

# Hardware System Maintenance

## Standard Maintenance

No regular or preventative maintenance is required for this product (there are no internal batteries); however, a routine maintenance check (about every one or two months) of your PLC and control system is good practice, and should include the following items:

- Air Temperature – Check the air temperature in the control cabinet, so the operating temperature range of any component is not exceeded.
- Air Filter – If the control cabinet has an air filter, clean or replace it periodically as required.
- Fuses or breakers – Verify that all fuses and breakers are intact.
- Cleaning the Unit – Check that all air vents are clear. If the exterior case needs cleaning, disconnect the input power, and carefully wipe the case using a damp cloth. Do not let water enter the case through the air vents and do not use strong detergents because this may discolor the case.

## Diagnostics

### Diagnostics

Your DL05 Micro PLC performs many pre-defined diagnostic routines with every CPU scan. The diagnostics can detect various errors or failures in the PLC. The two primary error classes are *fatal* and *non-fatal*.

### Fatal Errors

Fatal errors are errors which may cause the system to function improperly, perhaps introducing a safety problem. The CPU will automatically switch to Program Mode if it is in Run Mode. (Remember, in Program Mode all outputs are turned off.) If the fatal error is detected while the CPU is in Program Mode, the CPU will not allow you to transition to Run Mode until the error has been corrected.

Some examples of fatal errors are:

- Power supply failure
- Parity error or CPU malfunction
- Particular programming errors

### Non-fatal Errors

Non-fatal errors are errors that need your attention, but should not cause improper operation. They do not cause or prevent any mode transitions of the CPU. The application program can use special relay contacts to detect non-fatal errors, and even take the system to an orderly shutdown or switch the CPU to Program Mode if desired. An example of a non-fatal error is:

- Particular programming errors The programming devices will notify you of an error if one occurs while online.
- DirectSOFT32 provides the error number and an error message.
- The handheld programmer displays error numbers and short descriptions of the error.

Appendix B has a complete list of error messages in order by error number. Many error messages point to supplemental V-memory locations which contain related information. Special relays (SP contacts) also provide error indications.

### V-memory Error Code Locations

The following table names the specific memory locations that correspond to certain types of error messages.

Error Class	Error Category	Diagnostic V-memory
User-Defined	Error code used with FAULT instruction	V7751
System Error	Fatal Error code	V7755
	Major Error code	V7756
	Minor Error code	V7757
Grammatical	Address where syntax error occurs	V7763
	Error Code found during syntax check	V7764
CPU Scan	Number of scans since last Program to Run Mode transition	V7765
	Current scan time (ms)	V7775
	Minimum scan time (ms)	V7776
	Maximum scan time (ms)	V7777

### Special Relays (SP) Corresponding to Error Codes

The special relay table also includes status indicators which can indicate errors. For a more detailed description of each of these special relays refer to Appendix D.

CPU Status Relays		Accumulator Status Relays	
SP11	Forced Run mode	SP60	Acc. is less than value
SP12	Terminal Run mode	SP61	Acc. is equal to value
SP13	Test Run mode	SP62	Acc. is greater than value
SP15	Test stop mode	SP63	Acc. result is zero
SP16	Terminal Program mode	SP64	Half borrow occurred
SP17	Forced stop	SP65	Borrow occurred
SP20	STOP instruction was executed	SP66	Half carry occurred
SP22	Interrupt enabled	SP67	Carry occurred
System Monitoring Relays		SP70	Result is negative (sign)
SP36	Override setup	SP71	Pointer reference error
SP37	Scan control error	SP73	Overflow
SP40	Critical error	SP75	Data is not in BCD
SP41	Non-critical error	SP76	Load zero
SP42	Diagnostics error		
SP44	Program memory error		
SP45	I/O error		
SP46	Communications error		
SP50	Fault instruction was executed		
SP51	Watchdog timeout		
SP52	Syntax error		
SP53	Cannot solve the logic		
SP54	Communication error		
SP56	Table instruction overrun		

### DL05 Micro PLC Error Codes

These errors can be generated by the CPU or by the Handheld Programmer, depending on the actual error. Appendix B provides a more complete description of the error codes.

The errors can be detected at various times. However, most of them are detected at power-up, on entry to Run Mode, or when a Handheld Programmer key sequence results in an error or an illegal request.

Error Code	Description	Error Code	Description
E003	Software time-out	E525	Mode Switch not in Term position
E004	Invalid instruction(RAM parity error in the CPU)	E526	Unit is offline
E104	Write failed	E527	Unit is online
E151	Invalid command	E528	CPU mode
E311	Communications error 1	E540	CPU locked
E312	Communications error 2	E541	Wrong password
E313	Communications error 3	E542	Password reset
E316	Communications error 6	E601	Memory full
E320	Time out	E602	Instruction missing
E321	Communications error	E604	Reference missing
E360	HP Peripheral port time-out	E620	Out of memory
E501	Bad entry	E621	EEPROM Memory not blank
E502	Bad address	E622	No Handheld Programmer EEPROM
E503	Bad command	E624	V memory only
E504	Bad reference / value	E625	Program only
E505	Invalid instruction	E627	Bad write operation
E506	Invalid operation	E628	Memory type error (should be EEPROM)
E520	Bad operation – CPU in Run	E640	Mis-compare
E521	Bad operation – CPU in Test Run	E650	Handheld Programmer system error
E523	Bad operation – CPU in Test Program	E651	Handheld Programmer ROM error
E524	Bad operation – CPU in Program	E652	Handheld Programmer RAM error

## Program Error Codes

The following table lists program syntax and runtime error codes. Error detection occurs during a Program-to-Run mode transition, or when you use AUX 21 – Check Program. The CPU will also turn on SP52 and store the error code in V7755. Appendix B provides a more complete description of the error codes.

Error Code	Description	Error Code	Description
E4**	No Program in CPU	E438	Invalid IRT address
E401	Missing END statement	E440	Invalid Data Address
E402	Missing LBL	E441	ACON/NCON
E403	Missing RET	E451	Bad MLS/MLR
E404	Missing FOR	E453	Missing T/C
E405	Missing NEXT	E454	Bad TMRA
E406	Missing IRT	E455	Bad CNT
E412	SBR / LBL >64	E456	Bad SR
E421	Duplicate stage reference	E461	Stack Overflow
E422	Duplicate SBR/LBL reference	E462	Stack Underflow
E423	HP Peripheral port time-out	E463	Logic Error
E431	Invalid ISG/SG address	E464	Missing Circuit
E433	Invalid ISG / SG address	E471	Duplicate coil reference
E434	Invalid RTC	E472	Duplicate TMR reference
E435	Invalid RT	E473	Duplicate CNT reference
E436	Invalid INT address	E499	Print instruction
E437	Invalid IRTC		