TROUBLE SHOOTING MANUAL

SINGLE PATIENT DIALYSIS MACHINE

SURDIAL

Manufacturer **NIPRO CORPORATION**

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1. GENERAL DESCRIPTION

When TROUBLE is detected, **check symptom and condition and perform** **TROUBLE SHOOTING** **to check them for finding trouble cause to determine action to be taken.**	**Condition, check method, cause and action to be taken for each trouble are described in this Manual.** ⚠WARNING ● **Perform check after reading Cautions for Safety thoroughly contained in Service Manual.** ● **When power ON of SURDIAL is required to perform check, take care of electric shock.**

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In accordance with procedure specified in **SERVICE MANUAL,** **take action and check the result.**	**Construction drawings and adjusting procedures of each Assy and component, list of components and the like are contained in Service Manual.**

2. ALARM/ERROR INDICATIONS AND DESCRIPTION

NO.	ALARM/ERROR INDICATION	NO.	ALARM/ERROR INDICATION
E01	RECOVER FROM EMERGENCY STOP	E41	VCa CLOSED CIRCUIT LEAK ERROR
E02	T1 TEMPERATURE SENSOR ERROR	E42	VCb CLOSED CIRCUIT LEAK ERROR
E03	T2 TEMPERATURE SENSOR ERROR	E43	VCb CLOSED CIRCUIT LEAK ERROR
E04	T3 TEMPERATURE SENSOR ERROR	E44	AIR ELIMINATION TANK ERROR
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E15	ARTERIAL PRESSURE MAX LIMIT	E55	BP BATTERY ERROR
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E29	SN SWITCH TIME ALARM	E69	BYPASS SW
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E32	CLV POSITION ERROR		Disabled SW function
E33	VISCOUS PUMP DRIVING ERROR(VPa)		Disabled syringe pump operation
E34	VISCOUS PUMP DRIVING ERROR(VPb)		Blood pump error
E35	VP DRAWING VOLUME IS AT MAX LIM.		Level change in venous drip chamber
E36	VCa CLOSED CIRCUIT LEAK ERROR		Air inclusion in dialysate
E37	VCa CLOSED CIRCUIT LEAK ERROR		Unstable dialysate flow rate
E38	VCb CLOSED CIRCUIT LEAK ERROR		Disabled discharge by pressing drain SW
E39	VCb CLOSED CIRCUIT LEAK ERROR		UFR error exceeding allowable upper/lower limits
E40	VCa CLOSED CIRCUIT LEAK ERROR		Date and time are initialized.

● PREFACE

Thank you for purchase of NIPRO Single Patient Dialysis Machine **"SURDIAL".**

Information for serviceman or technician required to perform check and maintenance of SURDIAL is given by this Trouble Shooting Manual. All operations described in this Manual should be performed by only qualified serviceman or technician who should be familiar with replacement of components of microprocessor based electronic devices and should have basic knowledge concerning conventional dialysate line of dialysis machine. The serviceman or technician should be familiar with all operations contained in this Manual by reading it thoroughly to full understand them before starting trouble shooting.

Use this Manual together with Operation and Service Manuals of SURDIAL. Same descriptions contained in them are minimal.

Generally, information required to operate SURDIAL is contained in Operation Manual of SURDIAL though technical description is also contained partially. Information related to maintenance, component replacement and various settings is contained in Service Manual of SURDIAL. In this Manual, information related to method of trouble shooting is contained.

E01 RECOVER FROM EMERGENCY STOP

Detection	Recovery to normal from emergency machine stop due to power failure caused during execution of sequence

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	○ (3 times)	Execution of sequence before error detection	—	—	—

Reset	Automatic recovery to normal	Note	Becoming error free of upper/lower alarm limits of venous, arterial and dialysate pressures by error detection

Conditionor cause	Check and action
Recovery from power failure	Not required
Intentional OFF-ON of power breaker	Not required
Intentional OFF-ON of power SW	Not required
OFF of breaker due to leakage or short circuit of AC230V (AC110V) line	Check : Identify position(s) of leakage or short-circuit of AC230V (AC110V) line. Disconnect components one by one from the line to identify damaged one(s) by testing or operate components in the line one by one manually to do so. ⚠CAUTION Check correct earth connection of SURDIAL and disconnect components after disconnecting power plug from receptacle. Action: Repair or replace damaged one(s).
Incorrect power plug connection	Action: Connect the plug to receptacle securely.
Incorrect power line connection	Check: Pull lightly each of harnesses connecting POWER PLUG－SWITCH GEAR－TERMINAL BLOCK2－POWER SWITCH－NOISE FILTER－TERMINAL BLOCK1－POWER SUPPLY－SUB-BOARD CN412－SUB-BOARD CN413－MAIN BOARD CN1 in series to check loosening, incorrect contact and disconnection. Action : If the loosening is detected, tighten securely. If the incorrect contact and/or disconnection are/is detected, replace relevant harness(es) with new one(s).

Conditionor cause	Check and action
Repetition of error of recovery from emergency stop	Check: Identify whether error cause(s) is (are) main board, sub-board and/or DC+5V/±12V switching power supply. Check that actual output voltage is ≧4.8V (nominal: 5VDC) when measured at test points on main and sub-board. Action： When ≧4.8V is not outputted to the main board and sub-board: ・Replace sub-board with new one or the switching power supply with new one. When it is outputted to sub-board, while it is not outputted to main board: ・ Replace main board with new one. When it is outputted to the main board and sub-board: ・ Replace main board with new one.

E02 T1 TEMPERATURE SENSOR ERROR

Detection	T1 temperature exceeding measurable limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	•Continuance • ↑ • ↑ • ↑ • ↑ •Dialysate line stop • ↑ • ↑ • ↑	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Indication error of temperature and other analog system	Check: Check whether indications of all temperature sensors and other sensors such as dialysate pressure sensor are incorrect. Check stable output of voltage of ≧4.9V (nominal: 5Vref) at test point on main board. Action: Replace main board with new one.
Incorrect [T 1] terminal connection	Check: Check no incorrect wiring, loosening, corrosion and/or disconnection at TM1 T1 terminal of main board. Action: If loosened, tighten securely. If incorrectly wired, correct. If corroded or disconnected, replace [T1] with new one.
Internal disconnection or short circuit of [T1]	Check: Remove TM1 T1 terminal from main board and measure resistance between Red and White to find short circuit, disconnection and fluctuation. Action: Replace [T1] with new one.
Introduction of high temperature water from water supply source	Action: Overhaul dialysate line to correct potential damage.
Incorrect indicated temperature calibration of main board	Action: Calibrate temperatures indicated by [T1], [T2] and [T3] circuits of main board using temperature calibrator. If the calibration is impossible, replace main board with new one.

E03 T2 TEMPERATURE SENSOR ERROR

Detection	T2 temperature exceeding measurable limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	•Continuance • ↑ • ↑ • ↑ • ↑ •Dialysate line stop • ↑ • ↑ • ↑	—	—	○

Reset	Press [RESET] SW.	Note	After Ver 3, measurable extent of upper limit while rinse isn't detectable.

Condition or cause	Check and action
Indication error of temperature and other analog system	Check: Check whether indications of all temperature sensors and other sensors such as dialysate pressure sensor are incorrect. Check stable output of voltage of ≧4.9V (nominal: 5Vref) at test point on main board. Action: Replace main board with new one.
Incorrect [T2] terminal connection	Check: Check no incorrect wiring, loosening, corrosion and/or disconnection at TM1 T2 terminal of main board. Action: If loosened, tighten securely. If incorrectly wired, correct. If corroded or disconnected, replace [T2] with new one
Internal disconnection or short circuit of [T2]	Check: Remove TM1 T2 terminal from main board and measure resistance between Red and White to find short circuit, disconnection and fluctuation. Action: Replace [T2] with new one.
Incorrect indicated temperature calibration of main board	Action: Calibrate temperatures indicated by [T1], [T2] and [T3] circuits of main board using temperature calibrator. If the calibration is impossible, replace main board with new one.

E04 T3 TEMPERATURE SENSOR ERROR

Detection	T3 temperature exceeding measurable limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	•Continuance • ↑ • ↑ • ↑ • ↑ •Dialysate line stop • ↑ • ↑ • ↑	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Indication error of temperature and other analog system	Check: Check whether indications of all temperature sensors and other sensors such as dialysate pressure sensor are incorrect. Check stable output of voltage of ≧4.9V (nominal: 5Vref) at test point on main board. Action: Replace main board with new one.
Incorrect [T3] terminal connection	Check: Check no incorrect wiring, loosening, corrosion and/or disconnection at TM1 T3 terminal of main board. Action: If loosened, tighten securely. If incorrectly wired, correct. If corroded or disconnected, replace [T2] with new one
Internal disconnection or short circuit of [T3]	Check: Remove TM1 T3 terminal from main board and measure resistance between Red and White to find short circuit, disconnection and fluctuation. Action: Replace [T3] with new one.
Incorrect indicated temperature calibration of main board	Action: Calibrate temperatures indicated by [T1], [T2] and [T3] circuits of main board using temperature calibrator. If the calibration is impossible, replace main board with new one.

E05 DIALYSATE TEMPERATURE MAX ALARM

Detection	Dialysate temperature T3 of ≧upper alarm limit during heater ON

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	Auto bypass Heater OFF	—	—	○

Reset	Press [RESET] SW to reset. Auto reset is caused after release from alarm condition for 10 seconds.	Note	

Condition or cause	Check and action
Actually higher dialysate temperature	Check: Check whether actual dialysate temperature is higher than upper alarm limit by touching dialysate supply line with hand when the line is connected to dialyzer or by measurement of temperature of dialysate discharged from coupler outlet using thermometer when patient is not connected to the machine.
○Failure of main board	Action: Replace main board with new one.
○Incorrect calibration of indicated temperature of main board	Action: Calibrate temperatures indicated by [T1], [T2] and [T3] circuits of main board using temperature calibrator. If the calibration is impossible, replace main board with new one.
○Higher supply water temperature	Action: Adjust supply water temperature as specified. ・When heat exchanger is used : 5 to 30℃ ・When heat exchanger is not used : 17 to 30℃
○Lower priming flow rate	Action: Adjust priming flow rate to 700 to 750mL/min.

Actually acceptable dialysate temperature	**Check: Check whether actual dialysate temperature is acceptable by touching dialysate supply line with hand when the line is connected to dialyzer or by measurement of temperature of dialysate discharged from coupler outlet using thermometer when patient is not connected to the machine.**
○Failure of T3 temperature sensor	**Check: Check whether indicated temperature is fluctuated when harness of T3 temperature sensor is shaken.** **Check also whether indicated T3 temperature is deviated when temperature calibrator is connected.** **Action: If check result is unacceptable, replace T3 temperature sensor with new one.**
○Incorrect calibration of main board	**Check: Check whether indicated T3 temperature is deviated when temperature calibrator is connected.** **Action: Calibrate [T3] circuit of main board using temperature calibrator.** **If the calibration is impossible, replace main board with new one.**

E06 DIALYSATE TEMPERATURE MIN ALARM

Detection	Dialysate temperature T3 of ≦lower alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (3 times)	Auto bypass	—	—	○

Reset	Press [RESET] SW to reset. Auto reset is caused after release from alarm condition for 10 seconds.	Note	

Condition or cause	Check and action

Actually lower dialysate temperature	**Check: Check whether actual dialysate temperature is lower than lower alarm limit by touching dialysate supply line with hand when the line is connected to dialyzer or by measurement of temperature of dialysate discharged from coupler outlet using thermometer when patient is not connected to the machine.** **Action: Replace main board with new one.**
○ Failure of main board **○ Incorrect calibration of indicated temperature of main board**	**Action: Calibrate temperatures indicated by [T1], [T2] and [T3] circuits of main board using temperature calibrator.** **If the calibration is impossible, replace main board with new one.**
○ Lower supply water temperature	**Action: Adjust supply water temperature as specified.** **・When heat exchanger is used : 5 to 30℃** **・When heat exchanger is not used : 17 to 30℃**
○Failure of heater	**Check: Measure resistance between both ends of heater at room temperature after power OFF.** **Action: Replace heater if the resistance is out of the below ranges:** **230V spec. : 38.3 to 44.1Ω** **110V spec. : 8.7 to 10.0Ω**
○ Higher priming flow rate	**Action: Adjust priming flow rate to 700 to 750ml/min.**
Actually acceptable dialysate temperature	**Check: Check whether actual dialysate temperature is acceptable by touching dialysate supply line with hand when the line is connected to dialyzer or by measurement of temperature of dialysate discharged from coupler outlet using thermometer when patient is not connected to the machine.**
○ Failure of T3 temperature sensor	**Check: Check whether indicated temperature is fluctuated when harness of T3 temperature sensor is shaken.** **Check also whether indicated T3 temperature is deviated when temperature calibrator is connected.** **Action: If check result is unacceptable, replace T3 temperature sensor with new one.**
○ Incorrect calibration of main board	**Check: Check whether indicated T3 temperature is deviated when temperature calibrator is connected.** **Action: Calibrate [T3] circuit of main board using temperature calibrator.** **If the calibration is impossible, replace main board with new one.**

E07 DIALYSATE PRESSURE MAX LIMIT

Detection	Dialysate pressure of ≧+400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait	•○ (7 times)	UF stop	2 sec.	2 sec.	○
•Rinse	•↑	ON of V4 and V10 for 2 sec.			
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Auto reset of BP, SP and CLV Press [RESET] SW to reset UF stop.	Note	

Condition or cause	Check and action
Pressure rise due to failure of [PR1]	Action: Adjustment of [PR1] In adjustment is impossible, repair or replace [PR1].
Leak from [V10]	Action: Repair or replacement of [V10]
Error occurrence at gas purge ○Occlusion of [R2]	Action: Change [R2] so that dialysate pressure becomes 0 to 100mmHg during gas purge.
○Excess tightening of [PC2]	Action: Adjust [PC2] so that dialysate pressure becomes 0 to 100mmHg during gas purge.
○Impossible opening of [V4]	Check: Check whether [V4] functions when it is turned on or off in maintenance mode 4 screen. If not functions, remove connector from [V4] and check whether 24V is outputted to the connector when [V4] is ON in maintenance mode 4 screen. Action: ・If 24V is not outputted, replace main board with mew one. ・If it is outputted, replace [V4] with mew one.
Pressure rise due to folding of blood line	Action: Correct folding.

Failure of dialysate pressure sensor board or the sensor	Check: Disconnect hose from the sensor Assy to expose to atmosphere for checking whether indicated pressure is nearly 0mmHg. Action: If the indicated pressure is not nearly 0mmHg, calibrate the sensor board. If calibration is impossible, replace the board or sensor with new one.

E07 DIALYSATE PRESSURE MAX LIMIT

Condition or cause	Check and action
Disconnection of harness from the sensor Assy or insufficient contact of connector of it	Check: Pull lead wire (harness) lightly to check whether it is separated or loosened. Action: Repair
Drain tube is blocked.	Check : Remove drain tube from drain port and check drain liquid is drained from port correctly or not.
○No folding/kinking of Drain tube	Action : Remove the trouble cause.
○Drain tube tip is placed too higher position.	Action : Drain tube tip must be placed above the machine floor by 0 to 60 cm.
○Drain tube is too long.	Action : Use tube of an inter diameter of 8 mm and a length of 2 m or shorter to connect to the port.

E08 DIALYSATE PRESSURE MIN LIMIT

Detection	Dialysate pressure of ≦-400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait	•○ (7 times)	UF stop	2 ses.	2 sec.	○
•Rinse	•↑	ON of V4 and V10 for 2 sec.			
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Auto reset of BP, SP and CLV Press [RESET] SW to reset UF stop.	Note	

Condition or cause	Check and action
Occlusion of dialysate line to dialyzer	Check: Check whether the line is folded or clamped by forceps visually. Action: Correct folding or clamp.
Excess occlusion in dialyzer	Action: Replace dialyzer with new one.
Leak from [V4]	Check: Check stop of leak by clamping [V4] line with forceps. Action: Clean [V4] by rinsing after disassembling or replace it with new one.
Opening of [V4] due to malfunction of [FSW]	Action: Clean air-elimination tank [AS2] by rinsing after disassembling or replace it with new one.
Occlusion of [RV2]	Action: Adjust pressure in closed line. If adjustment is impossible, Clean [RV2] by rinsing after disassembling or replace it with new one.
Error occurrence during gas purge ○Failure of [V10]	Check: Check whether [V10] functions when it is turned on or off in maintenance mode 4 screen. If not functions, disconnect connector from [V10] and turn on it in maintenance mode 4 screen to check whether 24V is outputted to the connector. Action: If 24V is not outputted, replace main board with new one. If it is outputted, replace [V10] with new one.

Failure of dialysate pressure sensor board or the sensor	**Check: Disconnect hose from the sensor Assy to expose to atmosphere for checking whether indicated pressure is nearly 0mmHg.** **Action: If the indicated pressure is not nearly 0mmHg, calibrate the sensor board.** **If calibration is impossible, replace the board or sensor with new one.**
Disconnection of harness from the sensor Assy or insufficient contact of connector of it	**Check: Pull lead wire (harness) lightly to check whether it is separated or loosened.** **Action: Repair**
Low water supply flow	**Action : Increase water supply flow rate more than 750 mL/min.**
No water supply	**Check/Action : See E26 SHORT WATER SUPPLY.**
Low water supply pressure	**Check/Action : See E26 SHORT WATER SUPPLY.**
Alarm while gaspurge	**Check/Action : See E26 SHORT WATER SUPPLY.**
On the acid rince without an acid rince option.	**Check/Action : See E26 SHORT WATER SUPPLY.**

E09 DIALYSATE PRESSURE MAX ALARM

Detection	Dialysate pressure of ≧set upper alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop ON of V4 and V10 for 2 sec.	2 sec.	2 sec.	○

Reset	Auto reset of BP, SP and CLV Press [RESET] SW to reset UF stop.	Note	By the alarm actuation, upper/lower alarm limits of venous pressure become error free.

Condition or cause	Check and action
Simultaneous actuation of this alarm with venous pressure max alarm	Check: See E13 VENOUS PRESSURE MAX ALARM. Action: See E13 VENOUS PRESSURE MAX ALARM.
Dialysate pressure rise due to UF stop	Action: Remove cause of UF stop.
Dialysate pressure rise due to failure of [PR1]	Action: Adjust [PR1]. If adjustment is impossible, repair [PR1] or replace it with new one.
Leak from [V10]	Action: Repair [V10] or replace it with new one.
Leak from [V5] and [V7]	Action: Repair [V5] and [V7] or replace them with new ones.

E10 DIALYSATE PRESSURE MIN ALARM

Detection	Dialysate pressure of ≦set lower alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop ON of V4 and V10 for 2 sec.	2 sec.	2 sec.	○

Reset	Auto reset of BP, SP and CLV Press [RESET] SW to reset UF stop.	Note	By the alarm actuation, upper/lower alarm limits of venous pressure become error free.

Condition or cause	Check and action
Simultaneous actuation of this alarm with venous pressure min alarm	Check: See E14 Venous pressure min alarm. Action: See E14 Venous pressure min alarm.
Occlusion of [RV2]	Action: Adjust pressure in closed line. If adjustment is impossible, clean [RV2] by rinsing after disassembling or replace it with new one.
Leak from [V4]	Check: Check no dialysate pressure change by clamping [V4] line with forceps. Action: In the case of no change, clean [V4] by rinsing after disassembling or replace it with new one.
Opening of [V4] due to failure of [FSW] The opening may be simultaneously caused with E44 AIR ELIMINATION TANK ERROR	Check: See E44 AIR ELIMINATION TANK ERROR Action: See E44 AIR ELIMINATION TANK ERROR
Leak from [V6] and [V8]	Action: Repair [V6] and [V8] or replace them with new ones.
Excess occlusion in dialyzer	Action: Replace dialyzer with new one if required.

E11 VENOUS PRESSURE MAX LIMIT

Detection	Venous pressure of ≧+400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait	•○ (7 times)	UF stop	○	—	○
•Rinse	•↑				
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Press [RESET] SW to recover.	Note	

Condition or cause	Check and action
Folding or occlusion of blood line between Venous Drip Chamber and patient or occlusion of the line with Robert clamp	Action: Remove the trouble cause.
Thrombus formed at mesh of venous drip chamber or at shunt connector	Action: Remove thrombus or replace blood line with new one.
Error occurrence during single needle dialysis	Action: Set upper pressure change limit of SN correctly.
Failure of venous pressure sensor board	Check: Disconnect blood line from venous pressure inlet port to expose to atmosphere and check indicated venous pressure is nearly 0mmHg. Action: If nearly 0mmHg is not indicated, calibrate the board. If calibration is impossible, replace the board with new one.

E12 VENOUS PRESSURE MIN LIMIT

Detection	Venous pressure of ≦-400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait	•○ (7 times)	UF stop	○	—	○
•Rinse	•↑				
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Press [RESET] SW to recover.	Note	

Condition or cause	Check and action
Simultaneous occurrence of this error with dialysate related error	Action: Remove cause of dialysate related error.
Simultaneous occurrence of this error with arterial pressure related error	Action: Remove cause of arterial pressure related error
Press of DRAIN SW without removing coupler of dialyzer under occluding venous line with Robert clamp	Note: DRAIN SW operation-miss
Failure of venous pressure sensor board	Check: Disconnect blood line from venous pressure inlet port to expose to atmosphere and check indicated venous pressure is nearly 0mmHg. Action: If nearly 0mmHg is not indicated, calibrate the board. If calibration is impossible, replace the board with new one.

E13 VENOUS PRESSURE MAX ALARM

Detection	Venous pressure of ≧set upper alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop	○	—	○

Reset	Press [RESET] SW to recover.	Note	By the alarm actuation, upper/lower alarm limits of dialysate pressure become error free.

Condition or cause	Check and action
Occlusion of venous line.	Check: Check shunt occlusion or blood line folding. Action: Remove the trouble.
Occlusion of arterial line	Check: Check shunt occlusion or blood line folding. Action: Remove the trouble.
Venous pressure change due to patient movement	Action: If the change is significant, raise somewhat upper alarm limit of venous pressure at discretion of doctor.
Significant discharge pressure change of blood pump	Check: Check whether discharge flow rate, pressure applied to rolling tube and rotor rotation of blood pump are normal. Action: Adjust the occlusion or the pump rpm correctly. If adjustment is impossible, replace the pump or sub-board with new one.

E14 VENOUS PRESSURE MIN ALARM

Detection	Venous pressure of ≦set lower alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop	○	—	○

Reset	Press [RESET] SW to recover.	Note	By the alarm actuation, upper/lower alarm limits of dialysate pressure become error free.

Condition or cause	Check and action
Blood pressure drop of patient	Action: Stop UF and monitor patient condition. Correct if set lower alarm limit of venous pressure is incorrect.
Dislodgment of venous line from venous pressure inlet port	Check: Check no introduction of blood in venous pressure sensor line. Action: When blood is not introduced in the line, connect venous line to the port. If introduced, replace the sensor line with new one.
Occlusion of venous line	Check: Check shunt occlusion or venous line folding. Action: Remove the trouble.
Occlusion of arterial line.	Check: Check shunt occlusion or arterial line folding. Action: Remove the trouble.
Venous pressure change due to patient movement	Action: If the change is significant, lower somewhat lower alarm limit of venous pressure at discretion of doctor.
Significant discharge pressure change of blood pump	Check: Check whether discharge flow rate, pressure applied to rolling tube and rotor rotation of blood pump are normal. Action: Adjust the occlusion or the pump rpm correctly. If adjustment is impossible, replace the pump or sub-board with new one.

E15 ARTERIAL PRESSURE MAX LIMIT

Detection	Arterial pressure of ≧+400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait	•○ (7 times)	UF stop	○	—	○
•Rinse	•↑				
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Press [RESET] SW to recover.	Note	

Condition or cause	Check and action
Simultaneous actuation of this error with dialysate pressure related error	Action: Remove cause of dialysate pressure related error.
Simultaneous actuation of this error with venous pressure related error	Action: Remove cause of venous pressure related error.
Folding or occlusion of blood line between arterial Drip chamber and dialyzer or occlusion of the line with Robert clamp	Action: Remove the trouble cause.
Folding or occlusion of blood line between venous Drip chamber and patient or occlusion of the line with Robert clamp	Action: Remove the trouble cause.
Thrombus formed at mesh of arterial drip chamber or	Action: Remove thrombus or replace blood line with new one.
Failure of arterial pressure sensor board	Check: Disconnect blood line from arterial pressure inlet port to expose to atmosphere and check indicated arterial pressure is nearly 0mmHg. Action: If nearly 0mmHg is not indicated, calibrate the board. If calibration is impossible, replace the board with new one.

E16 ARTERIAL PRESSURE MIN LIMIT

Detection	Arterial pressure of ≦-400mmHg

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait	•○ (7 times)	UF stop	○	—	○
•Rinse	•↑				
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Press [RESET] SW to recover.	Note	

Condition or cause	Check and action
Simultaneous actuation of this error with dialysate pressure related error	Action: Remove cause of dialysate pressure related error.
Thrombus formed at arterial shunt connector	Action: Remove thrombus or replace blood line with new one.
Folding or occlusion of blood line between arterial drip chamber and patient or occlusion of the line with Robert clamp	Action: Remove the trouble cause.
Failure of arterial pressure sensor board	Check: Disconnect blood line from arterial pressure inlet port to expose to atmosphere and check indicated arterial pressure is nearly 0mmHg. Action: If nearly 0mmHg is not indicated, calibrate the board. If calibration is impossible, replace the board with new one.

E17 ARTERIAL PRESSURE MAX ALARM

Detection	Arterial pressure of ≧set upper alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop	○	—	○

Reset	Press [RESET] SW to recover.	Note	By the alarm actuation, set upper/lower alarm limits of dialysate pressure become error free.

Condition or cause	Check and action
Occlusion of venous line.	Check: Check shunt occlusion and blood line folding. Action: Correct the trouble.
Occlusion of arterial line.	Check: Check shunt occlusion and blood line folding. Action: Correct the trouble.
Arterial pressure change due to patient movement	Action: If the change is significant, raise set upper alarm limit of arterial pressure somewhat at discretion of doctor.
Significant discharge pressure change of blood pump	Check: Check whether discharge flow rate, pressure applied to rolling tube and rotor rotation of blood pump are normal. Action: Adjust the occlusion or the pump rpm correctly. If adjustment is impossible, replace the pump or sub-board with new one.

E18 ARTERIAL PRESSURE MIN ALARM

Detection	Arterial pressure of ≦set lower alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	UF stop	○	—	○

Reset	Press [RESET] SW to recover.	Note	By the alarm actuation, set upper/lower alarm limits of dialysate pressure become error free.

Condition or cause	Check and action
Blood pressure drop of patient	Action: Stop UF and monitor patient condition. Correct if set lower alarm limit of venous pressure is incorrect.
Dislodgment of blood line form arterial pressure inlet port	Check: Check no introduction of blood in arterial pressure sensor line. Action: When blood is not introduced in the line, connect arterial line to the port. If introduced, replace the arterial line with new one.
Occlusion of venous line.	Check: Check shunt occlusion and blood line folding. Action: Correct the trouble.
Occlusion of arterial line.	Check: Check shunt occlusion and blood line folding. Action: Correct the trouble.
Arterial pressure change due to patient movement	Action: If the change is significant, raise set upper alarm limit of arterial pressure somewhat at discretion of doctor.
Significant discharge pressure change of blood pump	Check: Check whether discharge flow rate, pressure applied to rolling tube and rotor rotation of blood pump are normal. Action: Adjust the occlusion or the pump rpm correctly. If adjustment is impossible, replace the pump or sub-board with new one

E19 TMP ALARM

Detection	TMP (VP - DP) of ≧set alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis •Recovery	○ (Continuous)	UF stop	○	○	○

Reset	Press [RESET] SW to recover.	Note	

Condition or cause	Check and action
Excess occlusion in dialyzer	Action: Replace dialyzer with new one at discretion of doctor.
Lower setting of TMP alarm limit	Action: Set TMP to appropriate value.
E09 DIALYSATE PRESSURE MAX ALARM E10 DIALYSATE PRESSURE MIN ALARM E13 VENOUS PRESSURE MAX ALARM Simultaneous actuation of this alarm with E14 VENOUS PRESSURE MIN ALARM	Action: See E09 DIALYSATE PRESSURE MAX ALARM See E10 DIALYSATE PRESSURE MIN ALARM See E13 VENOUS PRESSURE MAX ALARM See E14 VENOUS PRESSURE MIN ALARM
E07 DIALYSATE PRESSURE MAX LIMIT E08 DIALYSATE PRESSURE MIN LIMIT E11 VENOUS PRESSURE MAX LIMIT Simultaneous actuation of this alarm with E12 VENOUS PRESSURE MIN LIMIT	Action: See E07 DIALYSATE PRESSURE MAX LIMIT. See E08 DIALYSATE PRESSURE MIN LIMIT. See E11 VENOUS PRESSURE MAX LIMIT. See E12 VENOUS PRESSURE MIN LIMIT.

E20 DIALYSATE CONDUCTIVITY MAX ALARM

Detection	Dialysate conductivity of ≧upper alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	Auto bypass	—	—	—

Reset	Press [RESET]SW. Auto reset after release from alarm condition for 10 sec.	Note	

Condition or cause	Check and action
Abnormal actual conductivity	Check: Take dialysate sample from [SL] to measure actual conductivity by specified method.
○No adjustment of conductivity	Action: Set conductivity correctly and calibrate indicated conductivity in maintenance mode 5 screen.
○Failure of main board	Check: See E33 VISCOUS PUMP DRIVING ERROR(VPa) and E34 VISCOUS PUMP DRIVING ERROR(VPb). Action: See E33 VISCOUS PUMP DRIVING ERROR(VPa) and E34 VISCOUS PUMP DRIVING ERROR(VPb).
○Failure of [V13] or [V14]	Action: Repair [V13] or [V14] (V15)) or replace it with new one.
○Failure of [V2] or [V3]	Action Repair [V2] or [V3] or replace it with new one.
○Higher or lower priming flow rate	Action: Adjust the flow rate to 700-750mL/min.
○Failure of [C2]	Action: Replace [C2] with new one.
○Folding, occlusion or collapsing of concentrate line tube	Action: Correct the trouble.

E20 DIALYSATE CONDUCTIVITY MAX ALARM

Condition or cause	Check and action
Normal actual conductivity	Check: Take dialysate sample from [SL] to measure conductivity by specified method.
○[CD] electrode contaminated with dirt such as $CaCO_3$ or leak from conductivity sensor	Action: Rinse the electrode with acetic acid followed by water rinsing sufficiently. If the dirt can not be removed, use specified detergent such as CARON or SYUNMA to remove it after disassembling conductivity sensor.
○Incorrect [CD] terminal connection	Check: Check no miss-wiring, loosening, corrosion and disconnection of TM1 CD terminal of main board. Action: If loosened, tighten the connection securely. If miss-wired, correct. If corroded or disconnected, replace harness with mew one.
○Internal disconnection or short circuit of [CD] harness	Check: After disconnecting TM1 CD terminal from main board, measure resistance between [CD] and [GND] to check no short circuit, disconnection and fluctuation of measured resistance. Action: Replace [CD] harness with new one.
○Failure of main board	Check: Change ambient temperature of main board to check whether conductivity and temperature indications are changed. Action: If incorrectly indicated, replace main board with new one.
When Na infusion unit (option) is used:	
○Higher or lower concentration of Na concentrate	Action: Use 10% Na concentrate.
○ Use of other chemical added concentrate	Action: Set proper upper alarm limit of conductivity by considering electrolyte concentration.
○Use of other concentrate	Action: Use 10% Na concentrate.

E21 DIALYSATE CONDUCTIVITY MIN ALARM

Detection	Dialysate conductivity of ≦lower alarm limit

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	Auto bypass	—	—	—

Reset	Press [RESET]SW. Auto reset after release from alarm condition for 10 sec.	Note	

Condition or cause	Check and action
See E20 DIALYSATE CONDUCTIVITY MAX ALARM.	See E20 DIALYSATE CONDUCTIVITY MAX ALARM.

E22 BLOOD LEAK SENSOR ERROR	TYPE Ⅰ (RK-GR1)

Detection	•Absolute blood leak REAL value of ≧201 in PREP. or PREP. END process •Absolute blood leak REAL value of ＜201 in DIALYSIS or RECOVERY process •Signal of RINSE alarm

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	Line function stop	—	—	○

Reset	Press [RESET]SW.	Note	BLD SENS VALUE :No7 in maintenance mode 1 Cancellation of ditection alarm is avairable with ROM Ver3.30 at maintenance mode 2.

E22 BLOOD LEAK SENSOR ERROR	TYPE Ⅱ (RK-GR2)

Detection	•Absolute blood leak REAL(BLD AUTO ZERO) value of ≧201 in PREP. or PREP. END process •Signal of RINSE alarm

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	Line function stop	—	—	○

Reset	Press [RESET]SW	Note	•BLD AUTO ZERO:№6 in maintenance mode1 •Cancellation of ditection alarm is avairable with ROM Ver3.30 at maintenance mode 2.

E22 BLOOD LEAK SENSOR ERROR	TYPE Ⅱ (BLD-01)

Detection	•Absolute blood leak REAL(BLD AUTO ZERO) value of ≧201 in PREP. or PREP. END process

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. end	○ (Continuous)	Line function stop	—	—	○

Reset	Press [RESET]SW	Note	•BLD AUTO ZERO:№6 in maintenance mode1 •Cancellation of ditection alarm is avairable with ROM Ver3.30 at maintenance mode 2.

Condition or cause	Check and action
Excess leak from dialyzer	Action: Replace dialyzer with new one. ⚠CAUTION After setting to error free condition, error is continued when leaked blood is retained in drain side of viscous chamber. In such case, release the alarm to operate the machine until the blood is discharged. If required, clean leak sensor window by wiping with swab or the like after opening the sensor cover.
Excess dirt of blood leak sensor window (RK-GR1,RK-GR2,BLD-01)	Action: Clean the window by wiping with swab or the like after opening the sensor cover.
Inclusion of large amount of air in blood leak sensor	Check: Take dialysate sample from drain port of the machine or dialysate outlet of dialyzer to check blood in the sample visually or by use of specified tester. Check: Check visually whether fine air bubbles impossible to be removed by [AS1] and [AS2] remain in them and whether negative pressure line (example: pump inlet) in the machine is leaked. Action: Repair damaged part or replace damaged component with new one.
Incorrect connection of blood leak sensor connector	Check: Pull harness lightly to find disconnection and loose connection and check defect of connector. Action: Replace harness with new one.
Deterioration or failure of LED of blood leak sensor	Action: Readjust the sensor. If adjustment is impossible, replace the sensor Assy with new one.
Leak of silicone oil from chamber	Action. Replace chamber Assy with new one. Clean chamber inside with detergent to remove dirt formed by contact with the oil from there. Replace silicone oil line and/or connectors contaminated by the oil leak with new one(s) when required.

E23 BLOOD LEAK ALARM

Detection	BLD REAL VALUE of ≧set alarm limit (BLD REAL VALUE: No.5 of maintenance mode 1, Alarm limit: No.12 of maintenance mode 2)

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	UF stop Auto bypass	○	—	○

Reset	Press [RESET]SW.	Note	

Condition or cause	Check and action
Blood leak	Check: Take dialysate sample from drain port of the machine or dialysate outlet of dialyzer to check blood in the sample visually or by use of specified tester. Action: If leaked from dialyzer: After shifting to RECOVERY process, press BYPASS SW and replace dialyzer with new one followed by priming it.

No blood leak	**Check: Take dialysate sample from drain port of the machine or dialysate outlet of dialyzer to check blood in the sample visually or by use of specified tester.**
○Air inclusion	**Check: Check visually whether fine air bubbles impossible to be removed by [AS1] and [AS2] remain in them and whether negative pressure line (example: pump inlet) in the machine is leaked.**
○Dirt of blood leak sensor window (Deposition of protein and/or $CaCO_3$)	**Action: Repair damaged part or replace damaged component with new one.**
○ Deterioration or failure of LED of blood leak sensor	**Action: Clean the window.**
○Failure of main board	**Action: Readjust the sensor. If adjustment is impossible, replace the sensor Assy with new one.**
○Leak of silicone oil	**Action: Replace the sensor with new one and check correct function of it..** **If the replacement is ineffective, replace main board with new one.**
	Check: Remove cover from the sensor and check whether dialysate is turbid or is mixed with the oil.
	Action. Replace chamber Assy with new one. **Clean chamber inside with detergent to remove dirt formed by contact with the oil from there.** **Replace silicone oil line and/or connectors contaminated by the oil leak with new one(s) when required.**

E24 AIR BUBBLES ARE DETECTED

Detection	Air bubbles when BUBBLE [ON/OFF] SW is ON

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	UF stop	○ SW-OFF	○	○

Reset	Press [RESET] SW to reset UF stop and CLV. Reset BP/SP by SW-ON.	Note	Detection of air bubbles only when BUBBLE [ON/OFF] SW is ON.

Condition or cause	Check and action
Air bubbles are detected: ○Air introduction from blood line	Action: Correct air introduction site and collect air in drip chamber.
Air bubbles are not detected: ○Accidental dislodgment of blood line from air bubble sensor	Action: Return the line to the sensor.
○Malfunction due to external noise	Action: Remove source of noise or place the source at distant position.
○Disconnection of the sensor harness	Action: Replace the sensor with new one.
○Failure of air bubble sensor board	Action: Adjust the board. If adjustment is impossible, replace the board or the sensor with new one.

E25 HEATER OVER HEAT ALARM

Detection	Functioning of [LS1] placed at outer wall of heater

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. End •Dialysis •Recovery	○ (Continuous)	Heater OFF	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Heater overheat	Check: Measure voltage at heater side of TERMINAL BLOCK 3 using tester to find whether 230V (or 110V) is not applied always. ⚠CAUTION DO NOT touch heater with hand because heater temperature exceeds 60℃ when heater SW is ON.
○Failure of [T1], [T2] or [T3]	Action: See E02 T1 TEMPERATURE ERROR; E03 T2 TEMPERATURE ERROR; and E04 T3 TEMPERATURE ERROR
○Failure of sub-board	Action: Replace sub-board with new one.
○Failure of SSR	Action: Replace SSR with new one.
○Failure of RELAY	Action: Replace RELAY with new one.
No heater overheat	
○Failure of [LS1]	Check: Check closed contact of [LS1] at room temperature. If possible, check opening of the contact when heater surface temperature is about 60℃. Action: Replace [LS1] with new one if malfunction of [LS1] is detected.
○ Disconnection of lead wires connected to [LS1] or incorrect connector connection	Check: Pull lightly lead wires of CN19 and those of connector of heater side to check disconnection or loosening of the wires. Action: Repair.
○Failure of main board	Action, If [LS1] is normal, replace main board with new one.

E26 SHORT WATER SUPPLY

Detection	Detect alarm depends on the time of Water priming complete. ● Disabled detection of PS (Pressure switch) within 160 sec after starts the Preparation. ● Disabled detection of PS within 60 sec after suction of B liquid on Flesh Dialysate mixing cycle. (After suction of A liquid in case of Acetate Dialysis) ● Disabled detection of PS within 65 sec after complete the UF leak check procedure.

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) • ↑ • ↑ • ↑	Line function stop	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
No water supply	Check: Remove water supply port to check normal water flow.
○Occlusion of water supply filter	Action: Clean the filter or replace it with new one.
○Folding or occlusion of water supply line	Action: Correct the trouble.
○Leak from water supply system	Action: Repair leaked site.
○Water supply stop	Action: Operate water supply equipment.

Low water supply pressure	**Check: Remove water supply port to check normal water flow.**
○Low water supply pressure	**Action: Raise the pressure to ≧0.049MPa(0.5kgf/cm^{2})**
○Incorrect adjustment or failure of [PR]	**Action: Adjust [PR] correctly.** **If adjustment is impossible, repair [PR].**
○ Incorrect adjustment or failure of [RV1]	**Action: Adjust priming completion pressure correctly by operating [RV1].** **If adjustment is impossible, repair [RV1].**
○Incorrect adjustment or failure of [PS]	**Action: Adjust [PS] correctly.** **If adjustment is impossible, repair [PS].**
○Failure of main board	**Check: Remove connector from [PS] and check ON and OFF of [PS] by short circuiting and opening connector pins respectively in maintenance mode 4 screen.** **Action: If ON and OFF are not executed, replace main board with new one**
○Alarm while gaspurge **○On the acid rince without an acid rince option.**	**Check: Check the capacity of a RO supply against number of Dialysis machine.** **Action: Adjust the ratio of RO supply capacity to a number of Dialysis machine.** **Check: Check a mode of acid rince option .** **Action: Set a mode of acid rince option to off.**

E27 SHORT DIALYSATE FLOW

Detection	No functioning of [FS] after 85 seconds following chamber changeover

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	—	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action

Normal dialysate flow (at set rate)	
○Low dialysate flow rate	○Adjust the flow rate to 300 to 600ml/min.
○ Disconnection of lead wires connected to [FS] or incorrect connector contact	Check: Pull lightly lead wires of CN15 placed on main board and those of connector of [FS] side to check disconnection or loosening of the wires. Action: Repair.
○Failure of [FS]	Check: Measure 24V power supply and output voltages of [FS] and pin voltage of flow sensor. ・Power supply voltage between ＋ and －: about 24V ・Output voltage between OUT and －: About 24V when float is UP condition About 0V when float is DOWN condition Action: Adjust positions of [FS] and [FM]. If adjustment is impossible, replace [FS] or flow meter Assy with new one.
○Failure of main board	Check: Measure 24V power supply and output voltages of [FS] and pin voltage of flow sensor Action: If voltage between ＋ and － is not about 24V, replace main board with new one. Check: If [FS] is normal, check indication of [FS] in maintenance mode 4 screen or FS function indicating lamp window. ・Float UP condition: OFF in maintenance mode 4 screen OFF of FS function indicating lamp window ・Float DOWN condition: ON in maintenance mode 4 screen ON of FS function indicating lamp window Action: Replace main board with new one.

E27 SHORT DIALYSATE FLOW

Condition or cause	Check and action
No dialysate flow	Check: Check no dialysate flow by [FM] placed at front side of the machine.
○Occlusion in closed circuit	Action: Repair occluded component or replace it with new one.
○Failure of [P2]	Action: Repair [P2] or replace it with new one.
○Failure of one or more of [V5] to [V9]	Action: Repair failed valve or replace it with new one.

E28 DIALYSATE FLOW STOP

Detection	•Functioning of [FS] within 20 seconds after chamber changeover •Functioning of [FS] for 170 seconds in DIALYSIS process excluding SQHD

Detection process	Audible Alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse (water rinse) •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) • ↑ • ↑ • ↑	Line function stop	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action

Normal dialysate flow	
○High dialysate flow rate	**Action: Adjust the flow rate to 300 to 600mL/min.**
○Low dialysate flow rate	**Check: Float of Flow meter cover the FS (Flow sensor) or not by checking maintenance mode 4.** **Action: Adjust the flow rate to 300 to 600mL/min.**
○This alarm occur just after gas purge function.	**Check: Detect the FS by decreasing dialysate flow to less than 300 mL/min by gas purge function under low dialysate flow condition.** **Action: Adjust the flow rate to 300 to 600mL/min.**
○ Disconnection of lead wires connected to [FS] or incorrect connector contact	**Check: Pull lightly lead wires of CN15 placed on main board and those of connector of [FS] side to check disconnection or loosening of the wires.** **Action: Repair.**
○Failure of [FS]	**Check: Measure 24V power supply and output voltages of [FS] and pin voltage of flow sensor.** **・Power supply voltage between ＋ and －: about 24V** **・Output voltage between OUT and －:** **About 24V when float is UP condition** **About 0V when float is DOWN condition** **Action: Replace [FS] or flow meter Assy.**
○Failure of main board	**Check: Measure 24V power supply and output voltages of [FS] and pin voltage of flow sensor** **Action: If voltage between ＋ and － is not about 24V, replace main board with new one.** **Check: If [FS] is normal, check indication of [FS] in maintenance mode 4 screen or FS function indicating lamp window.** **・Float UP condition: OFF in maintenance mode 4 screen** **OFF of FS function indicating lamp window** **・Float DOWN condition: ON in maintenance mode 4 screen** **ON of FS function indicating lamp window** **Action: Replace main board with new one.**

E28 DIALYSATE FLOW STOP

Condition or cause	Check and action
Connector is connected to Dialyzer on preparation process then Dialysate flow is auto-bypassed.	Action: Connect the connector to the Dialysate on preparation end process.
After connector connected to Dialyzer ,Turn BP on and unbypass.	Action: BP should be turned off while priming a Dialysis.
	Check: There is [R3] at [V10]out line tube or not.
Too much of flow at [V10]	Action: Put [R3] and change the ROM later than Ver.3 Then input D.PRESS offsetting.
Wrong dialyzer in use	Action: Change to the correct dialyzer.
No dialysate flow	Check: Check no dialysate flow by [FM] placed at front side of the machine.
○Reduced chamber capacity	Check: Measure chamber capacity.
	Action: If the capacity is not 345 to 375mL, add silicone oil or replace the chamber Assy with new one.
○Inclusion of large amount of air in closed circuit	Check: Check air inclusion in the line visually.
	Action: Repair air included component or replace it with new one.
○Low priming flow rate	Action: Adjust the flow rate to 700 to 750mL/min.
○Incorrect adjustment of [PS]	Action: Adjust [PS]. If adjustment is impossible, replace [PS] with new one.
○Occlusion in closed circuit	Action: Repair occluded component or replace it with new one.
○Failure of [P2]	Action: Repair [P2] or replace it with new one.
○Failure of one or more of [V5] to [V9]	Action: Repair failed valve or replace it with new one.

E29 SN SWITCH TIME ALARM

Detection	No arrival at SN switching pressure after set alerting time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	UF stop	○	○	○

Reset	Press [RESET] SW.	Note	Enabled alerting only when SN SW is ON

Condition or cause	Check and action
Slow venous pressure rise	Check: Check whether the pressure rise is normal by operating blood pump.
○ Large gap between rollers and housing of blood pump	Action: Adjust the gap so that rolling tube is occluded properly.
○Folding or fatigue of rolling tube	Action: Replace blood line including rolling tube
○Large clamp gap	Action: Adjust clamp gap.
○Incorrect connection of [CN18] clamp connector	Check: Remove connector to check corrosion and disconnection. Action: Replace harness with new one.
No functioning of clamp	Check: See E32 CLV POSITION ERROR. Action: See E32 CLV POSITION ERROR.
Normal venous pressure rise/lowering	Check: Observe venous pressure change during SN operation.
○ Incorrect blood flow rate, SN operation range or set SN alerting time	Check: Measure SN switching time. Action: Set properly.

E30 BLOOD PUMP ERROR

Detection	•Overload •Abnormal rotating direction •Abnormal rpm

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	○ SW-OFF	—	—

Reset	Press [RESET] SW. Turn on [BP/SP] SW.	Note	

Condition or cause	Check and action
Motor shaft lock	
○Catch of foreign matters by rotor of blood pump	Action: Turn off power to remove foreign matters.
○Damage of motor gear head	Action: Replace blood pump Assy with new one.
○Failure of sub-board	Action: Replace sub-board with new one.
No motor rotation	
○ Disconnection of lead wires connected to [BP] or incorrect connector contact	Check: Pull lightly lead wires of CN415 placed on sub-board and those of connector of [BP] side to check disconnection and loosening of the wires. Action: Connect or tighten securely.
○failure of blood pump motor	Action: Replace blood pump Assy with new one.
○Failure of sub-board	Action: Replace sub-board with new one.

E31 BLOOD PUMP STOP ERROR

Detection	•Opening of blood pump cover •OFF of [ON/OFF] SW of blood pump •0 setting of flow rate setting volume of blood pump.

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	UF stop	SP stop	—	—

Reset	Press [RESET] SW. Auto reset by release from error	Note	

Condition or cause	Check and action
Opening of blood pump cover	
○Opening of the cover	Action: Close the cover.
○ Incorrect setting of rolling tube to blood pump	Action: Set properly.
○ Impossible closing of blood pump cover due to deformation of hinge shaft.	Action: Correct the shaft deformation or replace the shaft with new one.
○No press of SW by pin of blood pump cover due to loose holding of hinge shaft	Action: Tighten screws used to hold hinge shaft securely.
Closing of blood pump cover	Check: Disconnect CN403 from sub-board to measure resistance between harness pins. ・When the cover is closed: short circuit ・When the cover is opened: open circuit
○Failure of [BPC]	Check: Check whether resistance between harness pins is open condition when the cover is closed. Action: Adjust position of [BPC]. If adjustment is impossible, replace harness with new one.
○ Disconnection of lead wires connected to [BPC] or incorrect connector contact	Check: Pull lightly lead wires of CN403 placed on sub-board to check disconnection and loosening of the wires. Action: Replace harness with new one.
○Failure of sub-board	Action: Replace sub-board with new one.

E32 CLV POSITION ERROR

Detection	Abnormal clamp positioning

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait	•○ (7 times)	—	○	—	—
•Rinse	•↑		SW-OFF		
•Rinse end	•↑				
•Air purge	•↑				
•Dialysis wait	•○ (Continuous)				
•Preparation	•↑				
•Prep. end	•↑				
•Dialysis	•↑				
•Recovery	•↑				

Reset	Press [RESET] SW. Turn on [BP/SP] SW.	Note	

Condition or cause	Check and action
Clamped condition	Check: Check whether [CLV] is OFF in maintenance mode 4 screen and also check clamp head positioning visually.
○Failure of main board	Check: Measure output voltage between 1 and 2 of CN18 placed on main board. Action: If about 24V is outputted, replace main board with new one.
○Failure of solenoid	Action: If about 24V is not outputted, replace solenoid with new one.

Non-clamped condition	**Check: Check whether [CLV] is ON in maintenance mode 4 screen and also check clamp head positioning visually.**
○Incorrect clamp positioning	**Check: Check clamp position visually.** **Action: Correct the position.**
○Incorrect positioning of [LS5] or screw for ON of [LS5]	**Check: Check whether [LS5] is turned on by screw for ON visually.** **Action: Adjust position of screw for ON.**
○Failure of [LS5]	**Check: Disconnect CN18 from main board to measure resistance between pins 5 and 6.** **Turn on and off [LS5] manually.** **・When [LS5] is ON : short circuit** **・When [LS5] is OFF : open circuit** **Action: Replace harness with new one.**
○Failure of main board	**Action: Replace main board with new one.**

E33 VISCOUS PUMP DRIVING ERROR(VPa)

Detection	● Disable to change OFF to ON of PH2 (Rotation pulse signal) during a specified time (depend on UFR) at the UF circle. ● Disable to change OFF to ON of PH1 (Original position signal) during 20 sec at the procedure of Original position. ● Detect opposite rotation during VPa working.

Detection process	Audible Alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) •↑ •↑ •↑	Line function stop	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action

Normal rotation of viscous pump with stop at error detection	
○Failure of rotation detector of sensor circuit board	**Check: Disconnect connector from viscous pump and check whether lower photo-sensor responds to manual slow rotation of position detection plate under monitoring PH2 of maintenance mode 4 screen.** **If the sensor does not respond, disconnect connector from the board and measure power supply voltage between pins 1 and 4 to find whether it is about 12V.** **Connect the connector and measure voltage between test points V and G of the board. When the voltage is about 12V, check whether Hi - Lo cycle is repeated during the pump rotation by the sensor output between test points OUT2 and G.** **Action: If voltage between test points V and G of the board is not about 12V or that between test points OUT2 and G of the board is abnormal, replace the board with new one.**
○ Failure of original point detector of sensor circuit board	**Check: Check whether upper photo-sensor responds to manual slow rotation of position detection plate under monitoring PH1 of maintenance mode 4 screen.** **If the sensor does not respond, disconnect connector from the board and measure power supply voltage between pins 1 and 4 to find whether it is about 12V.** **Connect the connector and measure voltage between test points V and G of the board. If the voltage is about 12V, check whether the sensor output between test points OUT1 and G is Lo at detection of original point and Hi at no detection of the point.** **Action: If voltage between test points V and G of the board is not about 12V or the sensor output between test points OUT1 and G of the board is abnormal, replace the board with new one.**
○ Disconnection of [PHA] harness or incorrect connector contact	**Check: Pull lightly lead wires of CN7 placed on main board to check disconnection and loosening of the wires.**
○ Failure of main board	**Action: Replace the harness with new one.**
○ Occur with E35 VP DRAWING VOLUME IS AT MAX LIM.	**Action: If the sensor circuit board is normal, replace main board with new one.** **Action: Refer to E35. then push the reset button two or three times.**

E33 VISCOUS PUMP DRIVING ERROR(VPa)

Condition or cause	Check and action
Disabled motor rotation or uneven rotation	
○Insufficient motor torque	Check: Check whether motor torque is sufficient. Press position detection plate lightly by hand during motor rotation or at motor start to find whether motor stop is caused. Action: Replace chamber Assy.
○High water supply pressure	Action: Set the pressure to 0.5 to 7.5MPa(kgf/cm^2).
○High secondary pressure	Action: Adjust [PR]. If adjustment is impossible, repair [PR] or replace it with mew one.
○High priming pressure	Action: Adjust [RV1]. If adjustment is impossible, replace [RV1] with new one.
○ Disconnection of lead wired connected to [Vpa] or incorrect connector contact	Check: Pull lightly lead wires of CN409 placed on sub-board and those of connector of Vpa side to check disconnection and loosening of the wires. Action: Correct the disconnection or loosening.
○Failure of sub-board	Action: Replace sub-board with new one.
○Failure of VPa	Action: Replace [Vpa] or chamber Assy with new one.
○Sensor Guide Plate crosses over PH1 by some causes.	Action: Disconnect connector from Viscous pump and rotate Position Detection Plate manually lower than detect position of PH1.

E34 VISCOUS PUMP DRIVING ERROR(VPb)

Detection	● Disable to change OFF to ON of PH4 (Rotation pulse signal) during a specified time (depend on UFR) at the UF circle. ● Disable to change OFF to ON of PH3 (Original position signal) during 20 sec at the procedure of Original position. ● Detect opposite rotation during VPb working.

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) •↑ •↑ •↑	Line function stop	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action

Normal rotation of viscous pump with stop at error detection	
○ **Failure of rotation detector of sensor circuit board**	**Check: Disconnect connector from viscous pump and check whether lower photo-sensor responds to manual slow rotation of position detection plate under monitoring PH4 of maintenance mode 4 screen.** **If the sensor does not respond, disconnect connector from the board and measure power supply voltage between pins 1 and 4 to find whether it is about 12V.** **Connect the connector and measure voltage between test points V and G of the board. When the voltage is about 12V, check whether Hi - Lo cycle is repeated during the pump rotation by the sensor output between test points OUT2 and G.** **Action: If voltage between test points V and G of the board is not about 12V or that between test points OUT2 and G of the board is abnormal, replace the board with new one.**
○ **Failure of original point detector of sensor circuit board**	**Check: Check whether upper photo-sensor responds to manual slow rotation of position detection plate under monitoring PH3 of maintenance mode 4 screen.** **If the sensor does not respond, disconnect connector from the board and measure power supply voltage between pins 1 and 4 to find whether it is about 12V.** **Connect the connector and measure voltage between test points V and G of the board. If the voltage is about 12V, check whether the sensor output between test points OUT1 and G is Lo at detection of original point and Hi at no detection of the point.** **Action: If voltage between test points V and G of the board is not about 12V or the sensor output between test points OUT1 and G of the board is abnormal, replace the board with new one.**
○ **Disconnection of [PHS] harness or incorrect connector contact**	**Check: Pull lightly lead wires of CN8 placed on main board to check disconnection and loosening of the wires.** **Action: Replace the harness with new one.**
○ **Failure of main board**	**Action: If the sensor circuit board is normal, replace main board with new one.**
○ **Occur with E35 VP DRAWIN VOLUME IS AT MAX LIM**	**Action: Refer to E35. then push the reset button two or three times.**

E34 VISCOUS PUMP DRIVING ERROR(VPb)

Condition or cause	Check and action
Disabled motor rotation or uneven rotation	
○Insufficient motor torque	Check: Check whether motor torque is sufficient. Press position detection plate lightly by hand during motor rotation or at motor start to find whether motor stop is caused. Action: Replace chamber Assy.
○High water supply pressure	Action: Set the pressure to 0.5 to 7.5MPa(kgf/cm^2).
○High secondary pressure	Action: Adjust [PR]. If adjustment is impossible, repair [PR] or replace it with mew one.
○High priming pressure	Action: Adjust [RV1]. If adjustment is impossible, replace [RV1] with new one.
○ Disconnection of lead wired connected to [Vpb] or incorrect connector contact	Check: Pull lightly lead wires of CN409 placed on sub-board and those of connector of Vpb side to check disconnection and loosening of the wires. Action: Correct the disconnection or loosening.
○Failure of sub-board	Action: Replace sub-board with new one.
○Failure of VPb	Action: Replace [Vpb] or chamber Assy with new one.
○Sensor Guide Plate crosses over PH3 by some causes	Action: Disconnect connector from Viscous pump and rotate Position Detection Plate manually lower than detect position of PH3.

E35 VP DRAWING VOLUME IS AT MAX LIM.

Detection	Out of operable range of viscous pump

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) •↑ •↑ •↑	Line function stop	—	—	○

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Execution of high UF at low dialysate flow rate	Check: Measure chamber switching time using stopwatch under monitoring flow meter indication. Action:ROM Ver 3.60 and older Adjust UFR or dialysate flow rate so that [UFR (L/h)]×[Chamber Switching Time] becomes ＜364. ROM Ver 3.70 and later Adjust UFR or dialysate flow rate so that [UFR (L/h)]×[Chamber Switching Time] becomes ＜260.
Significant deviation of input values of viscous pump flow rates	Check: Check whether values of [11.VPa FLOW] and [12.VPb FLOW] are correctly inputted in maintenance mode 6 screen.
Significant deviation of input values of chamber capacities	Check: Check whether values of [9.VCa VOLUME] and [10.VCb VOLUME] are correctly inputted in maintenance mode 6 screen.
No chamber switching for long time due to failure of [FS]	Check: See E27 SHORT DIALYSATE FLOW. Action: See E27 SHORT DIALYSATE FLOW.
Refer E33 VISCOUS PUMP DRIVING ERROR(VPa) E34 VISCOUS PUMP DRIVING ERROR(VPb)	Check: See E33 VISCOUS PUMP DRIVING ERROR(VPa) and E34 VISCOUS PUMP DRIVING ERROR(VPb). Action: See E33 VISCOUS PUMP DRIVING ERROR(VPa) and E34 VISCOUS PUMP DRIVING ERROR(VPb). After removing the above error causes, press [RESET] SW twice or thrice.

E36 VCa CLOSED CIRCUIT LEAK ERROR

Detection	Insufficient negative pressure in A chamber No arrival at set pressure within set time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from this error in maintenance mode 2 .

Condition or cause	Check and action
Leak from closed circuit	Check: Check leak from closed circuit visually or by contact the circuit with finger. Action: Replace leaked component with new one.
Leak from NC side of [V5] or [V6]	Action: Repair leaked [V5] or [V6] or replace it with new one.
Leak from NO side of [V7] or [V8]	Action: Repair leaked [V5] or [V6] or replace it with new one.
Detection of leak error in both A and B chambers	Action: Identify leaked site(s). Operate the machine in RINSE or DIALYSIS PREP. process to apply negative pressure to C2 line. Shift to DIALYSIS WAIT process. Turn on and off each of valves [V5] to [V8] manually in maintenance mode 4 screen and operate viscous pump manually after removing connector from the pump. Clamp IN or OUT side of dialysate pressure sensor with forceps to find whether leak is caused from V5,7 or V6,8 side. Repeat clamp position change to find other leaked sites.
○Leak from [V3] or [V4]	Action: Repair leaked [V3] or [V4] or replace it with new one.
○Leak from coupler	Action: Replace O-ring of coupler or coupler including O-ring with new one.
○ Insufficient deaeration performance of water supply	Check: Measure dissolved oxygen % in water. Action: Improve deaeration performance of the means or change set closed circuit leak detection value properly.
○Gas purge pressure setting is wrong .	Action: After input D.PRESS offset appropriately, adjust [PC2]to make gas purge pressure 0 ～ 100 mmHg .

E37 VCa CLOSED CIRCUIT LEAK ERROR

Detection	Negative pressure change in A chamber Pressure change out of set range during set time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)		—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from this error in maintenance mode2.

Condition or cause	Check and action
See E36 VCa CLOSED CIRCUIT LEAK ERROR	See E36 Vca CLOSED CIRCUIT LEAK ERROR.

E38 VCb CLOSED CIRCUIT LEAK ERROR

Detection	Insufficient negative pressure in B chamber No arrival at set pressure within set time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from this error in maintenance mode 2 .

Condition or cause	Check and action
Leak from closed circuit	Check: Check leak from closed circuit visually or by contact the circuit with finger. Action: Replace leaked component with new one.
Leak from NC side of [V7] or [V8]	Action: Repair leaked [V7] or [V8] or replace it with new one.
Leak from NO side of [V5 or [V6]	Action: Repair leaked [V5] or [V6] or replace it with new one.
Detection of leak error in both A and B chambers	Action: Identify leaked site(s). Operate the machine in RINSE or DIALYSIS PREP. process to apply negative pressure to C2 line. Shift to DIALYSIS WAIT process. Turn on and off each of valves [V5] to [V8] manually in maintenance mode 4 screen and operate viscous pump manually after removing connector from the pump. Clamp IN or OUT side of dialysate pressure sensor with forceps to find whether leak is caused from V5,7 or V6,8 side. Repeat clamp position change to find other leaked sites.
○Leak from [V3] or [V4]	Action: Repair leaked [V3] or [V4] or replace it with new one.
○Leak from coupler	Action: Replace O-ring of coupler or coupler including O-ring with new one.
○Insufficient deaeration performance of water supply	Check: Measure dissolved oxygen % in water. Action: Improve deaeration performance of the means or change set closed circuit leak detection value properly.

E39 VCb CLOSED CIRCUIT LEAK ERROR

Detection	**Negative pressure change in B chamber** **Pressure change out of set range during set time**

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	**Press [RESET] SW.**	**Note**	**Enabled release from this error in maintenance mode 2 .**

Condition or cause	Check and action
See E38 VCb CLOSED CIRCUIT LEAK ERROR.	**See E38 VCb CLOSED CIRCUIT LEAK ERROR.**

E40 VCa CLOSED CIRCUIT LEAK ERROR

Detection	Insufficient positive pressure in A chamber No arrival at set pressure within set time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from this error in maintenance mode 2 .

Condition or cause	Check and action
Occlusion of water supply filter See E36 VCa CLOSED CIRCUIT LEAK ERROR.	Action: Wash up filter or change to a new filter See E36 Vca CLOSED CIRCUIT LEAK ERROR.

E41 VCa CLOSED CIRCUIT LEAK ERROR

Detection	**Positive pressure change in A chamber** **Pressure change out of set range during set time**

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	**Press [RESET] SW.**	**Note**	**Enabled release from this error in maintenance mode 2 .**

Condition or cause	Check and action
See E36 VCa CLOSED CIRCUIT LEAK ERROR.	**See E36 Vca CLOSED CIRCUIT LEAK ERROR.**

E42 VCb CLOSED CIRCUIT LEAK ERROR

Detection	**Insufficient positive pressure in B chamber** **No arrival at set pressure within set time**

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	**Press [RESET] SW.**	**Note**	**Enabled release from this error in maintenance mode 2 .**

Condition or cause	Check and action
Occlusion of water supply filter **See E38 VCb CLOSED CIRCUIT LEAK ERROR.**	**Action: Wash up filter or change to a new filter** **See E38 VCb CLOSED CIRCUIT LEAK ERROR.**

E43 VCb CLOSED CIRCUIT LEAK ERROR

Detection	Positive pressure change in B chamber Pressure change out of set range during set time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse (Water rinse)	○ (7 times)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from this error in maintenance mode 2 .

Condition or cause	Check and action
See E38 VCb CLOSED CIRCUIT LEAK ERROR.	See E38 VCb CLOSED CIRCUIT LEAK ERROR.

E44 AIR ELIMINATION TANK ERROR

Detection	Functioning of air elimination tank [FSW] for ≧15 seconds in DIALYSIS process or for ≧30 seconds in any process other than DIALYSIS process				
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •○ (Continuous) • ↑ • ↑ • ↑	•— • ↑ • ↑ •Line function stop •—	—	—	○
Reset	Press [RESET] SW.	Note			

Condition or cause	Check and action
Lowered float positioning	Check: Check function of [FSW] in maintenance mode 4 screen. When ○ is indicated, float is lowered position.
○Increased float density due to water absorption	Check: Measure float weight. Float weight exceeding 8g is unacceptable. Action: Replace float with new one.
○ Lowered float positioning due to attachment of foreign matters to float and float shaft	Action: Clean float and float shaft to remove foreign matters.
○No air discharge due to failure of [V4]	Action: Repair [V4] or replace it with new one.
○Occlusion of [R2] by foreign matters	Check: Measure gas purge pressure which shall be 0 to 100mmHg. Action: Clean [R2] by rinsing or replace it with new one.
○ No air discharge due to failure of electric circuit to drive [V4]	Check: Turn on [V4] manually to check whether 24V is outputted to [V4] in maintenance mode 4 screen. Action: If 24V is not outputted, replace main board with new one.

○Wrong dialyzer in use	Change to the correct dialyzer.
Raised float positioning	Check: Check function of [FSW] in maintenance mode 4 screen. Failure of electric system is indicated by continuous indication of ○.
○Failure of float SW due to short circuit	Check: Measure resistance of float side after removing connector from float. Action: If short circuited when float is raised position, replace float SW with new one.
○Failure of input circuit of float SW due to short circuit	Action: If float SW is normal, replace main board with new one.

E45 BLOWN-OUT FUSE DETECTION

Detection	Blown out of pump fuse

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	Line function stop	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
No functioning of [P1] or [P2]	
○Blown out of pump fuse	Check: Observe [FUSE 402] (P) and [FUSE 404] (P2) placed on sub-board visually or check using tester to find whether fuses are blown out. Action: If blown out, replace blown out fuse with new one.
○Incorrect contact of pump driving line	Check: Pull lightly each of harnesses connecting POWER PLUG－SWITCH GEAR－TERMINAL BLOCK2－SUB-BOARD CN404－SUB-BOARD CN401－PUMP in series to check disconnection and loosening of the harnesses. Action: Tighten harness connection securely if loosening is detected. Replace harness with new one if incorrect contact or disconnection is detected
○Failure of sub-board	Action: Replace sub-board with new one.

Functioning of [P1] and [P2]	
○Failure of sub-board	**Action: Replace sub-board with new one.**
○Failure of main board	**Action: Replace main board with new one.**
○Effect of noise	**Check: Identify noise source such as hyperthermia device, electro-cardiograph, laser knife or clean tower** **Action: Place the machine at a position distant from the source. Remove noise by any means such as use of insulating transformer.**

E46 WATCH-DOG ERROR

Detection	Reset of system due to system error detected by watchdog

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Initialization of RAM after error detection

Condition or cause	Check and action
Reset of system by the machine when system error is detected by watchdog Incorrect function of software by effect of external noise.	Check: Identify noise source such as hyperthermia device, electro-cardiograph, laser knife or clean tower Action: Place the machine at a position distant from the source. Remove noise by any means such as use of insulating transformer.
Failure of main board	Action: Replace main board with new one.

E47 RAM ERROR

Detection	RAM error

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Error detection at OFF→ON of POWER SW or return to normal after power failure Initialization of RAM after error detection

Condition or cause	Check and action
Detection of RAM error by self diagnosis after operation start of the machine	Action: Replace main board with new one.

E48 EEPROM ERROR

Detection	EEPROM error

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Error detection at OFF→ON of POWER SW or return to normal after power failure

Condition or cause	Check and action
Detection of EEPROM error by self diagnosis after operation start of the machine	Action: Replace main board with new one.

E49 EPROM ERROR

Detection	EPROM error

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Error detection at OFF→ON of POWER SW or return to normal after power failure Initialization of RAM after error detection

Condition or cause	Check and action
Detection of EPROM error by self diagnosis after operation start of the machine	Action: Replace main board with new one.

E50 RAM INITIALIZE

Detection	Initialization of RAM

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Error detection at OFF→ON of POWER SW or return to normal after power failure Automatic shift to DIALYSIS WAIT process after error detection

Condition or cause	Check and action
Detection of different version of ROM by check of RAM version	Normal
Detection of error as E46 WATCHDOG ERROR.	Normal
Detection of error as E47 RAM ERROR	Normal
Detection of error as E49 EPROM ERROR	Normal
Discharged memory back up battery on the Main board.	Check: Check if you have not turned on power breaker of the machine for long term (about 7 to 10 days). Turn on power breaker when you install the machine. Action: Set date, time and display of SETTING MODE 1 because it was initialized. Turn on power breaker of the machine to full charge battery for 22 hours
Failure of main board	Action: Replace main board with new one
Failure of sub-board	Action: Replace sub-board with new one.

E51 EEPROM INITIALIZE

Detection	Initialization of EEPROM

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	Error detection at OFF→ON of POWER SW or return to normal after power failure Automatic shift to DIALYSIS WAIT process after error detection

Condition or cause	Check and action
Detection of different version of EEPROM by check of EEPROM version	Normal.
Failure of main board	Action: Replace main board with new one.

E52 SWITCH ERROR

Detection	ON of any SW on operation panel for 20 sec continuously at POWER SW ON

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	—	—	—	—

Reset	Press [RESET] SW.	Note	●ROM Ver～3.93 Error detection at OFF→ON of POWER SW or return to normal after power failure ●ROM Ver 4.01～ Error detection at anytime

Condition or cause	Check and action
Press of any SW on operation panel	Check: Press SW's on operation panel one by one to find whether any SW remains to be pressed. Action: If any SW remains to be pressed, replace operation panel with new one.
No press of any SW on operation panel	
○Failure of operation panel	Action: Replace operation panel with new one.
○Failure of operation panel board	Action: Replace operation panel board with new one.
○Failure of main board	Action: Replace main board with new one.

E53 I/O PORT ERROR

Detection	Error of I/O port on board

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) •↑ •↑ •↑ •○ (Continuous) •↑ •↑ •↑ •↑	Line function stop	○	—	—

Reset	Turn on [POWER] SW.	Note	Disabled all machine and operation panel SW functions after error detection

Condition or cause	Check and action
Latch up of IC (71054) on main board	Check: Check whether the machine function becomes normal by turning on power breaker.
○Application of abnormal voltage to IC	Check: Check whether abnormal voltage is applied to IC accidentally during repair or maintenance of the machine. Action: Turn on power breaker.
○Effect of noise	Check: Identify noise source such as hyperthermia device, electro-cardiograph, laser knife or clean tower Action: Place the machine at a position distant from the source. Remove noise by any means such as use of insulating transformer.
Failure of main board	Check: Check whether error is alerted at each time when power breaker is turned on frequently. Action: Replace main board with new one.

E54 CONNECTION ERROR SBY0151-SBY0156

Detection	Disconnection of harness used to connect main board to operation panel board

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	• ○(7 tomes) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	Line function stop	○	—	—

Reset	Turn on [POWER] SW.	Note	Disabled all machine and operation panel SW functions after error detection

Condition or cause	Check and action
Disconnection of [CN2] from operation panel board and that of [CN10] from main board	Check: Check whether [CN2] and [CN10] are disconnected from respective boards. Action: If disconnected, connect correctly.
Connection of [CN2] to operation panel board and that of [CN10] to main board ○ Disconnection of [OPERATION 2] harness or incorrect connector contact .	Check: Pull lightly lead wires of [CN2] of operation panel board and those of [CN10] of main board to check disconnection and loosening of the wires. Action: Replace harness with new one.
○Failure of operation panel board	Action: Replace operation panel board with new one.
○Failure of main board	Action: Replace main board with new one.

E55 BP BATTERY ERROR

Detection	Voltage drop of blood pump backup battery to ≦8.5V

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	• ○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from error in maintenance mode 7 screen

Condition or cause	Check and action
Discharged battery ○Long time battery operation of blood pump or insufficient battery charge time ○Revere connector connection ○Battery life ○Failure of battery charge circuit	Check: Turn off power breaker of the machine and operate blood pump by battery to check whether the pump is operated normally. If the operation is abnormal, the cause is discharge or damage of battery. Action: Turn on power breaker of the machine to full charge battery for 48 hours. Action: Correct. Action: Replace battery with new one. Action: Replace sub-board with new one.
Charged battery	Check: Measure battery voltage using tester under loaded condition. Action: If voltage is ≧ 8.5V, replace main board or sub-board.

E56 COUPLER SW ON ALARM(DIALYSIS)

Detection	ON of [LS2]

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	Line function stop	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Functioning of [LS2]	
○**ON of [LS2] in dialysis process**	**Check: Operation miss** **Action: No**
No functioning of [LS2]	**Check: Turn on and off [LS2] manually and check its function in maintenance mode 4 screen.**
○**Failure of [LS2]**	**Check: Disconnect connector from [LS2] side and measure resistance between pins 1 and 2.** **・When [LS2] is ON: the pins shall be short circuit condition.** **・When [LS2] is OFF: the pins shall be open circuit condition.** **Action: If malfunction of [LS2] is detected, replace it with new one.**
○**Disconnection of harness connected to [LS2] or incorrect connector contact**	**Check: Pull lightly lead wires of [CN15] placed on main board and those of connector of [LS2] side to check disconnection or loosening of the wires.** **Action: Replace harness with new one.**
○**Failure of main board**	**Action: Replace main board with new one.**

E57 COUPLER SW ON ALARM(PREP.)

Detection	Press of [UF DIALYSE] SW under [LS2] being ON

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Prep. end •Recovery	○ (3 times)	—	—	—	—

Reset	Press [RESET] SW. Auto reset by release from error	Note	

Condition or cause	Check and action
「 Functioning of [LS2]	
○ Press of [UF DIALYSE] SW under setting of coupler to its receiver	Check: Operation miss Action: Set coupler to dialyzer.
No functioning of [LS2]	Check: Turn on and off [LS2] manually to check its function in maintenance mode 4 screen.
○Failure of [LS2]	Check: Disconnect connector from [LS2] side and measure resistance between pins 1 and 2. ・When [LS2] is ON: the pins shall be short circuit condition. ・When [LS2] is OFF: the pins shall be open circuit condition. Action: If malfunction of [LS2] is detected, replace it with new one.
○Disconnection of harness connected to [LS2] or incorrect connector contact	Check: Pull lightly lead wires of [CN15] placed on main board and those of connector of [LS2] side to check disconnection or loosening of the wires. Action: Replace harness with new one.
○Failure of main board	Action: Replace main board with new one.

E58 COUPLER SW OFF ALARM

Detection	OFF of [LS2]

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse	○ (3 times)	Line function stop	—	—	—

Reset	Press [RESET] SW. Auto reset by release from error	Note	

Condition or cause	Check and action
No setting of coupler to its receiver ○Shift to RINSE process without setting coupler to its receiver or dislodgment of coupler from its receiver during RINSE process	Check: Operation miss Action: Set coupler correctly.
Setting of coupler to its receiver ○Damage of buttons of [LS2]	Check: Turn on and off [LS2] manually and check its function in maintenance mode 4 screen. Action: Replace [LS2] with new one.
○ Deviated [LS2] position due to loosening of set screws	Action: Correct the position and set [LS2] securely.
○ Deviated coupler receiver position due to loosening of set screws	Action: Correct the position and set the receiver securely.
○Failure of [LS2]	Check: Disconnect connector from [LS2] side and measure resistance between pins 1 and 2. ・When [LS2] is ON: the pins shall be short circuit condition. ・When [LS2] is OFF: the pins shall be open circuit condition. Action: If malfunction of [LS2] is detected, replace it with new one.
○ Disconnection of lead wires connected to [LS2] or incorrect connector contact	Check: Pull lightly lead wires of [CN15] placed on main board and those of connector of [LS2] side to check disconnection or loosening of the wires. Action: Replace harness with new one.
○Failure of main baord	Action: Replace main board with new one.

E59 UF MAX ALARM

Detection	Non-conformance with requirement of [UFR]≦[Blood Flow Rate]×60×[Set Upper UF Alarm Limit]

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	UF stop	—	—	—

Reset	Press [RESET] SW. Auto reset by release from error	Note	

Condition or cause	Check and action
Non-conformance with requirement of [UFR] ≦ [Blood Flow Rate] × 60 × [Set Upper UF Alarm Limit]	
○Decrease of blood pump flow rate	Action: Increase blood pump flow rate.
○Increase of UFR	Action: Decrease UFR.
[UF Alarm Limit] improperly set in maintenance mode 2 screen	Action: Set [UF Alarm Limit] properly.

E60 SYRINGE INFUSION COMPLETION

Detection	Output of syringe pump overload signal [LS3] during ON of SP SW

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Rinse wait •Rinse •Rinse end •Air purge •Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	•○ (7 times) • ↑ • ↑ • ↑ •○ (Continuous) • ↑ • ↑ • ↑ • ↑	—	SP stop	—	—

Reset	Press [RESET] SW. Auto reset by release from alerting	Note	Alerting during ON of SP SW

Condition or cause	Check and action
Completion of fluid drug infusion	Check: Observe no fluid drug in syringe visually. Action: Turn off [ON/OFF] SW of SP.
Catch of syringe by any object	Action: Turn off power to release the catch.

Continuous indication of ○ (overload) at [LS3] in maintenance mode 4 screen	
○ Incorrect positioning of [LS3] or screw for ON of it	**Check: Observe whether screw for ON is positioned to allow ON of [LS3] visually.** **Action: Adjust the screw position correctly.**
○failure of [LS3]	**Check: Disconnect [CN16] from main board and measure resistance between pins 1 and 3.** **Turn on and off [LS3] manually.** **・When [LS3] is ON (normal): the pins shall be short circuit condition.** **・When [LS3] is OFF (overload): the pins shall be open circuit condition.** **Action: Replace harness with new one.**
○ Disconnection of [LS3] harness or incorrect connector contact	**Check: Pull lightly lead wires of [CN16] placed on main board to check disconnection and loosening of the wires.** **Action: Correct the disconnection and/or loosening.**
○Failure of main board	**Check: Monitor indication of [LS3] in maintenance mode 4 screen.** **・Live condition : no indication** **・Overload condition: indication of ○** **Action: Replace main board with new one.**

E61 COMPLETION OF SYRINGE.P INFUSION

Detection	Arrival at set syringe infusion time

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (3 times)	—	SP stop	—	—

Reset	Press [RESET] SW. Auto reset by release from alerting	Note	

Condition or cause	Check and action
Arrival of set syringe infusion time	Check: Not required (Normal) Action: To re-infuse, set infusion rate by adjusting syringe pump flow rate setting SW. If not re-infused, turn off [ON/OFF] SW of SP.
Setting of syringe stop tine to left dialysis time in maintenance mode 2 screen	Check: Not required(Normal) Action: To re-infuse, set infusion rate by adjusting syringe pump flow rate setting SW. If not re-infused, turn off [ON/OFF] SW of SP.
Change of UFR and UF goal and setting of dialysis left time to syringe stop time	Check: Not required(Normal) Action: To re-infuse, set infusion rate by adjusting syringe pump flow rate setting SW. If not re-infused, turn off [ON/OFF] SW of SP.

E62 PERFORMED PRIMING

Detection	Completion of priming of target volume

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Priming	○ (3 times)	—	BP stop SW-OFF	○	—

Reset	Press [RESET] SW. Auto reset by release from alerting	Note	

Condition or cause	Check and action
Completion of priming	Check: Not required Action: To re-prime, set target priming volume by operating [F·1] SW. If not to re-prime, terminate priming function by operating [F·4] SW.
Reduction of target priming volume to currently primed volume	Check: Not required Action: To re-prime, set target priming volume by operating [F·1] SW. If not to re-prime, terminate priming function by operating [F·4] SW.

E63 PERFORMED TARGET UF.

Detection	Completion of UF of target volume

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (Continuous)	UF stop	—	—	—

Reset	Press [RESET] SW. Auto reset by release from alerting	Note	Becoming error free of set upper alarm limits of venous and dialysate pressures by alerting

Condition or cause	Check and action
Completion of UF of target volume	Check: Not required. Action: To perform UF again, increase target UF volume. If not to perform UF, terminate dialysis.
Setting of target UF volume lower than total UF volume	Check: Not required. Action: To perform UF again, increase target UF volume. If not to perform UF, terminate dialysis.

E64 NO WATER RINSING

Detection	Shift to DIALYSIS WAIT process without performing water rinsing for a set time after acid rinsing, disinfection, hotwater rinsing, and hotdisinfection acid rinsing

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis wait	○ (3 times)	—	—	—	—

Reset	Press [RESET] SW. Reset by performing water rinsing for a set time	Note	Hotwater rinsing, and hot disinfection are not avairable with ROM Ver.2.40 and older

Condition or cause	Check and action
No completion of water rinsing after acid rinsing, disinfection, hotwater rinsing, and hotdisinfection.	Action: Perform water rinsing for a set time.

E65 PREPARE DIALYSATE CONC.

Detection	No connection to concentrate tank due to no detection of pressure rise in A or B concentrate line by [PS]

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Preparation	○ (Continuous)	Line function stop	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
No dislodgment of concentrate connector from rinse port during PREPARATION process	Action: Check the both A and B lines if connect to correct port or not Dislodge concentrate connector from rinse port.
No rise of priming end pressure	
○No water supply	Action: Supply water.
○Incorrect adjustment or failure of [PR]	Action: Adjust [PR]. If adjustment is impossible, repair [PR] or replace it with mew one.
○ Incorrect adjustment or failure of [RV1]	Action: Adjust priming end pressure by operating [RV1]. If adjustment is impossible, repair [RV1] or replace it with mew one.
○Incorrect adjustment or failure of [RV3]	Action: Repair [RV3] or replace it with new one.
○Failure of [P1]	Action: Repair [P1] or replace it with new one.
○Failure of [C2]	Action: Replace [C2] with new one.
○Leak from rinse port	Check: Observe visually whether leak is caused from rinse port. Action: Replace rinse port with new one.

Rise of priming end pressure **○Incorrect adjustment or failure of [PS]** **○Failure of main board**	**Check: Measure priming end pressure.** **Action: Adjust [PS].** **If adjustment is impossible, repair [PS] or replace it with mew one.** **Check: Disconnect connector from [PS] and check ON and OFF of [PS] in maintenance mode 4 screen by short circuiting and opening the connector pins respectively.** **Action: If ON/OFF function of [PS] is incorrect, replace main board with new one.**

E66 CONC CONNECTOR TO RINSING PORT.

Detection	No connection to rinse port due to detection of pressure rise in A or B concentrate line by [PS]

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Rinse	○ (3 times)	Line function stop	—	—	—

Reset	Press [RESET] SW.	Note	

Condition or cause	Check and action
Acetate dialysis No connection of concentrate connector to rinse port while on preparation process.	Check:Check if the undiluted solution is correct or not Action:Connect line A to the undiluted solution. Connect line B to the B rinse port Action: Connect concentrate connector to rinse port.

Connection of concentrate connector to rinse port	
○Incorrect adjustment or failure of [PR]	**Action: Adjust [PR].** **If adjustment is impossible, repair [PR] or replace it with new one.**
○ Incorrect adjustment or failure of [RV1]	**Action: Adjust priming end pressure by operating [RV1].** **If adjustment is impossible, repair [RV1] or replace it with new one.**
○ Incorrect adjustment or failure of [RV3]	**Action: Repair [RV3] or replace it with new one.**
○Incorrect adjustment or failure of [PS]	**Action: Adjust [PS].** **If adjustment is impossible, repair [PS] or replace it with new one.**
○Failure of main board	**Check: Disconnect connector from [PS] and check ON and OFF of [PS] in maintenance mode 4 screen by short circuiting and opening the connector pins respectively.** **Action: If ON/OFF function of [PS] is incorrect, replace main board with new one.**
○ Failure of [V11], [V13], [V14], [V5], [V6], [V7] and/or [V8]. (Failure of [V15] when Na option is used.) **○Failure of main board**	**Check: Check ON and OFF of each valve in maintenance mode 4 screen.** **If ON/OFF function of each valve is incorrect, check whether output voltage is 24V.** **Action: If 24V is outputted, replace relevant valve with new one.** **If 24V is not outputted, replace main board with new one.**

E67 RESET SW

Detection	No press of [RESET] SW for a set time after alerting

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
•Dialysis wait •Preparation •Prep. end •Dialysis •Recovery	○ (Continuous)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from alerting in maintenance mode 2 screen

Condition or cause	Check and action
No press of [RESET] SW	Check: Not required. Action: Press [RESET] SW.

E68 UF DIALYSE SW

Detection	No press of [UF DIALYSE] SW for a set time after alerting

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Prep. end	○ (3 times)	—	—	—	○

Reset	Press [RESET] SW.	Note	Enabled release from alerting in maintenance mode 2 screen

Condition or cause	Check and action
No press of [UF DIALYSE] SW	Check: Not required Action: Press [UF DIALYSE] SW to shift to DIALYSIS process.

E69 BYPASS SW

Detection	**No release from manual ON condition of [BYPASS] SW for a set time**

Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Dialysis	○ (3 times)	—	—	—	○

Reset	**Press [RESET] SW.**	**Note**	**Enabled release from alerting in maintenance mode 2 screen**

Condition or cause	Check and action
No press of [BYPASS] SW	**Check: Not required.** **Action: Press [BYPASS] SW to release from bypass condition.**

NO INDICATION IN LCD

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Reset		Note			

Condition or cause	Check and action
Simultaneous alerting of this error with E54 CONNECTION ERROR SBY0151-SBY0156	Check: See E54 CONNECTION ERROR SBY0151-SBY0156. Action: See E54 CONNECTION ERROR SBY0151-SBY0156.
Screen disappearance during RINSE WAIT process ○Functioning of auto OFF mode	Check: Not required. Note: Back-light is OFF after no SW operation for ≧30 minutes during **"indication of rinse execution screen and Pre-Rinse Wait process" or "indication of rinse end screen".** Action: Press any SW on operation panel to turn on back-light.

OFF of LCD	
○Incorrect contrast adjustment	**Action: Adjust contrast by turning volume placed on operation panel board.**
○Disconnection of [OPERATION PART 1] harness or incorrect connector contact	**Check: Pull lightly lead wires of [CN1] of operation panel board and [CN10] of main board to check disconnection and loosening of the wires.**
○Disconnection of LCD harness or incorrect connector contact	**Action: Replace harness with new one followed by turning on power SW.**
○Failure of LCD	**Check: Pull lightly lead wires of [CN4] and [CN5] of operation panel board to check disconnection and loosening of the wires.**
○Failure of main board	**Action: Replace lead wires (harness) with new ones.**
	Action: Replace LCD with new one.
	Action: Replace main board with new one.

NO INDICATION IN LCD

Condition or cause	Check and action
Deviated indication	
○**Indication deviated by external noise**	**Check: Recover by turn on power SW again.** **Identify noise source such as hyperthermia device, electro-cardiograph, laser knife or clean tower.** **Action: Move the source to a position distant from the machine.** **Use noise reducing means such as insulating transformer.**
○**Disconnection of [OPERATION PART 1] harness or incorrect connector contact**	**Check: Pull lightly lead wires of [CN1] of operation panel board and [CN10] of main board to check disconnection and loosening of the wires.** **Action: Replace harness with new one followed by turning on power SW.**
○**Disconnection of LCD harness or incorrect connector contact**	**Check: Pull lightly lead wires of [CN4] and [CN5] of operation panel board to check disconnection and loosening of the wires.** **Action: Replace lead wires (harness) with new ones.**
○**Failure of LCD**	**Action: Replace LCD with new one.**
○**Failure of main board**	**Action: Replace main board with new one.**

DISABLED SW FUNCTION

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset

Reset		Note	

Condition or cause	Check and action
Simultaneous alerting of this error with E54 CONNECTION ERROR SBY0151-SBY0156	Check: See E54 CONNECTION ERROR SBY0151-SBY0156. Action: See E54 CONNECTION ERROR SBY0151-SBY0156.
Disabled SW function; or Enabled SW function with error (function of any SW different from that of pressed SW)	
○Disconnection of operation panel sheet cable or incorrect connector contact	Check: Pull lightly flexible cable of [CN3] placed on operation panel board to check disconnection and loosening of the cable. Action: Replace flexible cable with new one.
○Disconnection of [OPERATION PART 1] harness or incorrect connector contact	Check: Pull lightly lead wires of [CN1] of operation panel board and [CN10] of main board to check disconnection and loosening of the wires. Action: Replace harness with new one.
○Failure of operation panel sheet	Action: Replace operation panel sheet with new one.
○Failure of operation panel board	Action: Replace operation panel board with new one.
○Failure of main board	Action: Replace main board with new one.

DISABLED SYRINGE PUMP OPERATION

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Reset		Note			

Condition or cause	Check and action
Disabled motor operation	
○No selection of SYRINGE	Action: Select ON of [18.SYRINGE OPTION] in maintenance mode 7 screen.
○ Disconnection of [SP] harness or incorrect connector contact	Check: Pull lightly lead wires of [CN410] placed on sub-board and those of connector of [SP] side to check disconnection and loosening of the wires.
○Failure of sub-board	Action: Replace.
○Failure of motor	Action: Replace.
Enabled motor operation	
○Slip of half nut	Action: Replace.
○Idle run of pulley	Check: Check whether pulley is loosely fixed to shaft. Action: Tighten.
○Breakage of belt	Action: Replace.
○Loosening of belt	Action: Tighten.

BLOOD PUMP ERROR

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Reset		Note			

Condition or cause	Check and action
Uneven rotation ○Improper gap between rotors and housing	Action: Adjust the gap.
Restricted top rotation speed. ○Failure of sub-board or motor	Check: See E30 BLOOD PUMP ERROR. Action: See E30 BLOOD PUMP ERROR.
Higher or lower rotation speed ○Incorrect BP flow rate adjustment ○Failure of sub-board or motor	Action: Adjust BP flow rate correctly. Check: See E30 BLOOD PUMP ERROR. Action: See E30 BLOOD PUMP ERROR.
Heavy manual rotation ○Disabled OFF of BP cover SW ○Failure of sub-board or motor	Check: See E31 BLOOD PUMP STOP ERROR. Action: See E31 BLOOD PUMP STOP ERROR. Check: See E30 BLOOD PUMP ERROR. Action: See E30 BLOOD PUMP ERROR.

Noise	
○Wearing of gear head	**Action: Replace blood pump Assy.**
○Wearing of rotor bearing	**Action: Replace the bearing.**

CHANGE OF LEVEL IN VENOUS DRIP CHAMBER

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset

Reset		Note	

Condition or cause	Check and action
Rise of level in chamber	
○Leak from a site between venous drip chamber and pressure inlet port, in particular, from filter junction	Check: Clamp line between the chamber and port by forceps to find leaked site. Action: Remove the leak cause.
○ Leak from a site between pressure inlet port and pressure sensor	Check: Clamp line between the port and sensor by forceps to find leaked site. Action: Remove the leak cause.
○Failure of pressure sensor	Action: Replace venous pressure sensor board with new one.
○ Folding or occlusion of venous line downstream of venous drip chamber	Action: Correct.
Lowering of level in chamber	
○Air inclusion due to insufficient blood supply	Action: Correct.
○Air inclusion through arterial line	Action: Correct.
○Air introduction from dialyzer	Action: Remove the air introduction cause.

ABNORMAL DIALYSATE DISCHARGE BY PRESS OF DRAIN SW

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset

Reset		Note	

Condition or cause	Check and action
Slow discharge flow rate	
○ Deformation of diaphragm of electro-magnetic valve [V4] or catch of plunger of it by any object	Action: Repair [V4] or replace it with new one.
○Occlusion of orifice [R2]	Action: Repair [R2] or replace it with new one.
○Performance reduction of dialysate pump [P2]	Action: Repair [P2] or replace it with new one.
○Folding of tube downstream of air elimination tank [AS2]	Action: Correct folding.
○High gas purge pressure	Action: Adjust the gas purge pressure to 0 ～ 100mmHg.

No discharge	
○Failure of electromagnetic valve [V4]	**Action: Repair [V4] or replace it with new one.**
○Disconnection of [VALVE 2] harness or incorrect connector contact	**Check: Pull lightly lead wires of [CN12] placed on main board and those of connector of [V4] side to check disconnection and loosening of the wires.** **Action: Replace harness (lead wires) with new ones.**
○Failure of main board	**Check: Turn on [V4] manually to check whether 24V is outputted to [V4] in maintenance mode 4 screen.** **Action: If 24V is not outputted, replace main board with new one.**
○Failure of DRAIN SW	**Action: Replace operation panel sheet or operation panel board with new one.**

UFR ERROR

Detection					
Detection process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset
Reset		Note			

Condition or cause	Check and action
Leak from closed circuit	Check: See E36～E43 VC CLOSED CIRCUIT ERROR. Action: See E36～E43 VC CLOSED CIRCUIT ERROR.
Incorrect viscous pump rotation	Check: See E33～E34 VISCOUS PUMP DRIVING ERROR. Action: See E33～E34 VISCOUS PUMP DRIVING ERROR.
Incorrectly set UFR calibration coefficients: a, c and/or d	Action: Set [13.UF CORR.COEFFICIENT a], [14.UF CORR. COEFFICIENT c] and/or [15.UF CORR.COEFFICIENT d] indicated in maintenance mode 6 screen to a, c and/or d shown in set value seal.
Incorrect (deviated) VP flow rate	Check: Check values of [11.VPa FLOW] and [12.VPb FLOW] in maintenance mode 6 screen. Action: Re-input normal values if VP flow rate is higher than normal (lower UFR) or lower than it (higher UFR).
Air inclusion from dialysate line of priming circuit . ○Air inclusion from [AS1]	Check: Observe visually whether [AS1] is positioned slantwise. Action: If slanted, correct to horizontal placement. If not so, replace [AS1] with new one.

Incorrect pressure adjustment of dialysate line	
○Incorrect priming end pressure	
Incorrect adjustment or failure of [PR]	**Action: Adjust [PR] correctly. If adjustment is impossible, repair [PR] or replace it with new one.**
Incorrect adjustment or failure of [RV1]	**Action: Adjust priming end pressure by operating [RV1]. If adjustment is impossible, repair [RV1] or replace it with new one.**
Incorrect adjustment or failure of [RV3]	**Action: Repair [RV3] or replace it with new one.**
Failure of [P1]	**Action: Repair [P1] or replace it with new one.**
Failure of [C2]	**Action: Replace [C2] with new one.**
Leak from rinse port	**Check: Observe visually whether leak is caused from rinse port.**
○ Incorrect adjustment of pressure in closed circuit	**Action: If leak is detected, replace rinse port.**
Incorrect adjustment or failure of [RV2]	**Action: Adjust [RV2]. If adjustment is impossible, repair [RV2] or replace it with new one.**

DATE AND TIME ARE INITIALIZED

Detection	

Detection Process	Audible alarm	Dialysate line function	BP/SP stop	CLV function	Reset

Reset		Note	

Condition or cause	Check and action
Date and time are indicated to 1997 years 6 months 15 dates 12:00 time. ○Discharged memory back up battery on the Main board.	Check: Check if you have not turned on power breaker of the machine for long term (about 7 to 10 days). Turn on power breaker when you install the machine. Action: Set date and time. Turn on power breaker of the machine to full charge battery for 22 hours.