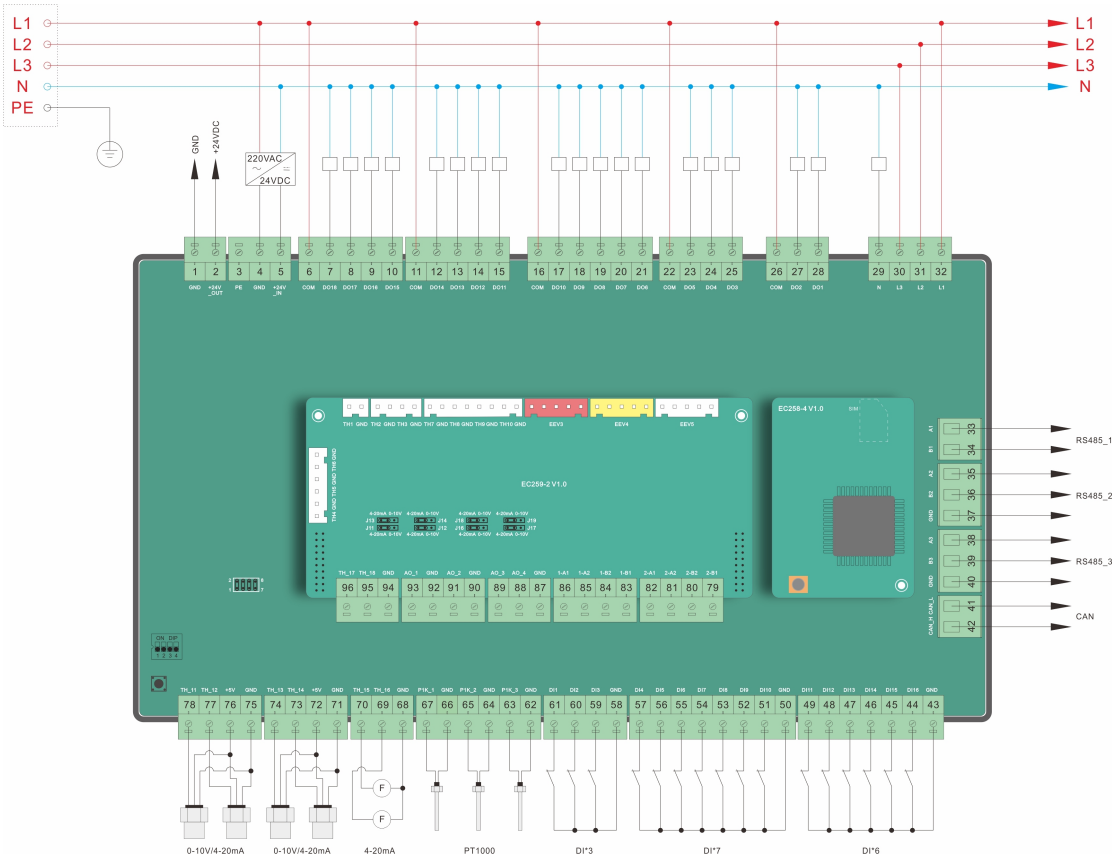
No.	Position	Function Description	Port Type
70	TH_15		
Analog Input（J25）			
71	GND	0~10V / 4~20mA (Optional). Configured via jumper P6. Provides DC5V output with total current of 100mA.	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
72	+5V		
73	TH_14		
74	TH_13		
Analog Input（J24）			
75	GND	0~10V / 4~20mA(Optional). Configured via jumper P6. Provides DC5V output with total current of 100mA.	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
76	+5V		
77	TH_12		
78	TH_11		
Reset（S1）			
/	S1	System Reset Button	/
Dip Switch（U12）			
/	U12	4-Position DIP Switch	/
Jumper（P6）			
/	P6	TH_11~TH_14Four jumpers corresponding to TH_11~TH_14 respectively.	/
EXV2（2-J21）			
79	2-B1	Bipolar Electronic Expansion Valve Control Interface. 1.5A 24VDC.	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
80	2-B2		
81	2-A2		
82	2-A1		
EXV1（2-J22）			
83	1-B1	Bipolar Electronic Expansion Valve Control Interface. 1.5A 24VDC.	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
84	1-B2		
85	1-A2		
86	1-A1		
Analog Output（2-J20）			
O	GND	0~10V / 4~20mA(Optional), configured via jumper.	Green Terminal Block

No.	Position	Function Description	Port Type
88	AO-4	0~10V load resistance >1.5KΩ (short 2-3). 4~20mA load resistance >160Ω (short 1-2).	KF2EDGR_5.08-3P(RoHS)
89	AO-3		
Analog Output（2-J15）			
90	GND	0~10V / 4~20mA(Optional), configured via jumper. 0~10V load resistance >1.5KΩ (short 2-3). 4~20mA load resistance >160Ω (short 1-2).	Green Terminal Block KF2EDGR_5.08-4P(RoHS)
91	AO-2		
92	GND		
93	AO-1		
Analog Output（2-J10）			
94	GND	4~20mA input	Green Terminal Block KF2EDGR_5.08-3P(RoHS)
95	TH_18		
96	TH_17		
NTC4-6（2-J3）			
/	TH_4	NTC（10K）	White, Single-row Connector XH 2.54*6PIN
/	GND		
/	TH_5		
/	GND		
/	TH_6		
/	GND		
NTC1（2-J1）			
/	TH_1	NTC（10K）	White, Single-row Connector XH 2.54*2PIN
/	GND		
NTC2-3（2-J2）			
/	TH_2	NTC（10K）	White, Single-row Connector XH 2.54*4PIN
/	GND		
/	TH_3		
/	GND		
NTC7-10（2-J9）			
/	TH_7	NTC（10K）	White, Single-row Connector XH 2.54*8PIN
/	GND		

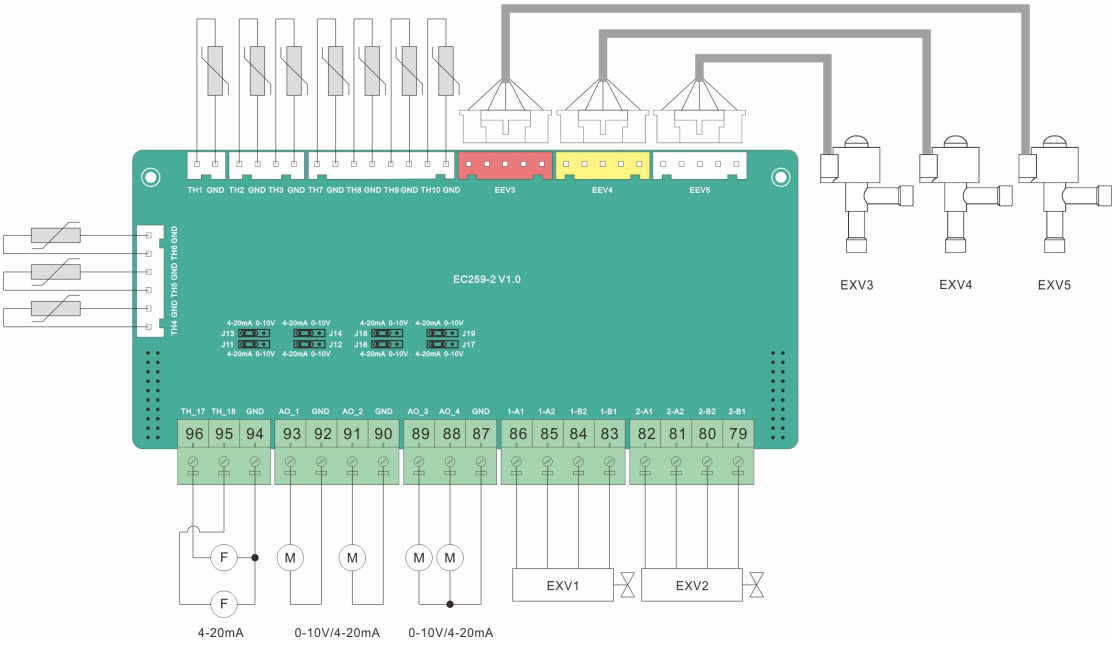
No.	Position	Function Description	Port Type
/	TH_8		
/	GND		
/	TH_9		
/	GND		
/	TH_10		
/	GND		
EXV3（2-J7）			
/	EXV3	Unipolar Electronic Expansion Valve Control Interface. Max. Current 375mA.	Red， Single-row Connector XH 2.54*5PIN
EXV4（2-J6）			
/	EXV4	Unipolar Electronic Expansion Valve Control Interface. Max. Current 375mA	Yellow， Single-row Connector XH 2.54*5PIN
EXV5（2-J8）			
/	EXV5	Unipolar Electronic Expansion Valve Control Interface. Max. Current 375mA	White, Single-row Connector XH 2.54*5PIN

4. Wiring Schematic Diagram

4.1. TH-EC259-1 Wiring Schematic Diagram



4.2. TH-EC259-2 Wiring Schematic Diagram



5. Safety Regulations and Operating Requirements

Before starting any installation or operation, please carefully read and fully understand these Safety Regulations and Operating Requirements to prevent accidents and personal injury.

5.1. Electrical Safety Requirements

- Electrical Safety: : This product is an electrical control device. Installation, wiring, and commissioning must be carried out by licensed and qualified electrical professionals. Unauthorized disassembly or operation by non-professionals is strictly prohibited.
- Power Supply Matching: Before wiring, please ensure that the controller's supply voltage matches the rating specified on the nameplate. Connecting voltages outside the rated range is strictly prohibited, as this may cause equipment damage, short circuits, or fire hazards.
- Power-Off Operation: Before wiring, maintenance, module replacement, or dust cleaning, the controller and the entire system power supply must be completely disconnected. Operation is only permitted after confirming that no residual voltage is present.

5.2. Installation and Environmental Requirements

- Environmental Conditions: The controller must be installed in a dry, well-ventilated indoor environment free from corrosive gases and strong electromagnetic interference. Avoid direct sunlight, rain exposure, and excessive vibration.
- Protection Rating: Strictly comply with the product's Protection rating (IP20). Do not use the controller in harsh environments exceeding this protection level, such as high-humidity, dusty, flammable, or explosive locations.
- Wiring Practices:Power cables and signal cables must be routed separately. Control signal cables should maintain sufficient distance from power lines or be shielded to prevent electromagnetic interference that may cause malfunction or misoperation.

5.3. Operation and Maintenance Requirements

- Proper Wiring: Wiring must strictly follow the wiring diagrams. Do not short-circuit the controller's input/output terminals, relay contacts, or safety circuits without authorization, as this may result in equipment damage or safety incidents.
- Routine Inspection: Regularly inspect wiring terminals for looseness, cable aging, and cooling

fan operation to ensure long-term stable operation of the controller.

- Component Replacement: When replacing controller components (such as sensors or modules), only original manufacturer parts or qualified components with equivalent specifications may be used. Mixing different models or using non-compliant parts is strictly prohibited.

The final right of interpretation belongs to Shenzhen Tringo Control Co., Ltd.

Shenzhen Tringo Control Co., Ltd.

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Our company reserves the right to modify the equipment parameters without prior notice.