SEVCON Gen4, Nano, Evo5, GpAC and espAC Fault Codes

Level	LED Flashes	UID	FID	Type	Display	Message	Description	Recommended Action
1	2	1	0x4481	Warning	F12001	Handbrake Fault	Handbrake is active when direction selected.	Release handbrake
1	5	1	0x4541	Warning	F15001	Fan Fault	No speed feedback from external heatsink fans	Check operation of heatsink fans
1	5	2	0x4542	Warning	F15002	Low Oil	Low Oil	Check oil level
1	5	3	0x4543	Warning	F15003	Hydraulic filter	Hydraulic Filter	Check hydraulic filter
1	5	4	0x4544	Warning	F15004	Pump Current Low	Pump motor is not drawing sufficient current	Check pump motor is connected
1	5	5	0x4545	Warning	F15005	Isolation Fault	Isolation fault detected between logic and power frame	Check isolation between low and high voltage circuits
1	5	6	0x4546	Warning	F15006	No Motor Speed Signal	No speed feedback from motor	Check encoder wiring and speed measurement signal
1	5	7	0x4547	Warning	F15007	Tow Mode	Tow mode has been activated	Disable tow mode if not required
1	5	8	0x4548	Warning	F15008	Steer Sensor Warning	Invalid steer sensor state	Check steer sensor wiring
1	5	9	0x4549	Warning	F15009	Pulsed Enable	Pulsed enable signal not present, unable to enable bridge	Check 1kHz pulsed enable signal is received
1	6	1	0x4581	Warning	F16001	Throttle Fault (Warn)	Warning level throttle fault. Used for Renault Twizy	Check throttle wiring and installation.
1	6	2	0x4582	Warning	F16002	Safety Case 1	Throttle appears to be stuck. This fault will clear if throttle starts to work again.	Check throttle wiring and installation.
1	6	3	0x4583	Warning	F16003	Safety Case 2	Throttle appears to be stuck. This fault will latch and can only be cleared by repairing the throttle and recycling power.	Check throttle wiring and installation.
1	6	4	0x4584	Warning	F16004	Analogue Output Over Current (warn)	Contactor driver over current	Ensure contactor doesn't exceed maximum current and check contactor wiring
1	6	5	0x4585	Warning	F16005	Analogue Output Off with Failsafe (warn)	Contactor driver not working	Internal hardware fault
1	6	6	0x4586	Warning	F16006	Analogue Output Over Temperature (warn)	Contactor driver over temperature	Ensure contactor doesn't exceed maximum current and check contactor wiring
1	6	7	0x4587	Warning	F16007	Analogue Output Under Current (warn)	Contactor driver unable to achieve current target in current mode	Ensure contactor driver current target is within range
1	6	8	0x4588	Warning	F16008	Analogue Output Short Circuit (warn)	Contactor driver MOSFET short circuit detected	Internal hardware fault
1	7	1	0x45C1	Warning	F17001	BDI Warning	BDI remaining charge (0x2790,1) is less than BDI Warning level (0x2C30,5)	Charge battery
1	7	2	0x45C2	Warning	F17002	BDI Cutout	BDI remaining charge (0x2790,1) is less than BDI Cutout level (0x2C30,4)	Charge battery
1	7	3	0x45C3	Warning	F17003	Low Battery Cut	Battery voltage (0x5100,1) is less than Under Voltage limit (0x2C02,2) for longer than the protection delay (0x2C03,0)	Charge battery
1	7	4	0x45C4	Warning	F17004	High Battery Cut	Battery voltage (0x5100,1) is greater than Over Voltage limit (0x2C01,2) for longer than the protection delay (0x2C03,0)	Charge battery
1	7	5	0x45C5	Warning	F17005	High Capacitor Cut	Capacitor voltage (0x5100,3) is greater than Over Voltage limit (0x2C01,2) for longer than the protection delay (0x2C03,0)	Charge battery
1	7	6	0x45C6	Warning	F17006	Vbat below rated min	Battery voltage (0x5100,1) is less than rated minimum voltage for controller for longer than 1s. NOTE: This fault is sometimes seen at power down.	Charge battery
1	7	7	0x45C7	Warning	F17007	Vbat above rated max	Battery voltage (0x5100,1) is greater than rated maximum voltage for controller for longer than 1s.	Charge battery
1	7	8	0x45C8	Warning	F17008	Vcap above rated max	Capacitor voltage (0x5100,3) is greater than rated maximum voltage for controller for longer than 1s.	Charge battery
1	7	9	0x45C9	Warning	F17009	Motor in low voltage cutback	Motor control has entered low voltage cutback region.	Charge battery
1	7	10	0x45CA	Warning	F17010	Motor in high voltage cutback	Motor control has entered high voltage cutback region.	Charge battery
1	8	1	0x4601	Warning	F18001	Device too cold	Low heatsink temperature (0x5100,4) has reduced power to motor	Allow controller to warm up to normal operating temperature.
1	8	2	0x4602	Warning	F18002	Device too hot	High heatsink temperature (0x5100,4) has reduced power to motor	Allow controller to cool down to normal operating temperature.
1	8	3	0x4603	Warning	F18003	Motor in thermal cutback	High measured (0x4600,3) or estimated (0x4602,8) motor temperature has reduced power to motor	Allow motor to cool down to normal operating temperature.
1	8	4	0x4604	Warning	F18004	Motor too cold	Low Measured temperature has reached -30deg	Check motor thermistor connection or allow motor to warm up.
1	10	1	0x4681	Warning	F10101	Unit in preoperational	Controller is in pre-operational state	If configured and ready for use, change state to operational.
1	10	2	0x4682	Warning	F10102	IO can't init	Controller has not received all configured RPDOs at power up	Check PDOs on all CANbus nodes are configured correctly and match up.
1	10	3	0x4683	Warning	F10103	RPDO Timeout (warning)	One or more configured RPDOs not received with 3s at start up or 500ms during normal operation.	Check status of all nodes on CANbus. Check PDOs on all CANbus nodes are configured correctly and match up.
1	11	1	0x46C1	Warning	F11101	Encoder Alignment Warning	Encoder is not aligned properly.	Ensure encoder offset is correctly set or re-align encoder

1	11	2	0x46C2	Warning	F11102	SinCos Tracking Warning	SinCos Encoder Min Max Values are heading towards a voltage rail or converging together.	Thermal or mechanical variation is causing the sincos encoder to deviate from the cold factory commissioned values.
1	12	1	0x4701	Warning	F12101	CAN warning	Vehicle is operating in reduced power mode as some CAN messages are not being received (Renault only)	Check status of nodes on CANbus expected to be transmitting data
1	14	1	0x4781	Warning	F14101	CANopen anon EMCY level 1	EMCY message received from non-Sevcon node and anonymous EMCY level (0x2830,0) is set to 1.	Check status of non-Sevcon nodes on CANbus
1	14	2	0x4782	Warning	F14102	24V Supply Low		
1	14	3	0x4783	Warning	F14103	24V Supply High		
1	15	1	0x47C1	Warning	F15101	Vehicle Service Required	Vehicle service next due time (0x2850,5) has expired. If supported Service driveability profile (0x2925) will activate.	Service vehicle and reset service hours counter
2	2	1	0x4881	Drive Inhibit	F22001	Seat Fault	Valid direction selected with operator not seated or operator is not seated for a user configurable time in drive.	Must be seated with switches inactive
2	2	2	0x4882	Drive Inhibit	F22002	Two Direction Fault	Both the forward and reverse switches have been active simultaneously for greater than 200 ms.	Check vehicle wiring and reset switches
2	2	3	0x4883	Drive Inhibit	F22003	SRO Fault	FS1 active for user configurable delay (0x2914,2) without a direction selected.	Deselect FS1
2	2	4	0x4884	Drive Inhibit	F22004	Sequence Fault	Any drive switch active at power up.	Deselect all drive switches
2	2	5	0x4885	Drive Inhibit	F22005	FS1 Recycle Fault	FS1 active after a direction change and FS1 recycle function enabled (0x2914,1 bit 1)	Deselect FS1
2	2	6	0x4886	Drive Inhibit	F22006	Inch Fault	Inch switch active along with any drive switch active (excluding inch switches), seat switch indicating operator present or handbrake switch active.	
2	2	7	0x4887	Drive Inhibit	F22007	Overload Fault	Vehicle overloaded	Remove overload condition
2	2	8	0x4888	Drive Inhibit	F22008	Raised and Tilted Fault	Scissor lift platform raised and tilted	Lower platform
2	2	9	0x4889	Drive Inhibit	F22009	Pothole Fault	Scissor lift pothole protection active	Move vehicle out of pot hole.
2	2	10	0x488A	Drive Inhibit	F22010	Traction Inhibit Fault	Traction function inhibited using traction inhibit switch (0x2137)	Deselect traction inhibit.
2	2	11	0x488B	Drive Inhibit	F22011	Illegal Mode Change Fault	Vehicle changed from traction mode to pump mode (or vice versa) when direction selected	Deselect all drive switches
2	2	12	0x488C	Drive Inhibit	F22012	Tilt Sensor Fault	Aichi error code (0x3802,0) set to 0x02	Check tilt sensor
2	2	13	0x488D	Drive Inhibit	F22013	Belly fault	Belly function has activated.	Deselect belly switch
2	2	14	0x488E	Drive Inhibit	F22014	Mom dir fault	Fault with momentary direction selection switch	Release momentary direction switch
2	5	1	0x4941	Drive Inhibit	F25001	Motor Overspeed		
2	5	2	0x4942	Drive Inhibit	F25002	PST Fault	An issue has occurred with the PST unit	Check PST unit
2	6	1	0x4981	Drive Inhibit	F26001	Throttle Fault	Throttle value (0x2620,0) is greater than 20% at power up.	Release throttle
2	7	1	0x49C1	Drive Inhibit	F27001	Slope Current Cutback Fault	Motor model current limit has cutback back below level allowed by cutback table (0x3805) on slope	Check for temperature or voltage cutback condition and take appropriate action
2	7	2	0x49C2	Drive Inhibit	F27002	Entering Cutback	Controller has entered thermal or voltage cutback region	Check for temperature or voltage cutback condition and take appropriate action
2	8	1	0x4A01	Drive Inhibit	F28001	Cutback	Thermal or voltage cutback factors have reduced belowed user defined levels.	Check for temperature or voltage cutback condition and take appropriate action
2	10	1	0x4A81	Drive Inhibit	F20101	RPDO Timeout (drive inhibit)	One or more configured RPDOs not received with 3s at start up or 500ms during normal operation.	Check status of all nodes on CANbus. Check PDOs on all CANbus nodes are configured correctly and match up.
2	12	1	0x4B01	Drive Inhibit	F22101	CAN off bus (drive inhibit)	CANbus off fault condition detected on multinode system. NOTE: This fault was added for Aichi, to replace Very Severe CAN off fault	Check CANbus wiring
2	12	2	0x4B02	Drive Inhibit	F22102	Ren Data	Data missing from CAN (Renault only)	Check connection to CANbus, ensure all devices on bus are communicating.
2	14	1	0x4B81	Drive Inhibit	F24101	CANopen anon EMCY level 2	EMCY message received from non-Sevcon node and anonymous EMCY level (0x2830,0) is set to 2.	Check status of non-Sevcon nodes on CANbus
3	1	1	0x4C41	Severe	F31001	Too many slaves	Number of slaves (0x2810,0) set higher than maximum allowed number of slaves	Check 0x2810,0 setting
3	4	1	0x4D01	Severe	F34001	Circuit Breaker Open		
3	4	2	0x4D02	Severe	F34002	Circuit Breaker Welded		
3	4	3	0x4D03	Severe	F34003	DC Link Collapsed		
3	4	4	0x4D04	Severe	F34004	Circuit Breaker Timeout	Time to close breaker of GpAC has expired	Cycle power and restart breaker close sequence
3	5	1	0x4D41	Severe	F35001	Motor Isolation Fault	Motor isolation contactor is open circuit	Check isolation contactor and wiring
3	5	2	0x4D42	Severe	F35002	Motor Open Circuit Fault	Motor terminal is open circuit or disconnected from controller	Check motor wiring. Check controller condition
3	5	3	0x4D43	Severe	F35003	No Motor Speed Signal	No speed feedback from motor	Check encoder wiring and speed measurement signal
3	7	3	0x4DC3	Severe	F37003	Power Supply Critical	Battery voltage has dropped below critical level	Check controller voltage supply

3	10	1	0x4E81	Severe	F30101	RPDO Timeout (severe)	One or more configured RPDOs not received with 3s at start up or 500ms during normal operation.	Check status of all nodes on CANbus. Check PDOs on all CANbus nodes are configured correctly and match up.
3	12	1	0x4F01	Severe	F32101	Unexpected slave state	CANopen slave has changed to unexpected state	Check status of all nodes on CANbus.
3	12	2	0x4F02	Severe	F32102	EMCY send failed	Unable to transmit EMCY message	Internal software fault
3	13	1	0x4F41	Severe	F33101	Internal Fault	Internal software fault	Internal software fault
3	13	2	0x4F42	Severe	F33102	Out of memory	Out of memory	Internal software fault
3	13	3	0x4F43	Severe	F33103	General DSP error	Unknown error raised by motor model code	Internal software fault
3	13	4	0x4F44	Severe	F33104	Timer Failed	Unable to allocate timer	Internal software fault
3	13	5	0x4F45	Severe	F33105	Queue Error	Unable to post message to queue	Internal software fault
3	13	6	0x4F46	Severe	F33106	Scheduler Error	Unable to create task in scheduler	Internal software fault
3	13	7	0x4F47	Severe	F33107	DSP Heartbeat Error	Communication lost between host and DSP processors	Internal hardware fault
3	13	8	0x4F48	Severe	F33108	I/O SS Error	Internal software fault	Internal software fault
3	13	9	0x4F49	Severe	F33109	GIO SS Error	Internal software fault	Internal software fault
3	13	10	0x4F4A	Severe	F33110	LCM SS Error	Internal software fault	Internal software fault
3	13	11	0x4F4B	Severe	F33111	LCP SS Error	Internal software fault	Internal software fault
3	13	12	0x4F4C	Severe	F33112	OBD SS Error	Internal software fault	Internal software fault
3	13	13	0x4F4D	Severe	F33113	VA SS Error	Internal software fault	Internal software fault
3	13	14	0x4F4E	Severe	F33114	DMC SS Error	Internal software fault	Internal software fault
3	13	15	0x4F4F	Severe	F33115	TracApp SS Error	Internal software fault	Internal software fault
3	13	16	0x4F50	Severe	F33116	New Powerframe Detected	New power frame detected.	Recycle keyswitch
3	13	17	0x4F51	Severe	F33117	DSP Not Detected	Communication lost between host and DSP processors	Internal hardware fault
3	13	18	0x4F52	Severe	F33118	DSP Comms Error	Communication lost between host and DSP processors	Internal hardware fault
3	13	19	0x4F53	Severe	F33119	App Manager SS Error	Internal software fault	Internal software fault
3	13	20	0x4F54	Severe	F33120	Autozero range error	Current sensor auto-zero current out of range	Internal hardware fault
3	13	21	0x4F55	Severe	F33121	DSP parameter error	Communication error between host and DSP processors	Internal software fault
3	13	22	0x4F56	Severe	F33122	Motor in wrong direction	Motor rotation detected as wrong direction. No longer supported	Check motor wiring.
3	13	23	0x4F57	Severe	F33123	Motor stalled	Motor rotation stalled. No longer supported	Check motor wiring.
3	14	1	0x4F81	Severe	F34101	CANopen anon EMCY level 3	EMCY message received from non-Sevcon node and anonymous EMCY level (0x2830,0) is set to 3.	Check status of non-Sevcon nodes on CANbus
4	1	1	0x5041	Very Severe	F41001	Bad NVM Data	EEPROM or flash configuration data corrupted and data can not be recovered.	
4	1	2	0x5042	Very Severe	F41002	VPDO Out of Range	VPDO mapped to non-existent or invalid object	Check all VPDO mappings (0x3000 to 0x3400)
4	1	3	0x5043	Very Severe	F41003	Static Range Error	At least one configuration object is out of range	Set configuration object to valid value. Our of range object can be identified using 0x5621 or Engineering DVT CLI window.
4	1	4	0x5044	Very Severe	F41004	Dynamic Range Error	At least one configuration object is out of dynamic range. This is where one objects range depends on another object.	Check all dynamic range objects. Engineering DVT CLI window indicates type of object which is out of range.
4	1	5	0x5045	Very Severe	F41005	Auto-configuration Fault	Unable to automatically configure I/O and vehicle setup.	Check auto configuration objects (0x5810 and 0x5811)
4	1	6	0x5046	Very Severe	F41006	Voltage autoconfig error	Unable to set battery voltage	Check auxillary drives support low voltage configurations
4	2	1	0x5081	Very Severe	F42001	Invalid Steer Switches	Steering switches are in an invalid state	Check steering switches and wiring
4	4	1	0x5101	Very Severe	F44001	Line Contactor o/c	Line contactor did not close when coil is energized.	Check line contactor and wiring
4	4	2	0x5102	Very Severe	F44002	Line Contactor welded	Line contactor closed when coil is denergized.	Check line contactor and wiring
4	5	1	0x5141	Very Severe	F45001	Beltloader Fault	Unable to change between traction and pump motors on beltloader.	Check change over contactors and motor wiring.
4	5	2	0x5142	Very Severe	F45002	Ren Signal	Fault signalled by Renault vehicle network	Check peripheral Renault devices
4	5	3	0x5143	Very Severe	F45003	VERLOG	VERLOG signal failure	Check peripheral Renault devices
4	6	1	0x5181	Very Severe	F46001	Digital Input Wire Off	Digital input wire-off	Check wiring
4	6	2	0x5182	Very Severe	F46002	Analogue Input Wire Off	Analogue input outside of allowed range (0x46cX)	Check wiring
4	6	3	0x5183	Very Severe	F46003	Analogue Output Over Current	Contactor driver over current	Ensure contactor doesn't exceed maximum current and check contactor wiring
4	6	4	0x5184	Very Severe	F46004	Analogue Output On with No Failsafe	Internal hardware failsafe circuitry not working	Internal hardware fault
4	6	5	0x5185	Very Severe	F46005	Analogue Output Off with Failsafe	Contactor driver not working	Internal hardware fault
4	6	6	0x5186	Very Severe	F46006	Analogue Output Over Temperature	Contactor driver over temperature	Ensure contactor doesn't exceed maximum current and check contactor wiring
4	6	7	0x5187	Very Severe	F46007	Analogue Output Under Current	Contactor driver unable to achieve current target in current mode	Ensure contactor driver current target is within range
4	6	8	0x5188	Very Severe	F46008	Analogue Output Short Circuit	Contactor driver MOSFET short circuit detected	Internal hardware fault
4	7	1	0x51C1	Very Severe	F47001	Power Supply Interrupt	Not used	

4	7	2	0x51C2	Very Severe	F47002	Capacitor Precharge Failure	Capacitor voltage (0x5100,3) did not rise above 5V at power up	Check power wiring
4	8	1	0x5201	Very Severe	F48001	Heatsink overtemp	Controller heat sink has reached critical high temperature, and has shut down.	Allow controller to cool down to normal operating temperature.
4	11	1	0x52C1	Very Severe	F41101	DSP Encoder Fault	Encoder input wire-off is detected.	Check encoder wiring
4	11	2	0x52C2	Very Severe	F41102	DSP Overcurrent Fault	Motor current exceeded controller rated maximum	Check motor configuration and wiring
4	11	3	0x52C3	Very Severe	F41103	DSP Control Fault	Motor controller unable to maintain control of motor	Check motor configuration. Ensure motor speed is not too high.
4	11	4	0x52C4	Very Severe	F41104	Motor Overspeed Fault	Motor control tripped due to motor overspeed	Check motor configuration. Ensure motor speed is not too high.
4	11	5	0x52C5	Very Severe	F41105	Encoder Alignment Severe	Encoder is not aligned properly.	Ensure encoder offset is correctly set or re-align encoder
4	12	1	0x5301	Very Severe	F42101	CANBUS Fault	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	2	0x5302	Very Severe	F42102	Bootup not received	CANopen slave has not transmitted boot up message at power up	Check status of all nodes on CANbus.
4	12	3	0x5303	Very Severe	F42103	LPRX queue overrun	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	4	0x5304	Very Severe	F42104	LPTX queue overrun	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	5	0x5305	Very Severe	F42105	HPRX queue overrun	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	6	0x5306	Very Severe	F42106	HPTX queue overrun	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	7	0x5307	Very Severe	F42107	CAN overrun	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	8	0x5308	Very Severe	F42108	CAN off bus	CANbus fault condition detected on multinode system.	Check CANbus wiring
4	12	9	0x5309	Very Severe	F42109	Nodeguarding Failed	Not used	
4	12	10	0x530A	Very Severe	F42110	Short PDO received	Received RPDO doesn't contains enough bytes	Check PDOs on all CANbus nodes are configured correctly and match up.
4	12	11	0x530B	Very Severe	F42111	CANopen Heartbeat Failed	Heartbeat not received within configured time out (0x1016)	Check status of all nodes on CANbus.
4	12	12	0x530C	Very Severe	F42112	CANopen slave in wrong state	CANopen slave has changed to unexpected state	Check status of all nodes on CANbus.
4	12	13	0x530D	Very Severe	F42113	CAN ESTAT set	Internal CANbus fault	Internal software fault
4	12	14	0x530E	Very Severe	F42114	SDO HDL Error	Internal CANbus fault	Internal software fault
4	12	15	0x530F	Very Severe	F42115	SDO Timeout Error	Internal CANbus fault	Internal software fault
4	12	16	0x5310	Very Severe	F42116	SDO Abort Error	Internal CANbus fault	Internal software fault
4	12	17	0x5311	Very Severe	F42117	SDO State Error	Internal CANbus fault	Internal software fault
4	12	18	0x5312	Very Severe	F42118	SDO Toggle Error	Internal CANbus fault	Internal software fault
4	12	19	0x5313	Very Severe	F42119	SDO Rec Error	Internal CANbus fault	Internal software fault
4	12	20	0x5314	Very Severe	F42120	SDO Len Error	Internal CANbus fault	Internal software fault
4	12	21	0x5315	Very Severe	F42121	SDO Send Error	Internal CANbus fault	Internal software fault
4	12	22	0x5316	Very Severe	F42122	SDO unknown event	Internal CANbus fault	Internal software fault
4	12	23	0x5317	Very Severe	F42123	SDO Bad SRC	Internal CANbus fault	Internal software fault
4	12	24	0x5318	Very Severe	F42124	SDO bad error number	Internal CANbus fault	Internal software fault
4	12	25	0x5319	Very Severe	F42125	Motor slave in wrong state	Motor slave in wrong state	Check status of all nodes on CANbus controlling motor slaves. Check local motor slaves on master. Ensure configuration is correct.
4	12	26	0x531A	Very Severe	F42126	Ren Protocol	CAN device on Renault Twizy not responding	Check connection to CANbus, ensure all devices on bus are communicating.
4	13	1	0x5341	Very Severe	F43101	Invalid DSP Protocol	DSP reports invalid protocol version on dual processor platform	Internal software fault
4	13	2	0x5342	Very Severe	F43102	OSC Watchdog Fault	Internal hardware fault	Internal hardware fault
4	13	3	0x5343	Very Severe	F43103	Fault List Overflow	Attempting to set too many faults.	Internal software fault
4	13	4	0x5344	Very Severe	F43104	DSP SPI Comms Fault	Communication error between host and DSP processors	Internal hardware fault
4	14	1	0x5381	Very Severe	F44101	CANopen anon EMCY level 4	EMCY message received from non-Sevcon node and anonymous EMCY level (0x2830,0) is set to 4.	Check status of non-Sevcon nodes on CANbus
5	1	1	0x5441	Return to Base	F51001	Incompatible hardware version	Detected controller hardware version incompatible with software	Check correct software is programmed into controller. Reprogram if necessary
5	1	2	0x5442	Return to Base	F51002	Calibration Fault	Calibration settings in controller are out of range	Controller requires recalibration in production
5	3	1	0x54C1	Return to Base	F53001	DSP Overvoltage	Voltage on B+ terminal exceeds rated maximum for controller	Check battery condition and wiring
5	3	2	0x54C2	Return to Base	F53002	DSP Powerframe Fault	Motor current exceeded controller rated maximum	Check motor configuration and wiring
5	3	3	0x54C3	Return to Base	F53003	MOSFET s/c M1>B+	MOSFET s/c detection on M1 top devices	Check motor wiring. Check controller condition
5	3	4	0x54C4	Return to Base	F53004	MOSFET s/c M1>B-	MOSFET s/c detection on M1 bottom devices	Check motor wiring. Check controller condition
5	3	5	0x54C5	Return to Base	F53005	MOSFET s/c M2>B+	MOSFET s/c detection on M2 top devices	Check motor wiring. Check controller condition
5	3	6	0x54C6	Return to Base	F53006	MOSFET s/c M2>B-	MOSFET s/c detection on M2 bottom devices	Check motor wiring. Check controller condition
5	3	7	0x54C7	Return to Base	F53007	MOSFET s/c M3>B+	MOSFET s/c detection on M3 top devices	Check motor wiring. Check controller condition
5	3	8	0x54C8	Return to Base	F53008	MOSFET s/c M3>B-	MOSFET s/c detection on M3 bottom devices	Check motor wiring. Check controller condition
5	3	9	0x54C9	Return to Base	F53009	MOSFET s/c checks incomplete	Unable to complete MOSFET s/c tests at power up	Internal software fault

5	3	10	0x54CA	Return to Base	F53010	Pump Mosfet S/C	MOSFET s/c detection Pump Mosfet Devices	Check motor wiring. Check controller condition
5	3	10	0x54CA	Return to Base	F53010	IGBT M1 Low Driver Fail	IGBT driver failure	Check status of IGBT
5	3	11	0x54CB	Return to Base	F53011	IGBT M1 High Driver Fail	IGBT driver failure	Check status of IGBT
5	3	12	0x54CC	Return to Base	F53012	IGBT M2 Low Driver Fail	IGBT driver failure	Check status of IGBT
5	3	13	0x54CD	Return to Base	F53013	IGBT M2 High Driver Fail	IGBT driver failure	Check status of IGBT
5	3	14	0x54CE	Return to Base	F53014	IGBT M3 Low Driver Fail	IGBT driver failure	Check status of IGBT
5	3	15	0x54CF	Return to Base	F53015	IGBT M3 High Driver Fail	IGBT driver failure	Check status of IGBT
5	13	1	0x5741	Return to Base	F53101	Invalid Powerframe Rating	Unable to identify hardware	Internal hardware fault
5	14	1	0x5781	Return to Base	F54101	CANopen anon EMCY level 5	EMCY message received from non-Sevcon node and anonymous EMCY level (0x2830,0) is set to 5.	Check status of non-Sevcon nodes on CANbus