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VisualMotion 9
Multi-Axis Motion Control using GPP and GMP Firmware

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Troubleshooting Guide

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Purpose of Documentation

This documentation describes …

- the use of VisualMotion Toolkit for assitance in diagnostics
- the proper steps for indentifing diagnostic faults
- and the suggested remedies for clearing faults

Record of Revisions

Description	Release Date	Notes
DOK-VISMOT-VM*-09VRS**-WA02-EN-P	02/2003	Second release

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Note

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1 VisualMotion 9 Overview

1.1 System Overview

VisualMotion is a programmable multi-axis motion control system capable of controlling up to 40 intelligent digital drives from Bosch Rexroth. The PC software used for motion control management is named VisualMotion Toolkit.

VisualMotion 9 supports the following hardware form factors and firmware versions:

- PPC-R (RECO-version) using GPP 9 firmware
- PPC-P11.1 (PCI-version) using GMP 9 firmware

1.2 GPP 9 System Overview

The PPC-R is a stand-alone multi-axis motion control. It has the RECO02 form factor, a form factor used by Bosch Rexroth for motion controls, PLCs and I/O modules. These devices share the RECO02 back-plane bus for data exchange.

It is recommended to use the VisualMotion motion control with Bosch Rexroth's DIAX04 and/or ECODRIVE03 digital servo drives. The communication between control and digital servo drives is performed using the SERCOS fiber optic interface, the international standard for real-time communication for digital servo drives.

VisualMotion can provide multi-axis coordinated or non-coordinated motion control with tightly integrated RECO02 I/O logic control functions. The flexibility of GPP 9 firmware supports a variety of applications, from general motion control to sophisticated multiple master electronic line shafting (ELS) and robotics.

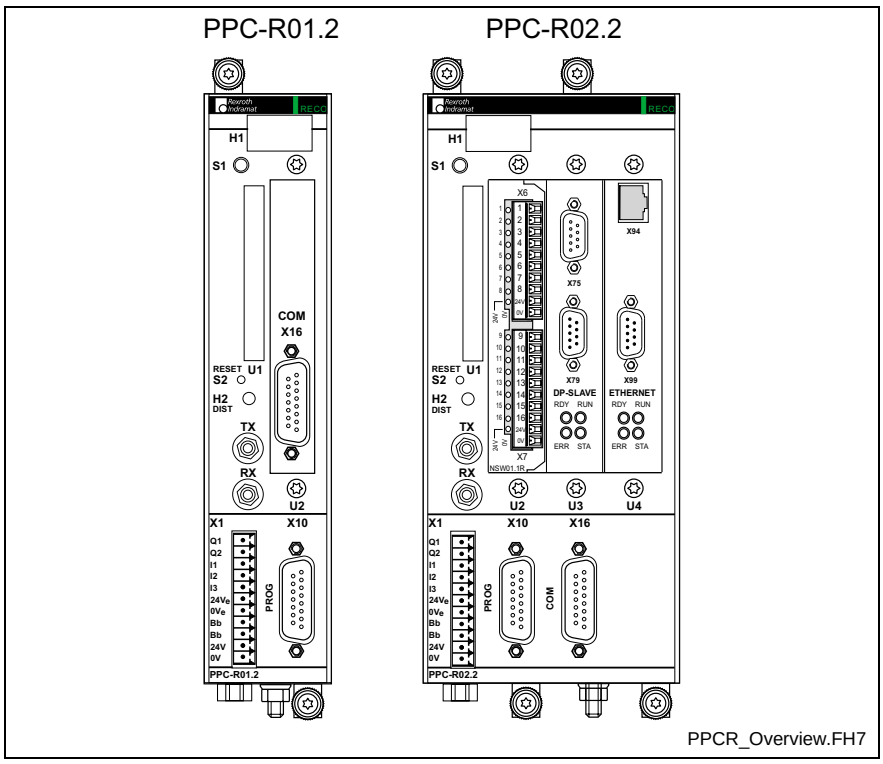


Fig. 1-1: PPC-R Motion Control

GPP 9 System Components

The VisualMotion GPP 9 system is comprised of the following components:

- PPC-R control using GPP 9 firmware
- RECO02 I/O modules (Local and SERCOS)
- VisualMotion Toolkit (VMT) Windows program for motion control programming, parametrization, system diagnostics and motion control management. VMT also includes DDE and OPC servers. These servers are the communication protocol between Windows programs and the control.
- Up to 40 intelligent digital drives can be connected to one control over the SERCOS fiber optic ring
  - DIAX04 (using SSE03 or ELS05 firmware) drives and motors
  - ECODRIVE03 (using SMT02, SGP01, SGP03 or SGP20 firmware) drives and motors
  - ECODRIVE C (using MPG01 firmware) drives and motors
- HMI interfaces (BTC06, BTV04, BTV05, BTV06)

GPP 9 PLC Support

The Bosch Rexroth MTS-R is a PLC unit that interfaces with the VisualMotion control (PPC-R) and is available preconfigured in two sizes.

- MTS-R01.1 with one expansion slot
- MTS-R02.1 with three expansion slot

Note: The expansion slot(s) on the MTS-R can be configured with fieldbus master interface or serial interface cards.

GPP 9 Interface Support

VisualMotion GPP 9 supports the following interfaces:

Fieldbus Interfaces

- Profibus-DP slave interface (32 words)
- Interbus slave interface (16 words)
- DeviceNet, ControlNet or EtherNet/IP slave interface (32 words)

Note: When using EtherNet/IP in a VisualMotion 9 system, no other fieldbus interface card (i.e., Profibus, DeviceNet, ControlNet, Interbus) or the MTS-R PLC interface can be installed.

EtherNet/IP uses firmware version FMC-ETH01*-PHT-02VRS-NN.

Note: The word size in parenthesis indicates the maximum number of words allowed in the cyclic telegram for both the Input and Output directions.

Additional Interfaces:

- Option Card **P**rogrammable **L**imit **S**witch (16 or 32 outputs)
- Link Ring for Master/Slave interfacing of VisualMotion controls
- Ethernet Interface

Note: The same EtherNet hardware is used for both EtherNet/IP fieldbus and standard EtherNet TCP/IP networking communication. When enabled as an EtherNet/IP fieldbus interface in VisualMotion 9 using GPP 9 firmware, standard TCP/IP communication between VisualMotion Toolkit over the same network is possible.

Drive I/O Support

Bosch Rexroth digital drives support the following I/O devices:

- DEA0x.2M (x = 4, 5 or 6) I/O cards for DIAX04 digital drives
- EMD I/O module using the EcoX interface for DKC22.3 digital drives using SGP20 firmware

1.3 GMP 9 System Overview

The PPC-P11.1 (PCI-version) is a PC-based stand-alone multi-axis motion control. The GMP 9 firmware used with the PPC-P is designed to work as a complete motion control solution. A host PC containing a Logic Controller (SoftPLC) handles the system logic, fieldbus and Ethernet communications.

Just like the PPC-R, the PPC-P supports Bosch Rexroth DIAX04 and ECODRIVE03 digital servo drives. Communication between the control and digital servo drives is performed via the SERCOS fiber optic interface.

ppc_pci.tif

Fig. 1-2: PPC-P (PCI-version) Motion Control

GMP 9 Firmware Features

All firmware functionality supported in GPP 9 will also be supported in GMP 9 with the following restriction:

- VisualMotion fieldbus slave interfaces are not supported. If fieldbus communication is required, the SoftPLC should be equipped with the capability to communicate with a PC-based fieldbus card. The PPC-P cyclic channel (real-time communication to/from DPR) is configured using VisualMotion Toolkit's Fieldbus Mapper.
- Ethernet interface is also not supported

GMP 9 System Components

The VisualMotion GMP 9 system is composed of the following components:

- PPC-P control using GMP firmware
- SERCOS RECO02 I/O modules
- VisualMotion Toolkit (VMT) Windows program for motion control programming, parametrization, system diagnostics and motion control management. VMT also includes DDE and OPC servers. These servers are the communication protocol between Windows programs and the control.
- Up to 40 intelligent digital drives can be connected to one control over the SERCOS fiber optic ring
  - DIAX04 (using SSE03 or ELS05 firmware) drives and motors
  - ECODRIVE03 (SMT02, SGP01, SGP03 and SGP20 firmware) drives and motors
  - ECODRIVE C (using MPG01 firmware) drives and motors
- HMI interfaces (BTC06, BTV04, BTV05, BTV06)

Note: When using VisualMotion's I/O Setup tool to assign registers to physical outputs, the location (either input or output registers) will determine which device is the “master” of the particular set of physical outputs. If they are mapped to the PPC output section, then the PPC will have control of the outputs. If they are mapped to the PPC input section, then the SoftPLC will have control over the physical outputs.

GMP 9 Interface Support

VisualMotion GMP 9 supports the following interfaces:

- Optional **P**rogrammable **L**imit **S**witch Card (16 or 32 outputs).
- Link Ring for Master/Slave interfacing of VisualMotion controls.

Drive I/O Support

Bosch Rexroth digital drives support the following I/O devices:

- DEA0x.2M (x = 4, 5 or 6) I/O cards for DIAX04 digital drives
- EMD I/O module using the EcoX interface for DKC22.3 digital drives using SGP20 firmware

2 VisualMotion Tools for Diagnosing

2.1 Using VisualMotion Toolkit for Diagnosing

VisualMotion Toolkit 9 (VMT) is Rexroth's Windows™ based development environment for programming VisualMotion Controls. Along with VMT's programming capabilities, it can also be used to help diagnose VisualMotion programs, control and drive diagnostics.

Note: The information provided in this section is intended to illustrate only those screens in VisualMotion Toolkit that can assist in determining a diagnostic fault. For a complete description of VisualMotion Toolkit's menu selections, refer to chapter 2 of the VisualMotion 9 Functional Description.

VisualMotion to PC Connection

To establish communications between VisualMotion (PC) and the PPC-R control, use an IKB0005 standard RS-232 serial communication cable.

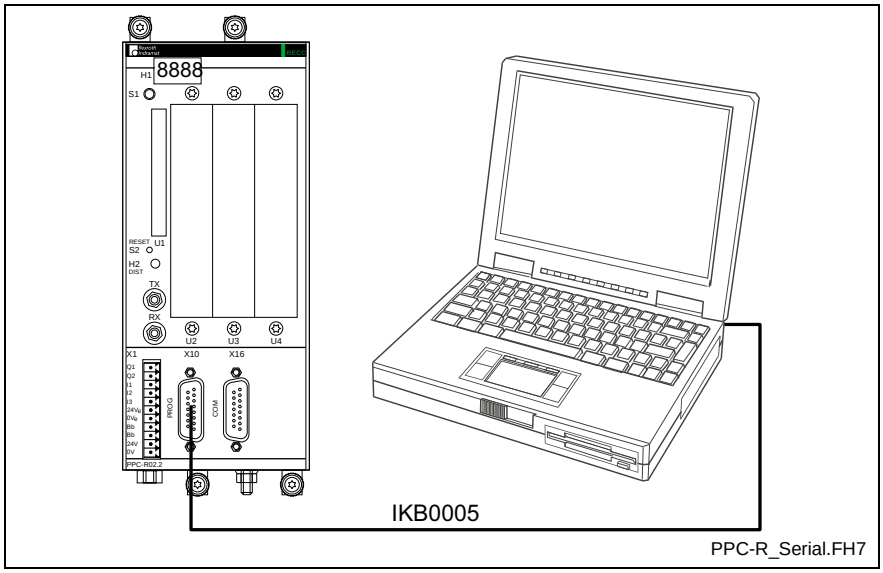


Fig. 2-1: VisualMotion (PC) to PPC-R Serial Connection

Use the following procedure to confirm hardware connections.

1. Connect communication cable IKB0005 between PPC-R X10 and the PC's Com port.

Note: Communication can also be established using the ETH01 Ethernet card. Refer to the VisualMotion 9 Project Planning Manual for details.

2. Power-up VisualMotion System (drives, control, motors, etc.).
3. Start VisualMotion Toolkit in "Service" mode by selecting the (*view and edit control data in "Service" mode)* radio button.
4. From the VisualMotion Toolkit main menu, select ***Diagnostics ⇒ System***. If the System Parameters screen loads with information, communications have been established. The user is now ready to use VisualMotion Toolkit.

Communication Error

If a connection can not be established, the DDE server will issue an error and the following Diagnostic dialog box will open. This indicates that either there is a problem in the physical connection or that the communication settings of the control do not match the settings of the DDE sever.

DDE_Server_Error.tif

Fig. 2-2: VisualMotion DDE Server Error

1. Verify that power has been applied to the control and the proper cable is being used (IKB0005) and the connections on both ends are made. If this does not resolve the problem, then the serial parameters should be verified.

Note: If a network connection is being used, verify that the Ethernet control parameters are set properly and that the network server is operating.

2. To view the current serial port settings on the PPC-R control, push the S1 button and read the H1 display as follows.

Press S1 # of Times	Description
0	System Diagnostic Message
1	Firmware version
2	X10 communications type (RS-232, RS-422, RS-485)
3	X10 baud rate (9600, 19.2K, 38.4K, 57.6K, 115.2K)
4	X16 communications type (RS-232, RS-422, RS-485)
5	X16 baud rate (9600, 19.2K, 38.4K, 57.6K, 115.2K)
6	Unit number (0 to 126, used for RS-485 mode)

Table 2-1: PPC-R S1 Button Display

3. Selecting *Settings* for the screen in Fig. 2-2 will open the dialog box in Fig. 2-3. Make sure that the baud rate setting in the Serial Communication window matches the PPC-R's setting. Also, verify that the *Serial Port* number matches that of the port used by the serial cable. Checking *Use Serial Event* improves the communication throughput of the PC hardware.

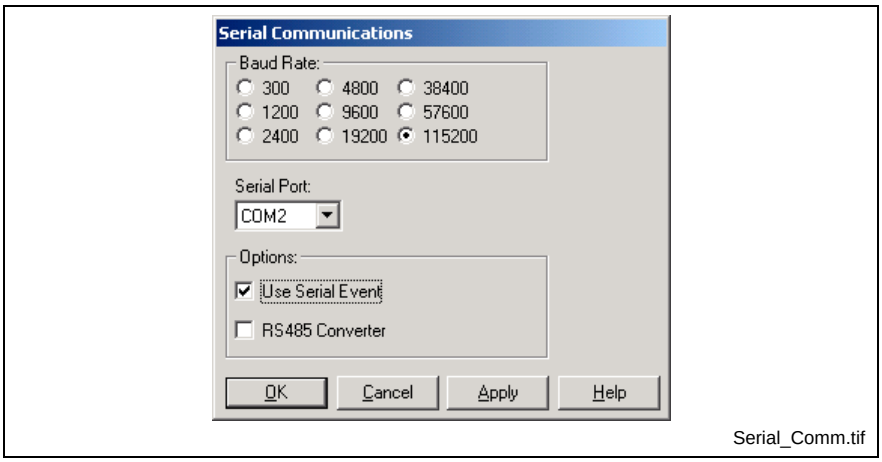


Fig. 2-3: Serial Communications

Changing the Serial Communication Baud Rate

From VisualMotion Toolkit's main menu, select ***Tools ⇒ Control Settings.*** Select the control's X10 or X16 port and change the baud rate.

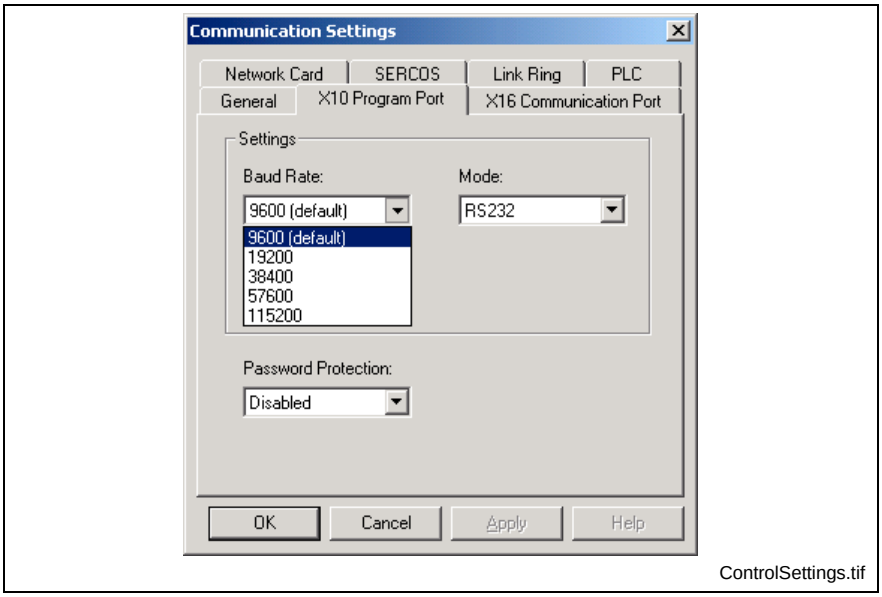


Fig. 2-4: Control Settings

The Diagnostics Menu

The diagnostics menu provides system information for logging and monitoring system errors and diagnostics.

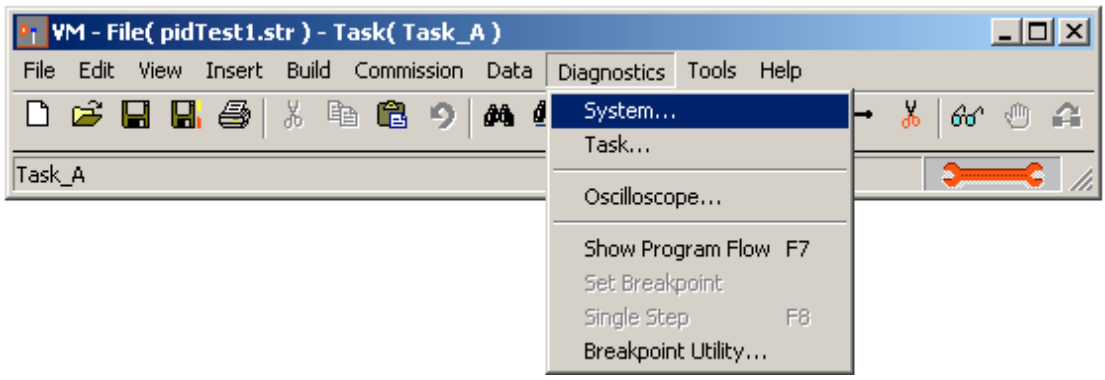


Fig. 2-5: Diagnostics Menu

System Diagnostics

The system diagnostic window displays current diagnostic information for diagnostic messages, hardware and firmware information, installed option cards, diagnostic log, hardware status, and control load status. This section will only focus on diagnostic messages and logging.

Status…

The Status tab displays the current diagnostic message with an extended message, if available. The system's current mode and SERCOS phase is also displayed.

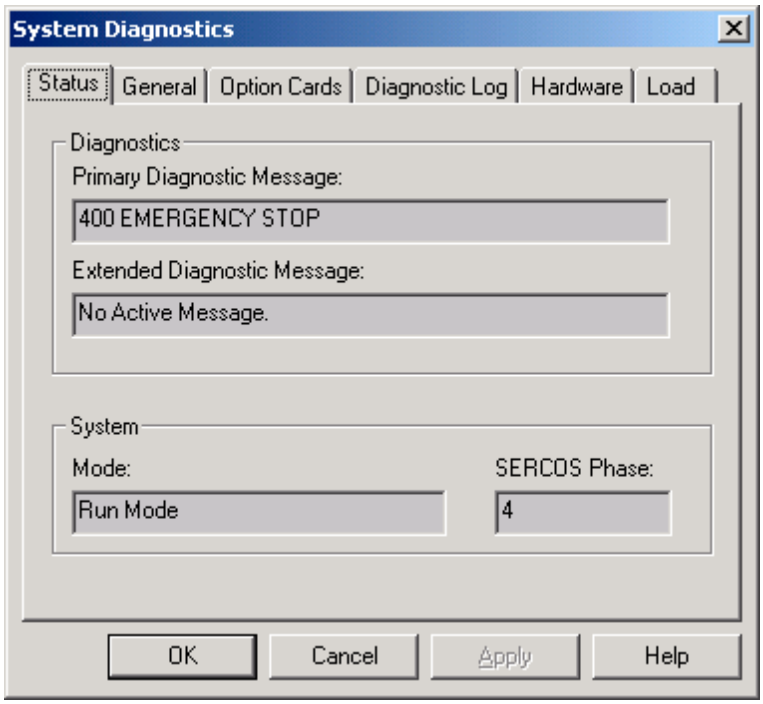


Fig. 2-6: Primary and Extended Diagnostic Message

Diagnostic Log…

The diagnostic log tab displays the last 100 errors that the control has encountered. Along with the error messages, the date, time and extended error codes are displayed.

Diagnostic Help

Error codes displayed in the Diagnostic log contain context sensitive help. Double clicking on an error code opens the context sensitive help for the selected error.

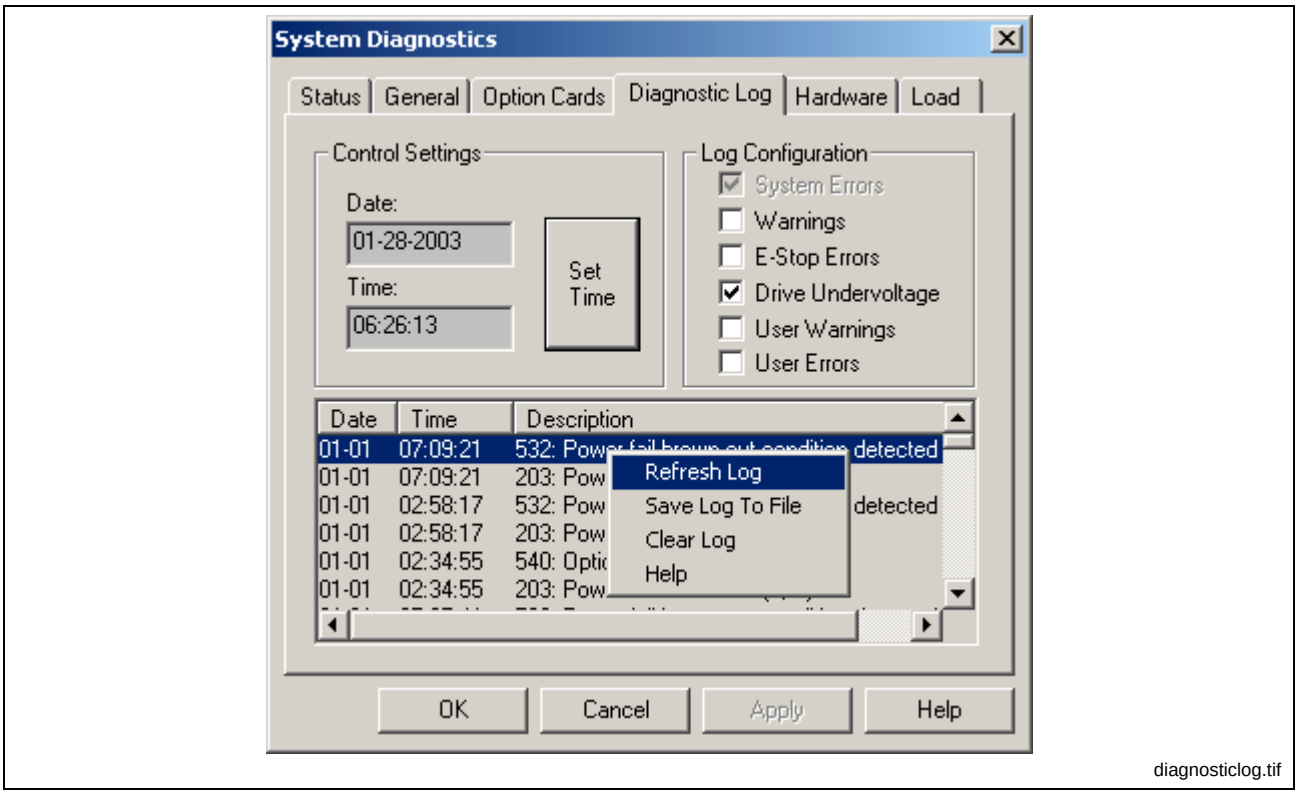


Fig. 2-7: Diagnostic Log Options

Date and Time

Date and time are relative to the power on of the control; they have no battery-backup clock unless the PPC-R is equipped with a battery. Refer to chapter 4 of the *VisualMotion 9 Project Planning Manual DOK-VISMOT-VM*-09VRS**-PR02-EN-P* for installation instructions. After power up, select the ***Set Time*** button to retrieve the date and time from the PC. The date and time are stored in parameter C-0-0126.

Log Configuration

The user can select what options are best suited for their application.

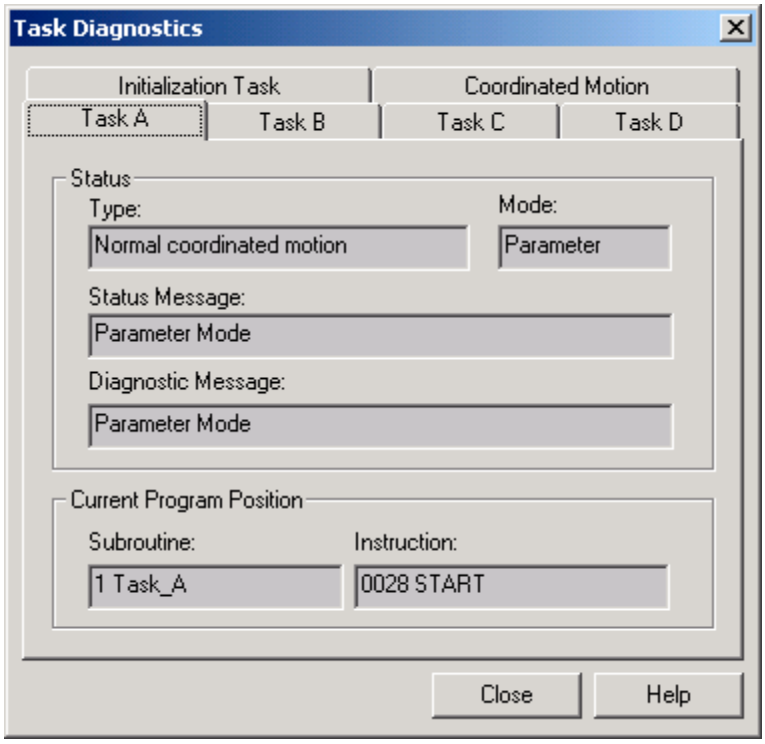
Refresh, Save and Clear Log

Right clicking over the diagnostic errors opens a small pop-up window where the user can perform the following features:

- Refresh Log
- Save Log to File
- Clear Log
- Help

Tasks Diagnostics

Selecting ***Diagnostics ⇒ Task*** opens the Task Diagnostics window and uploads data regarding all active VisualMotion tasks. Task letters are displayed only if they contain an icon program that has been compiled and downloaded to the control. All GPP9 programs will contain the Initialization Task and Task A tabs. The Coordinated Motion tab is only visible if any task contains a coordinated program. It displays the active coordinated axes and their current X, Y, Z positions.



DiagnosticTask.tif

Fig. 2-8: Task Parameters

Status

This section indicates the type of motion programmed in the selected task for the active program and the current control mode (Parameter, Initialization, Manual or Automatic). Status and Diagnostic messages for the selected task are also displayed.

Current Program Position

This section displays the subroutine and instruction executing and its pointer. This display is useful when debugging in single-step mode. If a program is running in automatic mode, the displayed instruction is the instruction that was executing at the time that the SERCOS cycle sampled instruction execution, which may appear to be random.

Drive Overview…

Selecting ***Drive Overview*** from the ***Commission*** menu opens the DriveTop drive selection window. Select the desired drive and click on the *Overview* button to launch the DriveTop drive status window.

This window displays drive status as well as active and current values for the selected drive.

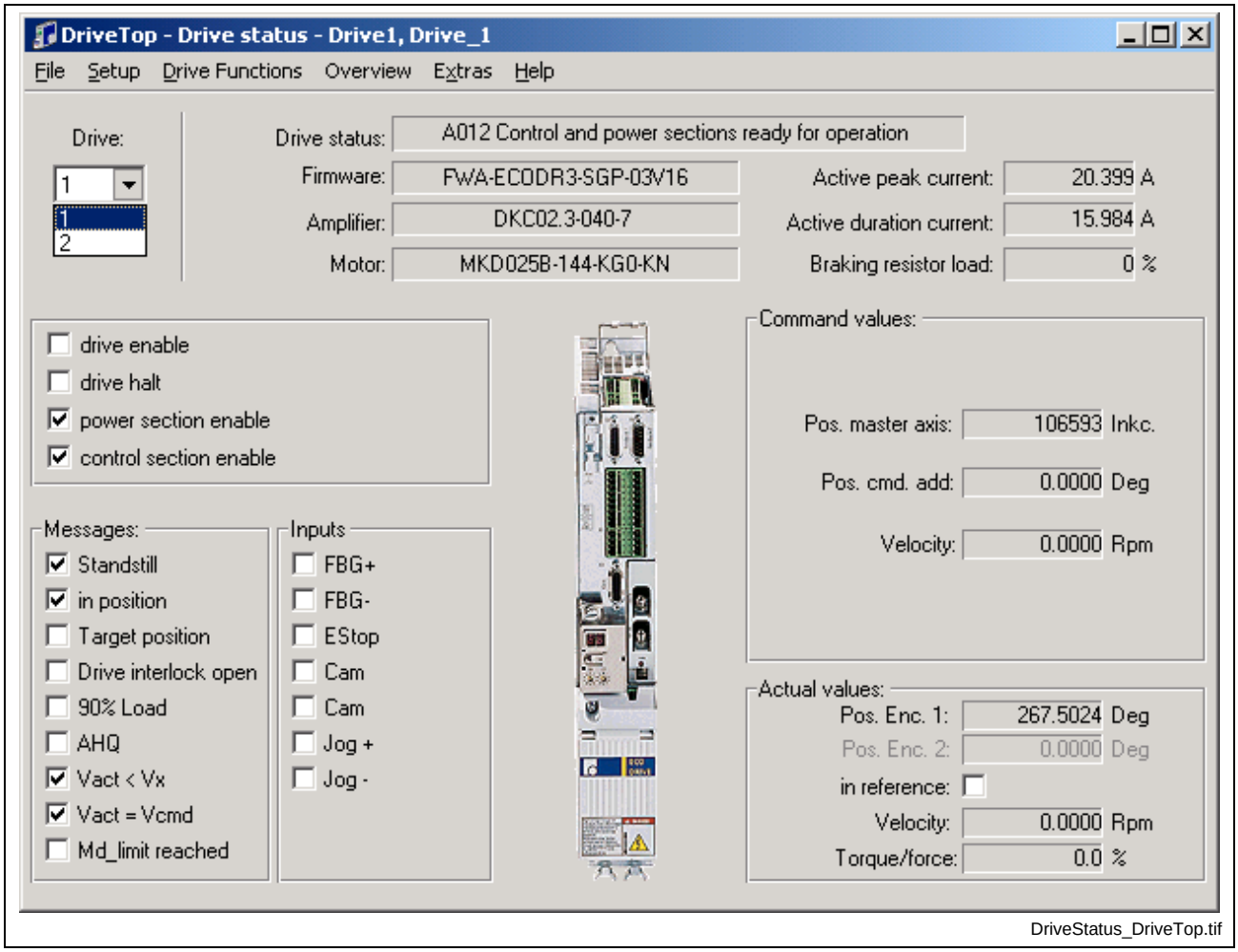


Fig. 2-9: DriveTop Drive Status

Note: If the drive controller connected to the VisualMotion system experiences an error, the user can obtain drive status information from the Drive Status message displayed within DriveTop.

2.2 Using VisualMotion's End User Tool for Diagnosing

VisualMotion's End User Tool is freeware diagnostic software designed to provide the user with diagnostic information and parameter accessibility in the following areas:

- Archive and Restore parameters
- Diagnostics for control and drives
- Viewing and editing control, task, axis and SERCOS drive parameters
- Viewing and editing parameters for additional SERCOS devices, such as I/O
- Ability to create and edit Custom parameter list
- Password Security

Note: The End User Tool installation is included, by default, as part of the VisualMotion 9 installation. The End User Tool can be launched from the \\Rexroth\VisualMotion 9 folder, by double clicking on the EndUserTool.exe file.

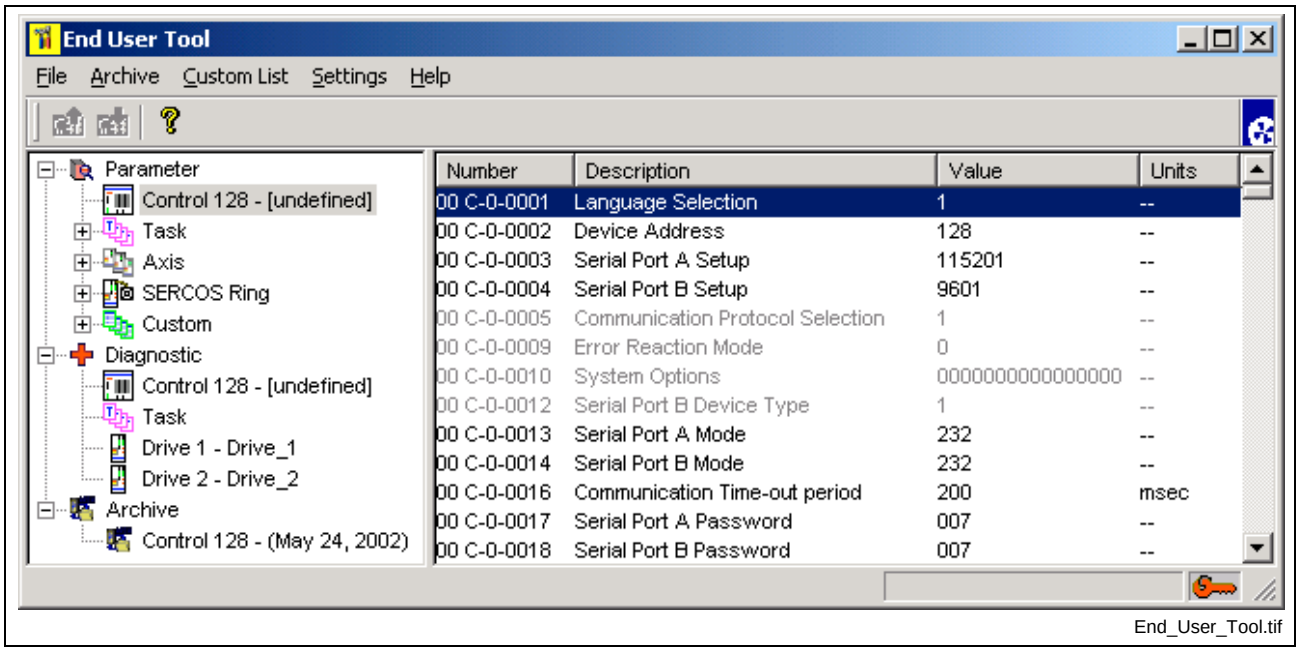


Fig. 2-10: End User Tool

3 Monitoring and Diagnostics

3.1 System Diagnostics - Codes and Message

VisualMotion provides three types of diagnostic messages:

- Status messages
- Warning messages
- Shutdown messages

An identifying 3-digit code number precedes diagnostic messages.

Example: 400 Emergency Stop

These identifying code numbers are assigned by Bosch Rexroth and are broken up into the following groups:

- (001-199) Status messages
- (201-399) Warning messages
- (400-599) Shutdown messages

Each group above does not contain the range of code numbers indicated as diagnostic messages. The range of numbers was designed to allow for future development.

The Host can request the currently active VisualMotion diagnostic message for the control and for each user task from the following parameters.

Control parameters

- Parameter C-0-0122: Displays current diagnostic message
- Parameter C-0-0123: Displays current diagnostic 3-digit code
- Parameter C-0-0124: Displays extended diagnostic message

VisualMotion Task parameters

- Parameter "0**x** T-0-0122": Displays Task (A-D) diagnostic message
- Parameter "0**x** T-0-0123": Displays Task (A-D) status message

  (Where 0**x** = 1-4 for Task A-D)

Drive Parameter

- Parameter "**xx** S-0-0095": Displays Drive diagnostic message

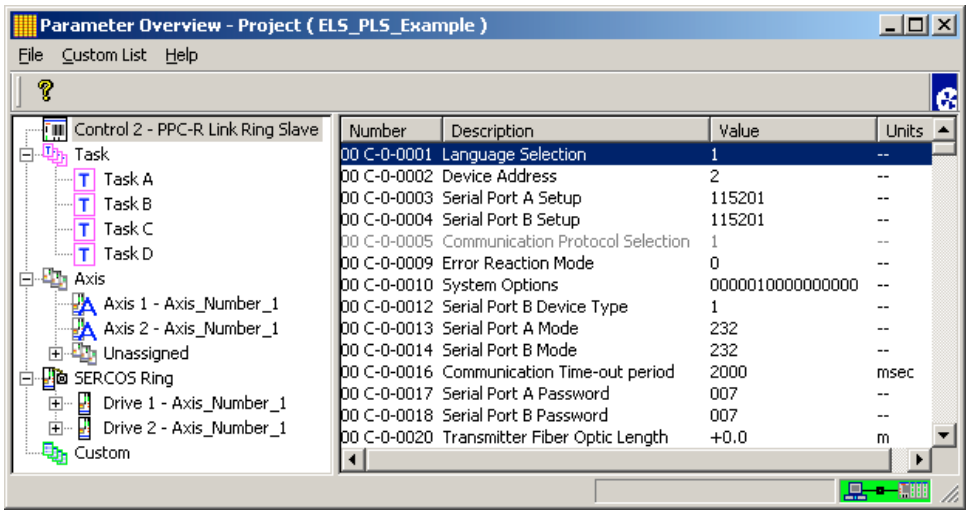
  (Where **xx** = 1-40 for Drive 1-40)

The above diagnostic message parameters can be view by using VisualMotion Toolkit and selecting ***Data*** ⇒ ***Parameters*** from the main menu.

Parameters

Selecting ***Data*** ⇒ ***Parameters*** opens the *Parameter Overview* window shown below. This window is used to view and modify existing Control, Drive, Task and Axis parameters.

Note: Parameters can only be viewed when VisualMotion Toolkit is either in service or online mode. Communication in either mode is established using a serial interface cable (IKB0005) or an Ethernet connection.



Param_Overview.tif

Fig. 3-1: Parameter Overview Window

Access to Parameters

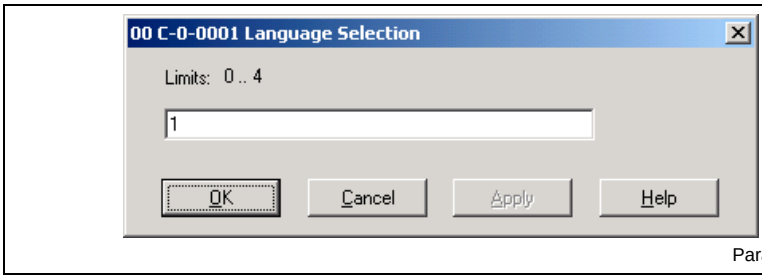
The Parameter Overview tool controls access to parameters whether in Phase 2 or Phase 4. Parameters are displayed in different colors to provide a visual representation of their access level. The following table explains the color code / access combination.

Color code	Description	Access Level
grayed out text	read-only parameter or not editable in current phase	read-only
black text	parameter that can be edited	read/write
red text	used to indicate an error	read/write
blue text parameter list	parameter list that can be edited (list value displayed as 6 Xs)	read/write
grayed out parameter list	read-only parameter list or not editable in current phase	read-only

Fig. 3-2: Access to Parameters

Editing a Parameter

A parameter can be edited by double clicking the desired parameter from the Parameter Overview window or by selecting the parameter and right clicking and selecting Edit Selection. The parameter's data range is displayed above the input field. Parameters that can not be edit in the current Phase display the current value in a gray field. Pressing the Help button or pressing the F1 key can access context sensitive help.



Param_Editor.tif

Fig. 3-3: Parameters Editor Window

DriveTop

Parameters pertaining to drive diagnostics can be viewed by selecting **Commission ⇒ Drive Overview**. This menu selection opens DriveTop.

Note: The Drive Parameter Editor used with VisualMotion 8 can only be accessed when communicating with GPP08 firmware. When communicating with GPP09 firmware, a new version of DriveTop will be used for the commissioning digital drives.

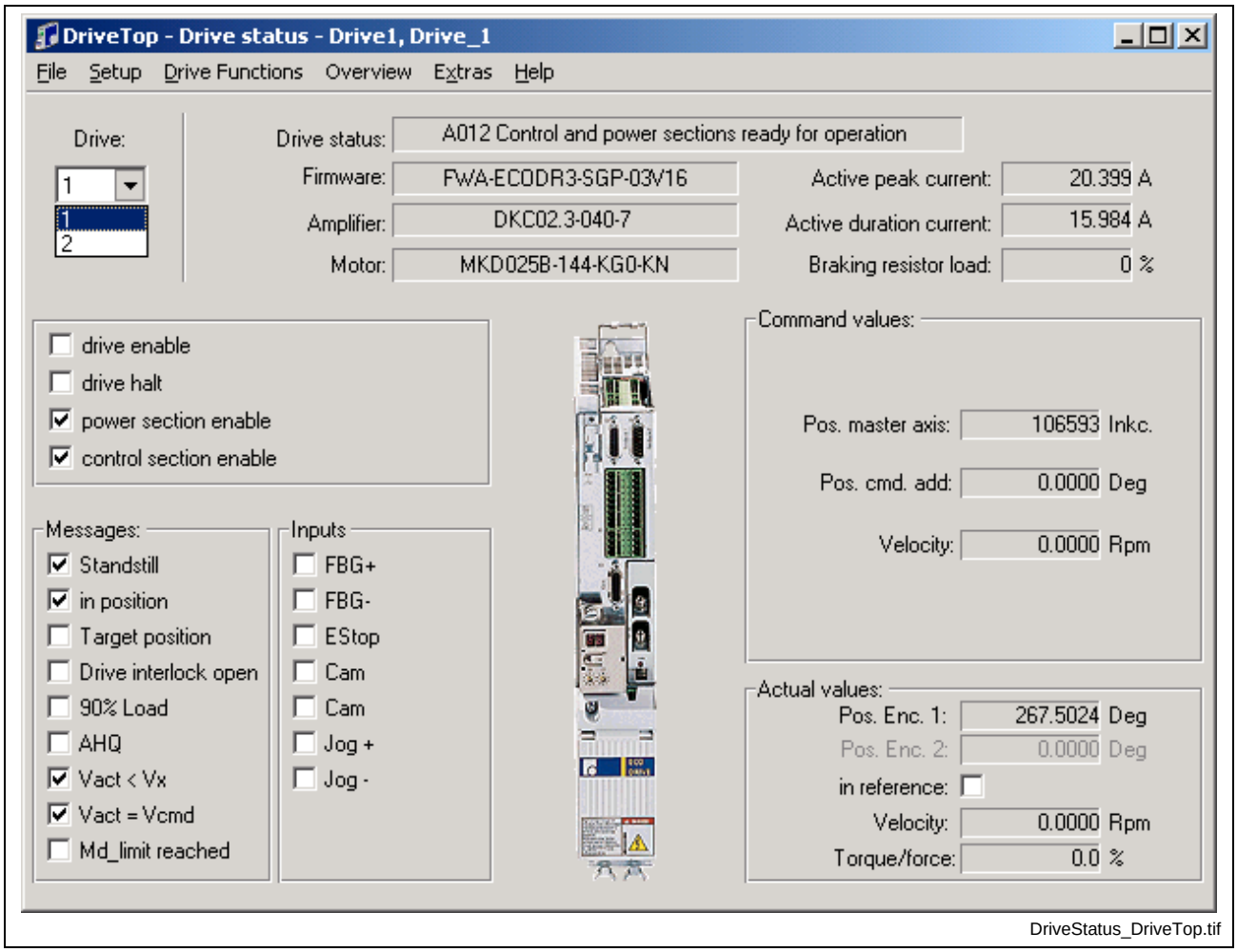


Fig. 3-4: DriveTop Drive Status

Select the drive number containing the diagnostic error code and the **Status** line will display the drive diagnostic message from parameter S-0-0095. Refer to the Drive manual for descriptions of drive diagnostics.

3.2 Control Startup Messages

On power up, the control's boot-up sequence displays a series of numbers and/or letters on the H1 display. These represent each step in the initialization process. The display stops on a numeric value if a step fails. Additionally, a distortion LED flashes with a defined code if the SERCOS loop is closed.

PPC Boot-Up Sequence

H1 Display			
PPC-R	PPC-P	(Distortion LED)	Description
-01	1	blinks 4 times on failure	Checksum test (Flash application) Flash encountered a programming error, hardware failure in PSM module or hardware failure in PPC-R.
-02	2	blinks 5 times on failure	SDRAM test. Address or data bus is faulty. Hardware failure in PSM module or hardware failure in PPC-R.
-03	3	no error evaluation	Not present on current standard ROM versions.
-04	4	blinks 6 times on failure	CRC32 Checksum test (Flash application)
-05	5	blinks 2 times on failure	Copies application code from FLASH to RAM and checks correct data using CRC32. Initializes processor registers, data cache, instruction cache, disables interrupts and initializes data area. Flash encountered a programming error, hardware failure in PSM module or hardware failure in PPC-R.
-06	6	no error evaluation	Initializes decrementer, floating point unit, interrupt controller and serial ports
-07	7	no error evaluation	Initializes operating system (pSOS, pROBE). Checks BSP variables Checksum and initializes serial driver. Initializes global setup, pROBE I/O, BSP variables and application variables. Adjusts runtime system variables. Builds component configuration tables. Sets up lower serial driver in case settings changed.
-08	8	no error evaluation	Start pROBE (which starts pSOS, which starts the application).

Table 3-1: PPC-R Boot-Up Sequence

Note: The distortion LED on the PPC-R is label H2 and located above the SERCOS connections. The distortion LED on the PPC-PCI card appears as a small dot at the bottom of the 7-segment display.

Control Firmware Sequence

H1 Display		
PPC-R	PPC-P	Description
-20	A	Obtains hardware information and clears memory if new firmware is detected. Initializes diagnostic system, CRC calculations and dynamic memory allocation.
-21	b	Initializes parameter system and path planner
-22	C	Initializes file system
-23	d	Initializes ELS system, CAM, PLS, PID, Oscilloscope, SERCOS and Link ring (if present)
-24	E	Initializes communication structure (serial and Ethernet) and PLC interface
-25	F	Creates and initializes several operating system task
-26	G	Starts several operating system task
-27	H	Enables interrupts, check battery (if present), initializes Fieldbus interfaces (if present), Option Card PLS (if present), starts Link Ring (if present), initializes temperature sensor and starts operating system tasks.

Table 3-2: PPC-R Firmware Sequence

Afterwards, the normal system diagnostics and/or error messages will be display.

3.3 Status Messages (001-199)

A Status Message indicates the normal operating status of an axis, task, or the system when there are no errors. A change in status that generates a new status message overwrites the previous message. No user acknowledgment is required for a change in a status message.

Status messages can be viewed within VisualMotion Toolkit (VMT) under menu selection ***Diagnostics ⇒ System*** or from the VM DDE Server if the Status Display is set to *SERIAL_0* or *NETWORK_0* under ***Settings ⇒ Server Configuration***.

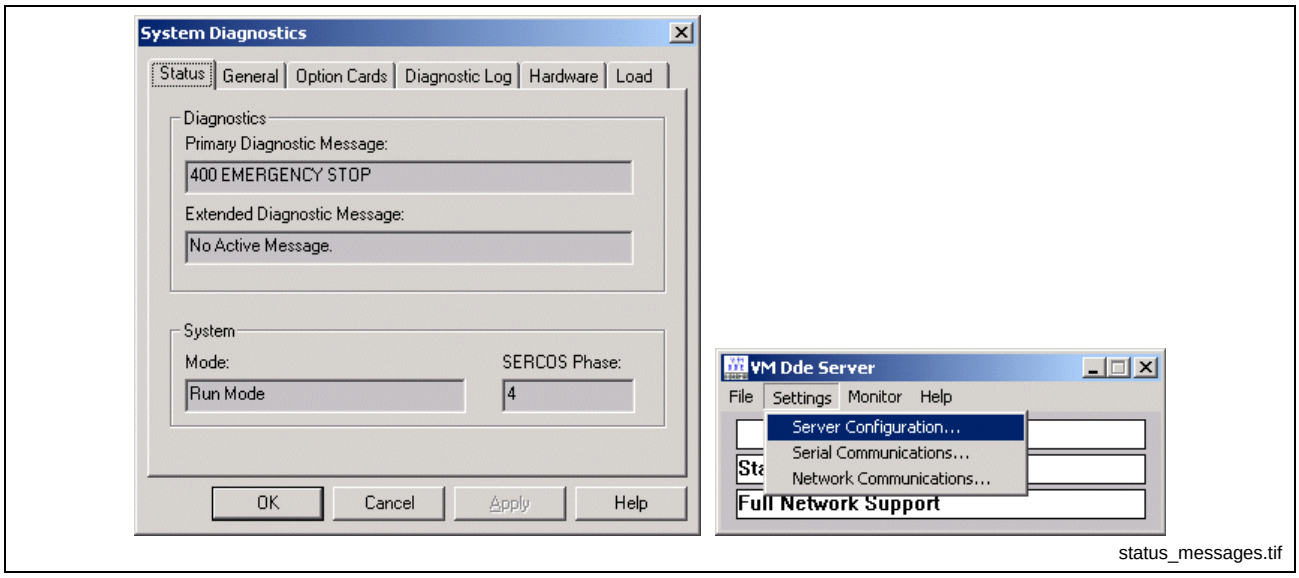


Fig. 3-5: Viewing Diagnostic Status Messages

001 Initializing System

The control is initializing the executive firmware, the SERCOS ring, and other devices at power-up or exit from parameter mode.

002 Parameter Mode

The control is in parameter mode, and the drives are in Phase 2.

003 Initializing Drives

SERCOS has been reconfigured and the fiber optic ring is being initialized.

004 System is Ready

The system has been initialized and is ready for operation.

005 Manual Mode

All user program tasks are in manual mode.

006 Automatic Mode: ABCD

The user program tasks indicated at the end of the message are in automatic mode, and the rest are in manual mode.

Example: "Automatic Mode: B" indicates that only Task B is in automatic mode.

007 Program Running: ABCD

The user program tasks indicated at the end of the message are running, and the rest are not running or are single stepping.

008 Single-Stepping: ABCD

The user program tasks indicated at the end of the message are in single-step mode. The other tasks are not running.

009 Select Parameter Mode to Continue

An error occurred and cleared during system initialization, but the error condition was not corrected. Switch into Parameter Mode to continue.

010 Breakpoint Reached: ABCD

The user tasks indicated at the end of the message have reached a user program breakpoint, and the rest of the tasks are not running.

011 Waiting for PLC

When control parameter C-0-0035 is set to 1, a handshaking is initialized between the PLC and the PPC on power up. This status message is issued under the following conditions:

- a timeout condition exists between PLC and PPC handshaking.
- the PLC contains wrong firmware.
- **C-0-0035** is set to 1 but no PLC is present.

018 Please cycle power to continue

This status message is displayed when system parameter **C-0-0996**, *Clear Program and Data Memory*, is used to reset system memory. Press the S2 Reset button on the PPC-R to cycle power to the control. Error message 492 Programs were lost, see ext. diag., will follow. Transition control register 001 bit 1 from 0 -> 1 and then from 1 -> 0. This will switch the control in and out of parameter mode. Use the archive function under the file menu in VisualMotion Toolkit to restore the system.

019 Executing User Initialization Task

This status message is displayed while the Initialization task is running. Typically, the display is momentary and it's duration varies based on the length and complexity of the Initialization task program flow. The initialization task is executed during the control's Phase 2 to Phase 4 transition. If the initialization task runs longer than 30 seconds, error code 550 User Initialization Task Timeout will be displayed.

3.4 Warning Messages (201-399)

Warning messages are issued when an improper system condition exists. The condition is important enough to be brought to an operator's immediate attention, but not critical enough to shut down the system. However, a warning may be a notification of an impending shutdown condition. Warnings typically allow normal system operation to continue.

A warning sets the error bit associated with the effected task or the system and displays the warning message. Once issued, the error condition must be corrected and acknowledged to the system. The user acknowledges and clears a warning with a low-to-high (0 ->1) transition of the Clear All Errors bit of the System Control Register.

System Control Register 1 can be viewed under menu selection ***Data ⇒ Registers***.

Note: VisualMotion Toolkit must be in either service or online mode for the menu selection to be accessible.

Double clicking on register #1 will open a window containing all bits in reg. #1 along with their names. Bit 5 is labeled as Clear_All_Errors and it's transition from low-to-high (0 -> 1) is typically controlled by an external PLC or switch. To view Data in binary, select binary under menu selection ***Format***.

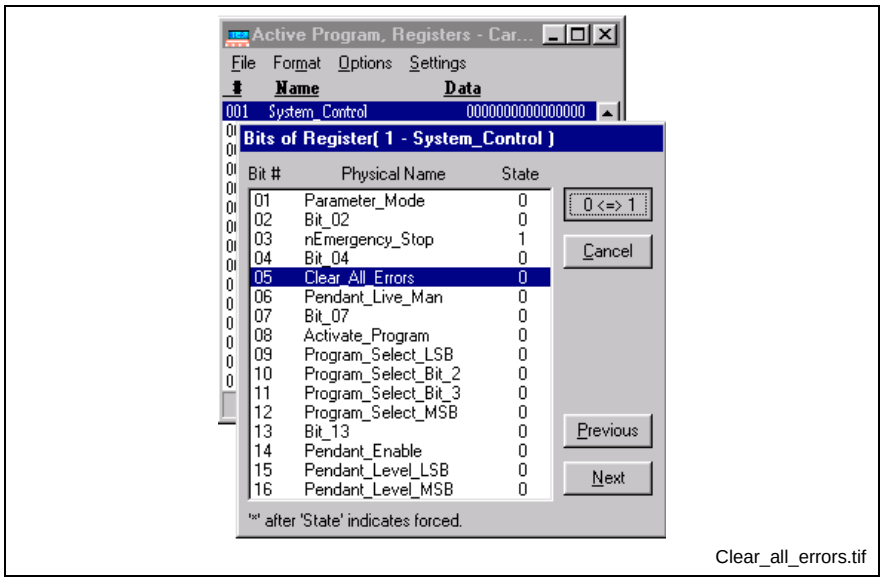


Fig. 3-6: Clearing All Errors

After a warning condition has been corrected and acknowledged, the user program can be resumed at the point where the error occurred. In SERCOS, warnings are Class 2 Diagnostics.

Warning messages can be cleared by correcting the warning condition, or by setting the control's clear error input. Similar to status messages, warning messages can also be viewed from system parameters and/or the VM DDE Server. Refer to Fig. 3-5: Viewing Diagnostic Status Messages.

201 Invalid jog type or axis selected

This message is issued before a coordinated I/O jog when an invalid type or axis is selected.

Causes:

1. The axis selected for jogging is not defined as a coordinated motion axis.
2. An axis defined for coordinated motion is commanded to jog as a single axis and visa versa.

Remedy:

Ensure that the selected axis  is programmed for either coordinated motion or single-axis motion and that the jogging command selected match the axis selected.

202 Drive %d is not ready

Cause:

An attempt to jog axis for drive %d (where %d = drive number) in manual mode was commanded before the drive was enabled (AF).

Remedy:

1. Clear error and wait for drive to be enabled before jogging.
2. Check the axis disable bit in AxisD_Control register under ***Data ⇒ Registers***. If the bit is high (1), the drive is disabled. Change the state to low and restart program.
3. Check the fiber optic connections and power to drive.

203 Power Fail detected

Cause:

Power was removed to the system while a program was running.

Remedy:

Make certain that all connections are correct and connected and restart system.

204 SERCOS ring was disconnected

Cause:

The SERCOS ring was disconnected before a shutdown error was cleared. The ring is now initialized. This message allows detection of an intermittent break in the fiber optic ring.

Remedy:

1. To continue, activate the clear input.
2. If error continues, replace fiber optic cable.
3. Ensure that the DSS card address is properly selected and has not changed.

205 Parameter transfer warning in Task %c

There is an error in the parameter transfer instruction. This indicates a warning condition that does not shutdown the task. A communication error message is displayed in the diagnostic message for the task %c (where %c = task letter) in which the error occurred (**T-0-0122**). Information on the actual parameter number that caused the error is provided in extended diagnostics (**C-0-0124**).

Using VisualMotion Toolkit,

Parameter T-0-0122: Task diagnostic message can be viewed under ***Diagnostics ⇒ Tasks***

Parameter C-0-0124: Extended diagnostic can be viewed under ***Diagnostics ⇒ System***

Cause:

The parameter format, parameter number, or stored value may be invalid.

Remedy:

Verify that the parameter transfer instruction  is valid for the program in task %c.

207 Axis %d position limit reached

Cause:

The negative or positive travel limit of axis %d (where %d = axis number) was reached, preventing a jog from occurring.

Remedy:

Clear error and move axis to a position within drive parameters
S-0-0049: Positive position limit value
S-0-0050: Negative position limit value
Current position can be view under ***Commission ⇒ Drive Overview***

208 Lost Fieldbus Connection

Cause:

A Lost Fieldbus connection is issued when cyclic communications between the slave and master fieldbus interfaces are no longer present. This message is issued when register 19 bit 4 transitions from high (1) to low (0). The error is hardware related as is normally caused by…

- a bad or disconnected cable.
- a hardware related problem with the Fieldbus interface on the control.

Note: Warning message **208** is only issued while in phase 4 if the Fieldbus Error Reaction in the Fieldbus Slave Configuration window is set to warning.

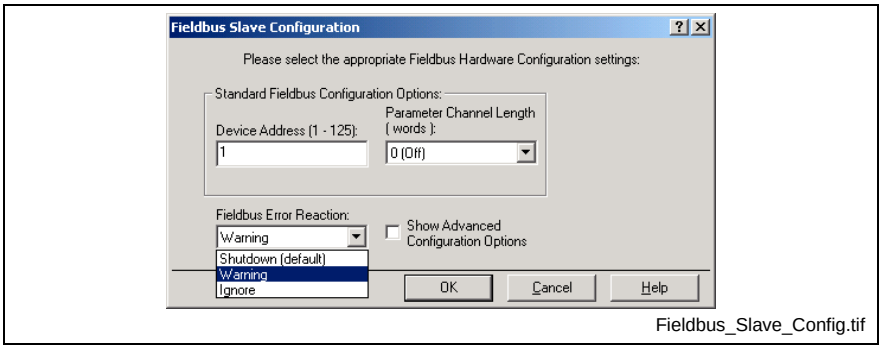
Remedy:

1. Check and verify all cable connects between the slave and master Fieldbus connections.
2. Contact Bosch Rexroth service for assistance.

209 Fieldbus Mapping Timeout

Cause:

The Fieldbus Mapper continually scans the system for sufficient resources to process the cyclic data mapping list (2600-list). If 10 out of 10 attempts of the mapping list update are missed, the system is considered to have insufficient resources. Error 209 Fieldbus Mapper Timeout is generated if the selected error reaction is set as "Warning," (Parameter **C-0-2635**), in the Fieldbus Slave Configuration window.



Fieldbus_Slave_Config.tif

Fig. 3-7: Fieldbus Slave Configuration

Remedy:

The PPC-R mapping list is scanned every 4 ms for GPP09 and fixed at 8 ms for GPP08. If this error occurs, contact Bosch Rexroth Service for assistance.

210 File System Defrag: %d completed

Cause:

VisualMotion user programs, I/O Mapper, I/O user configurations (P-0-2017), Fieldbus mapping and CAMs are stored to flash into a File System on the control's memory card. As programs are deleted from flash, unusable areas of memory are created. The defragmentation program runs on power up or when request serially. Actual compression only takes place if 60% of unusable memory exist and available unused memory is less than 256K.

Remedy:

The defragmentation process will run without disrupting the active program. VisualMotion programs and necessary files are copied and processed from RAM memory on the control.

211 Program- & Data memory cleared

Cause:

This warning message is written to VisualMotion's diagnostic log when system parameter **C-0-0996**, *Clear Program and Data Memory*, is used to reset system memory.

Remedy:

Refer to 018 Please cycle power to continue for details.

212 Option Card PLS Warning, see ext. diag.

Cause:

This is a general warning message for the Option Card PLS. It will always be accompanied by an extended warning diagnostic message.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostics C-0-0124	Description
003: Table is not initialized *xx*	The Option Card PLS can switch from one set of date to another. However, the data needs to be prepared before.
0*yy*: General error *xx*	An error happened during the communication between PPC and Option Card PLS. yy is an error number (1, 4, 5, 6, 10, 16 or 17);
Error while initializing Option Card PLS, report number: yy	An error occurred during parameterization of the Option Card PLS. This error is mainly related to the Option Card PLS hardware. The Option Card PLS needs to be recognized by the hardware and firmware is downloaded and started during power up. Errors can occur during this download. Also if one tries to start a command (C-0-2903, C-0-2905) on the Option Card PLS without a Option Card PLS being present, than this error will be issued. yy is an error number that specifies the failed operation.
065: Switch *yy* outside position limit	Switch number *yy* is not within the position limits of its associate Option Card PLS master.
066: Master number > 32 or master not present	The Option Card PLS master number is either not valid, or the master is not present in the system. Check C-0-2941.

Table 3-3: Option Card PLS Warning Extended Diagnostics

213 SERCOS cycle time changed

Cause:

This status message is written to VisualMotion's diagnostic log when control parameter C-0-0099 is automatically modified by the control. Refer to control parameter **C-0-0099** for details.

214 PLC Cyclic Mapping Timeout

Cause:

The Fieldbus Mapper continually scans the system for sufficient resources to process the PLC cyclic data mapping list **C-0-2600**. If 10 out of 10 attempts of the mapping list update are missed, the system is considered to have insufficient resources. This warning error message is issued when control parameter **C-0-2635** (*Fieldbus/PLC Error Reaction*) is set to warning (0x0001) and **C-0-2613** (*Fieldbus/PLC Cyclic Channel: Timeout Counter*) increments by 1.

Remedy:

The control's mapping list is scanned every 4 ms for GPP09 and fixed at 8 ms for GPP08. If this error occurs, contact Bosch Rexroth Service for assistance.

215 RECO I/O Failure, see ext. diag.

Cause:

This message is generated when GPP is configured to react to RECO I/O errors with a warning.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
Module Initialization Error, Slot 2, RECO3	An error occurred during the initialization of the I/O module in slot 2 of the SERCOS RECO controller rack at SERCOS address 3.
Cyclic Communications Error, Slot 3, RECO 0	A cyclic communications error occurred with the I/O module in slot 3 of the Local RECO I/O controller rack.
Incorrect Module, Slot 4, RECO 3	The I/O module found in slot 4 of the SERCOS RECO I/O controller rack at SERCOS address 3 is not consistent with the controller's configuration. Hot-swapping I/O modules will result in this error and could cause permanent damage.
24V Error, Slot 3, RECO 0	A 24V error exists at the RECO I/O module in slot 3 of the Local RECO I/O controller rack.
Module Error Code 7, Slot 3, RECO 0	The I/O module in slot 3 of the Local RECO rack is reporting error code 7
Unknown Error, RECO 3	An undefined error has occurred on the SERCOS RECO I/O controller at SERCOS address 3.

Table 3-4: Extended Diagnostics for RECO I/O Failure

216 Control PLS %d warning, see ext. diag

Cause:

A drive's primary or secondary encoder can be configured as a PLS master and assigned to a PLS switch. This warning occurs when the drive's modulo value, S-0-0103, is smaller than the value assigned to the PLS switch. An extended diagnostic error message will indicate the PLS switch. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Example:

Drive's modulo value is 360° and the user enters the following values for…

PLS1: Switch 1 is set to turn ON at 200° and OFF at 400°

The switch's OFF position is greater than the drive's modulo value.

Modulo values are dependent upon the application. For ELS applications, the modulo value is fixed at 360°. For all other, the modulo value is set in drive parameter S-0-0103 and dependent upon the application's specifications.

Remedy:

Verify that the assigned PLS switch limits are correct for the application. Correct any values that are beyond the drive's modulo value and download a new PLS configuration to the control.

217 PLC Communication, see ext. diag

Cause:

During power up, the PLC communication is initialized with the control. This warning is issued when a communication error is encountered. Refer to the extended diagnostic message for details.

Remedy:

Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
PLC/PCI communication not started	Register 19, bit 2=0, bit 1=0
Unknown PLC firmware	Register 19, bit 2=0, bit 1=1
PLC/PCI does not respond to initialization	Register 19, bit 2=1, bit 1=0
File: %s Line: %d	%s = filename e.g. MTS_PLC %d = line number e.g. 1395 Severe software failure
PLC in error state or not running	C-0-2635 = 0x0001 and the PLC life counter stops. The ERROR bit is set in the PLC status in the DPR, or the RUN bit is not set

Table 3-5: Extended Diagnostics for PLC Communication

218 PLC Register Mapping Timeout

The control and PLC can communicate across the DPR's register channel. The rate in which each device accesses the register channel varies by device and control firmware.

- PPC-R with GPP09 firmware uses set I/O Mapper scan time
- PPC-P11.1 with GMP09 firmware uses SERCOS Cycle time C-0-0099
- PLC uses program cycle time

If the control attempts to read or write to the register channel while the PLC is currently reading or writing data, control parameter C-0-2651 (*PLC Register Channel: Current number of misses)* is incremented by a count of 1. When C-0-2651 reaches a maximum of 10 misses, C-0-2653 (*PLC Register Channel: Timeout counter)* increments by 1.

Cause:

This warning error message is issued when control parameter C-0-2635 (*Fieldbus/PLC Error Reaction*) is set to warning (0x0001) and the PLC Register Channel: Timeout counter (C-0-2653) increments by 1.

219 PLC Lifecounter Timeout

The PLC life counter is incremented by 1 every PLC program cycle. Every increment is an indication that the PLC is functioning and communicating properly. The control monitors the PLC life counter value every SERCOS cycle. If the control does not read a different PLC life counter value, then C-0-2643 (*PLC Lifecounter Check: number of retries*) increments by a count of 1. When C-0-2643 reaches the user-defined maximum number of misses, C-0-2646 (*PLC Lifecounter Check: number of timeouts*) increments by 1.

Cause:

This warning error message is issued when control parameter C-0-2635 (*Fieldbus/PLC Error Reaction*) is set to warning (0x0001) and the PLC Lifecounter Check: number of timeouts (C-0-2643) increments by 1.

220 Excessive deviation in PMG%d, see ext. diag.

If the PMG Configuration parameter (C-0-3205, C-0-3215, C-0-3225, C-0-3235, C-0-3245, C-0-3255, C-0-3265, C-0-3275) bit 2 is set to 0 (Warning), the group is enabled and the current deviation exceeds the allowed deviation, this warning is displayed. The axis that caused the deviation will be listed in the extended diagnostic message. Extended diagnostics can be viewed by selecting ***Diagnostics*** ⇒ ***System*** in VisualMotion Toolkit.

221 Excessive Master Position Slip Deviation

The slip between the Primary and Secondary ELS Masters has exceeded the value of the Maximum Deviation Window. (Slip Mon configured for Warning reaction)

222 ELS Config. Warning, see ext. diag.

Due to the nature of rotary motion, the proper operation of ELS is limited to velocities less than 180° per SERCOS cycle. Therefore, both the generation and processing of motion in ELS are being limited to velocities less than 180° per SERCOS cycle.

The maximum ELS velocity limit is calculated as a function of the current SERCOS cycle time.

SERCOS Cycle Time	Max. ELS Velocity Limit (180° / SERCOS Cycle)	Max. ELS Velocity Limit Less 1 RPM
2 ms	15,000 RPM	14,999 RPM
4 ms	7,500 RPM	7,499 RPM
8 ms	3,750 RPM	3,749 RPM
16 ms	1,875 RPM	1,874 RPM

Table 3-6: Maximum ELS Velocities

Cause:

The jogging velocity G#_JOG_VEL (where # = ELS Group number) for the specified ELS Group exceeds the Maximum ELS Velocity for the current SERCOS cycle time. This warning is issued with an extended diagnostic. Extended diagnostics can be viewed by selecting ***Diagnostics*** ⇒ ***System*** in VisualMotion Toolkit. The following extended diagnostic message is available:

Extended Diagnostic C-0-0124	Description
Group %d Jog Vel. Limited to %.f RPM	%d = ELS Group number 1-8 %.f = Max. ELS velocity less 1 RPM

Table 3-7: ELS Config. Warning Extended Diagnostic

Remedy:

To correct the problem, the ELS Group's jogging program variable G#_JOG_VEL must be set to a value that does not exceed the calculated Max ELS Velocity Limit less 1 RPM.

3.5 Shutdown Messages (400 - 599)

A Shutdown is issued in an emergency situation or when the system or drives cannot operate correctly. During a shutdown, the control switches the user program tasks into manual mode, decelerates all motion to zero velocity, and sets the error bit in the status register.

If the shutdown condition results from an E-stop or drive shutdown condition, the control also disables the drives, disabling motor torque and engaging the brake.

A low to high transition on the Clear All Errors bit in the System Control Register will clear a shutdown. The control automatically sends a 'Reset Class 1 Diagnostics' command to each drive that has an error.

400 EMERGENCY STOP

Cause:

The Emergency Stop input is active (low). The E-Stop circuit has been opened due to activation of the E-Stop push button or external logic. All drives on the ring are disabled.

Remedy:

Release the E-Stop button or correct the error condition. Clear error on control. Set Emergency Stop input active (high) and restart program.

401 SERCOS Controller Error: %02d

Cause:

The SERCOS communications controller has indicated an error on the SERCOS ring.

Remedy:

Check the fiber optic connections, the addresses set on the drives, and the drive configuration.

402 SERCOS Config. Error: see ext. diag.

Cause:

An error in the SERCOS service channel has occurred when the control was initializing the timing and scaling parameters. The extended diagnostic (**C-0-0124**) gives a description of the error. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Remedy:

If the extended diagnostic indicates a timing error or data limit error, check the amount of data or drives on the ring and the minimum cycle time parameter **C-0-0099**. Otherwise, check the fiber optic connections, the addresses set on the drives, and drive firmware versions.

403 System Error see ext. diag.

Cause:

A communication problem has occurred in the SERCOS ring. The extended diagnostic displayed is, “Dxx: Multiplex AT Error,” where xx is the drive number. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Remedy:

Recycle system power. If recycling power does not resolve the error, contact Bosch Rexroth service for assistance.

405 Phase %d: Drive did not respond

Cause:

A time-out in the SERCOS ring occurred when the control did not receive a response from the drive during Phase %d (where %d = phase number) initialization. The control sent out a signal to the drive, but the drive did not respond. This distinguishes a communication error from an actual phase switch error.

Remedy:

Check the fiber optic connections, the addresses set on the drives, and the drive firmware versions.

407 Drive %d Phase 3 Switch Error

Cause:

The SERCOS phase 3 switch command failed for drive %d (where %d = drive number). This usually indicates that configuration parameters for the drive are invalid or have not been saved. This message is displayed when an error occurs while the drive is switching from phase 2 to phase 3.

Note: Do not clear the error or switch to parameter mode before viewing a list of invalid parameters. Doing so will clear any chance of viewing invalid parameters.

Remedy:

1. View drive diagnostic under ***Commission ⇒ Drive Overview.*** If the drive status indicates parameters are invalid or lost, display the Phase 2 error parameter list for Drive %d (Step 2.)
2. To view phase 3 switch errors for the specific drive, select ***Data ⇒ Parameters,*** select the appropriate drive and double click on SERCOS parameter S-0-0021. This parameter will list all parameters that are outside of their allowable ranges. Once the list is displayed, switch to parameter mode and change the invalid parameters or download a valid parameter file to the drive.
3. If the drive is not communicating, check the connections and the addresses. If drive parameters were just downloaded, switch back into parameter mode to reinitialize the interface.

409 SERCOS Disconnect Error

The SERCOS fiber optic ring was disconnected or a drive connected to the ring was powered down while in Phase 3 or 4. A more descriptive message will be displayed in the extended diagnostic control parameter **C-0-0124**.

Cause:

1. A fiber optic cable has been disconnected or damaged somewhere in the SERCOS ring.
2. A drive in the system may contain old firmware.

Remedy:

1. Check the fiber optic connections, the addresses set on the drives, and the drive firmware versions.
2. If a new drive was added to the SERCOS ring, make sure it contains current drive firmware.

411 Drive %d Phase 4 Switch Error

Cause:

The SERCOS phase 4 switch command failed for drive %d (where %d = drive number). This usually indicates that configuration parameters for the drive are invalid or have not been saved. This message is displayed when an error occurs while the drive is switching from phase 3 to phase 4.

Note: Do not clear the error or switch to parameter mode before viewing a list of invalid parameters. Doing so will clear any chance of viewing invalid parameters.

Remedy:

1. View drive diagnostic using DriveTop*.* If the drive status indicates parameters are invalid or lost, display the Phase 3 error parameter list for Drive %d (Step 2).
2. To view phase 4 switch errors for the specific drive, select ***Data*** ⇒ ***Parameters,*** select the appropriate drive and double click on SERCOS parameter S-0-0022. This parameter will list all parameters that are outside of their allowable ranges. Once the list is displayed, switch to parameter mode and change the invalid parameters or download a valid parameter file to the drive.
3. If the drive is not communicating, check the connections and the addresses. If drive parameters were just downloaded, switch back into parameter mode to reinitialize the interface.

412 No drives were found on ring

Cause:

No drives were found when the control initialized the SERCOS ring to Phase one.

Remedy:

Check the addresses set on the drives, in the VisualMotion program, and in the control parameters. Also, check that power is applied to all the drives and that the fiber optic connections are correct.

414 Parameters were lost

System, task, and axis parameters were lost, and default values have been loaded.

Cause:

This error has occurred for one of the following reasons:

- new firmware was loaded on the PSM memory card
- or an internal system error has corrupted the memory.

Remedy:

Perform a selective restore using VisualMotion's Archive tool under ***Commission*** ⇒ ***Archive***. Browse for the directory containing the latest backup and click the ***Next*** button. Click on the ***Help*** button for details on how to perform a selective restore.

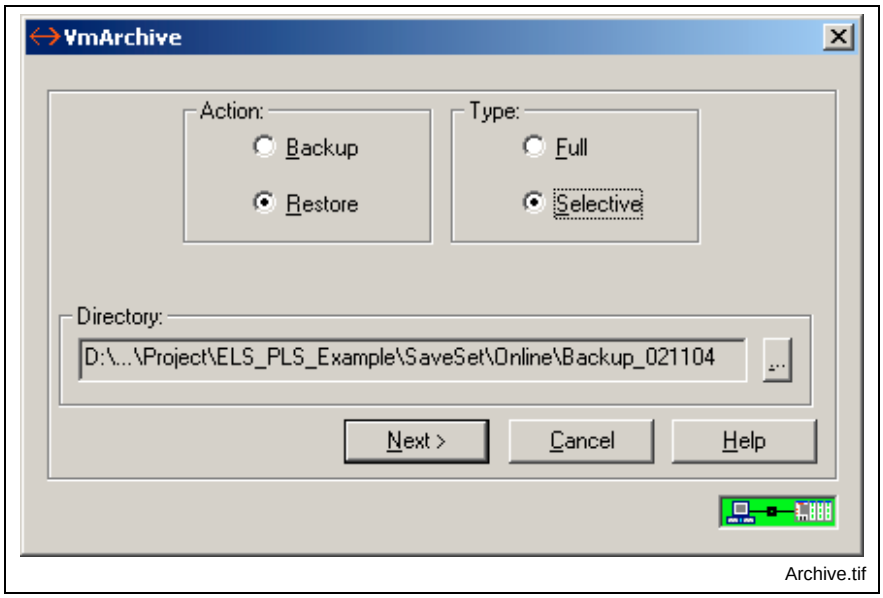


Fig. 3-8: Restore Archived System

415 Drive %d was not found

Drive %d (where %d = drive number) that is used in a program or selected in the system parameters was not found on the SERCOS ring.

Cause:

1. The axis icon in the VisualMotion program is specifying an axis number or name that is recognized by the system.
2. The SERCOS card addresses of two or more drives are set to the same number.

Remedy:

1. Verify that the Axis icon  in the VisualMotion program is programmed with the correct axis number or variable label.
2. Verify that all drives have unique SERCOS card addresses anywhere from 1 to 40.

416 Invalid Instruction at %04x

Cause:

An invalid user program instruction was found by the control during compilation.

Remedy:

Recompile the program from the PC and download it again. If the error still occurs, check the source program for an instruction that may not be supported in this firmware version.

417 SYSTEM ERROR: pSOS #%04x

Cause:

An internal control operating system error has occurred. This error is generated due to a severe software fault.

Example: A Task can not be created or no memory is available.

Remedy:

Call Bosch Rexroth Service for assistance.

418 No program is active

Cause:

No active user program was found on the control during initialization.

Remedy:

Activate a user program using VisualMotion Toolkit (VMT).

1. Open a file in VMT using the ***File*** ⇒ ***Open*** menu command.
2. Save, Download and Compile the VisualMotion program
3. Using ***Build*** ⇒ ***Program Management***, activate the program.
4. Once the program is active, clear the error.

419 Invalid Program File: code = %d

Cause:

A checksum or file format error was found in the active program file. The file may be corrupt or missing information.

Remedy:

Recompile the program using VisualMotion Toolkit and download it again. If the error still occurs, call Bosch Rexroth Service for assistance.

420 Drive %d Shutdown Error

Cause:

Drive %d (where %d = drive number) has issued a shutdown error, which disables motion.

Remedy:

1. Check the SERCOS Drive Status message (Drive parameter S-0-0095) for a description of the error.

2. Using VisualMotion Toolkit, open the DriveTop under menu selection ***Commission ⇒ Drives*** and view the status line for a description of the drive error. Refer to the drive manual for more information.

421 User Program Stack Overflow

Cause:

The subroutine call stack for a user program task has overflowed. The stack is an area of dedicated memory. The most likely scenario is that there are too many nested subroutines in a task. A nested subroutine is a subroutine within another subroutine.

Remedy:

Check the program for the following conditions:

- there is not a return for every subroutine call
- a subroutine is calling itself
- program flow has caused multiple returns
- more than 10 subroutines are nested

422 Parameter transfer error in Task %c

There is an error in the parameter transfer instruction. A communication error message is displayed in the diagnostic message for task %c (where %c = task letter) in which the error occurred (**T-0-0122**). Information on the actual parameter number that caused the error is provided in extended diagnostics (**C-0-0124**).

Using VisualMotion Toolkit,

Parameter T-0-0122: Task diagnostic message can be viewed under ***Diagnostics ⇒ Tasks***

Parameter C-0-0124: Extended diagnostic can be viewed under ***Diagnostics ⇒ System***

Cause:

The parameter format, parameter number, or stored value may be invalid.

Remedy:

1. Use Program Flow <F7> to locate parameter transfer instruction.
2. Verify that the parameter transfer instruction  is valid for the program in task %c.

423 Unimplemented Instruction

Cause:

The command instruction or icon is not recognized by the current version of GPP, GMP firmware or VisualMotion Toolkit software.

Example: A new icon function is used with older control firmware. Using the show program flow <F7> function can identify the icon.

Remedy:

Recompile the program without the instruction indicated by the current instruction pointer or update the firmware or VisualMotion software. Contact Bosch Rexroth for updated firmware and software information.

425 Instruction error: see Task %c diag.

Cause:

An error has occurred in a user program instruction. A more specific message is displayed in the diagnostic message for task %c (where %c = task letter) in which the error occurred (**T-0-0122**). This error usually applies to coordinated motion instructions.

Remedy:

Verify that the following icons are setup properly and do not contain variables with negative values or incorrect axis numbers.

Wait  ELS mode  ELS Stop  Text message 

426 Drive %d is not ready

Cause:

Programmed motion was commanded to the axis of drive %d (where %d = drive number) before the drive was enabled (AF).

Remedy:

1. Clear error and wait for drive to be enabled before commanding motion.
2. Check the axis disable bit in Axis%d_Control register under ***Data ⇒ Registers***. If the bit is high (1), the drive is disabled. Change the state to low and restart program.
3. Check the fiber optic connections and power to drive.

427 Calc: invalid table index %d

An invalid table index %d (where %d = index number) was specified using the Calc icon.

Cause:

1. In a user program calculation expression, the index to a point or event table is invalid.
2. A value used in the calculation expression is not accounted for when either a points or event table was generated.

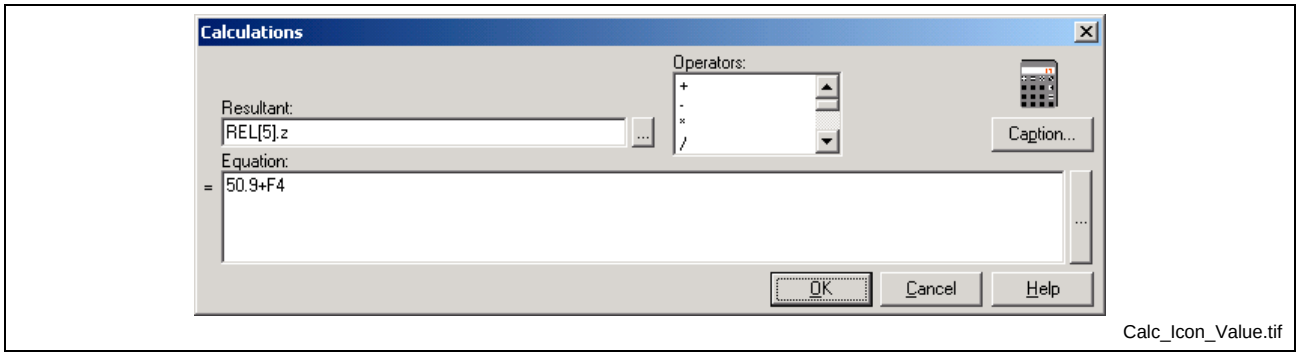


Fig. 3-9: Invalid Calculation Expression

Remedy:

3. Locate the Calc icon with the error, if more than one is used, by using program flow <F7>.
4. If the value in the Calc icon is incorrect, change it to an allowable value and clear the error.

428 Calc: division by zero

Cause:

In a user program calculation instruction, an attempt was made to divide a number by zero.

Remedy:

1. Locate the Calc icon with the error, if more than one is used, by using program flow <F7>.
2. Modify the Calc icon and remove any zero expression to the denominator. The denominator can be expressed as an integer or a variable.

429 Calc: too many operands

Cause:

In a user program calculation instruction, too many operands (+, -, *, /, etc.) and operators were used in the string. Use the show program flow <F7> function to locate the Calc icon containing the error.

Remedy:

Split the calculation operation using more than one Calc icon in consecutive order.

430 Calc: invalid operator

Cause:

An invalid arithmetic operator was found in a user program calculation instruction. The operator used is not supported by the current version of VisualMotion Toolkit.

Remedy:

Check the compiler and firmware version numbers, and call Bosch Rexroth service for assistance in upgrading software. Version information can be found for menu selection ***Diagnostics ⇒ System.***

431 Calc error: see Task %c diag.

Cause:

An error has occurred in a user program calculation instruction.

Remedy:

Refer to task %c diagnostic message (where %c = task letter) for a communication error message.

432 Calc: too many nested expressions

Cause:

In a user program calculation instruction, more than 16 operations were pending. See the diagnostic message for each task to find the task and the instruction.

Remedy:

Check the number of operands in the expression, looking for unbalanced parentheses or incomplete expressions.

433 Setup instruction outside of a task

Cause:

The following commands must be placed in a task's main program: TASK/AXES, KINEMATIC, and DATA/SIZE. This error is issued if any of these commands is found in a subroutine.

Remedy:

Move the instructions to Task A, B, C, or D, following the TASK/START instruction or Axis Setup icon.

434 Axis %d configured more than once

Cause:

Axis %d (where %d = axis number) was selected more than once in the Axis icon  .

Remedy:

Modify the program so that the axis is selected once.

435 Axis %d is not assigned to a task

Cause:

Axis %d (where %d = axis number) was not assigned to the task using the Axis icon  but was specified in a command.

Remedy:

Modify the program so that the axis is selected and configured for the correct axis number or variable label used in the program.

436 General Compiler Error: %04x

Cause:

An error was found in a compile-time instruction (TASK/AXES, KINEMATIC) after program activation.

Remedy:

See the task diagnostic message for a description under menu selection ***Diagnostics*** ⇒ ***Tasks***. If there is no task diagnostic message, call Bosch Rexroth for assistance.

438 Invalid Axis Selected: %d

Cause:

Axis %d (where %d = axis number) was not found on the SERCOS ring or is an invalid axis number. This error is issued during single-axis or ELS motion commands.

Remedy:

Check the constant or variable that contains the axis number.

439 Axis %d: Invalid Motion Type

Cause:

The axis type does not match the type of motion used by the instruction. This error is issued when a single-axis command is given to a coordinated motion axis.

Remedy:

Locate the icon containing the error and verify that the axis type matches the motion type.

Example: a coordinated VisualMotion program contains an axis setup icon that was originally setup for single-axis.

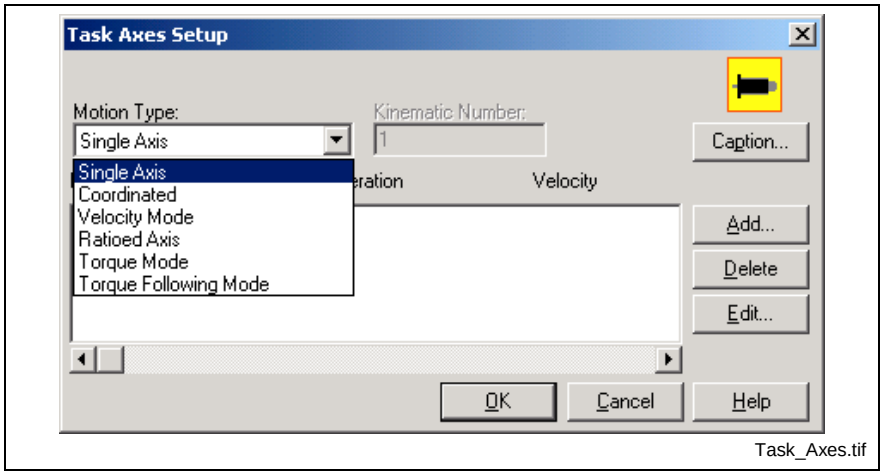


Fig. 3-10: Task Axes Setup

440 I/O Transfer Error: see task diag.

Cause:

An error occurred in a command instruction selecting a register to write to or to read from. Some examples are setting an I/O register, I/O Transfer or any other instruction that directly writes to a register.

Remedy:

Locate the instruction icon using show program flow <F7> and verify the register read and write command.

450 Event %d: invalid event type

Cause:

The event type selected in the event table %d (where %d = event number) is not valid or does not match the type of motion or event. This error is also issued if an event/trigger (event arm) is executed for a motion-based event.

Remedy:

Make sure that the event type selected under ***Data ⇒ Events*** is consistent with the type of motion specified for the axis. Modify the numbered event and correct the event type. Save, compile and download the program.

451 Invalid event number '%d'

Cause:

The event number %d (where %d = event number) is not within the bounds selected with the data/size command for this task.

Remedy:

1. Verify that the sizing icon contains the correct amount of events for the program.
2. Verify that the correct event number is selected and configured from within ***Data ⇒ Events.***

452 More than %d event timers armed

Cause:

Only %d repeating timer events (where %d = number of events) can be armed at one time.

Remedy:

Check the program flow to make sure that triggered events are being disabled.

453 Homing param. transfer error: %d

Cause:

A SERCOS communication error occurred during a drive-controlled homing command. The %d indicates the communication error code returned by the drive.

Remedy:

Try homing the axis again. If this error still occurs, call Bosch Rexroth Service for assistance.

454 Axis %d homing not complete

Cause:

The drive did not successfully complete the homing procedures instructed by axis %d (where %d = axis number).

Remedy:

See the drive diagnostics for a status or error message. This can be viewed under ***Commission ⇒ Drive Overview***.

459 Axis %d target position out of bounds

Cause:

The programmed position in an axis/move command or the Move  icon for axis %d (where %d = axis number) exceeds the drive's travel limits.

Remedy:

1. Adjust the travel limits or check the variable or constant containing the position. Drive travel limits are programmed in SERCOS parameters S-0-0049, Positive position limit value and S-0-0050, Negative position limit value. Check variable values under Data Variables.
2. Check travel limits set using DriveTop. Select Commission Drive ***Overview*** from VisualMotion Toolkit's main menu.

460 Invalid program %d from binary inputs

Cause:

Program %d (where %d = program number) selected from the Binary Program Select bits 9-12 in System register 1 does not exist on the control's memory or is greater than the maximum number of programs.

Remedy:

Make certain that the program number being selected is available on the control. Program number can be viewed using VisualMotion and selecting ***Build ⇒ Program Management***.

463 Ratio command: invalid ratio

Cause:

In the RATIO command, one of the factors is too large or the master factor is zero. The values entered in the Turns field are not correct.

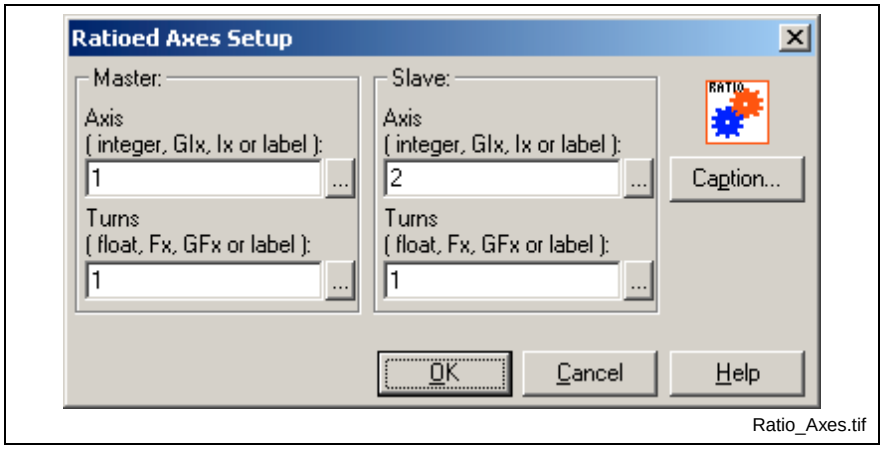


Fig. 3-11: Ratio Axes Setup

Remedy:

Update the ratios so that the master is not a zero and the values are not too large.

464 Can't activate while program running

Cause:

A new program cannot be activated through the Binary Program Select inputs, bit 8 of register 1, unless the program is stopped.

Remedy:

Stop the currently running program by setting register 1 bit 8 to 0. Set the desired program number in binary format through bits 9-12 and activate the new program by setting bit 8 to 1.

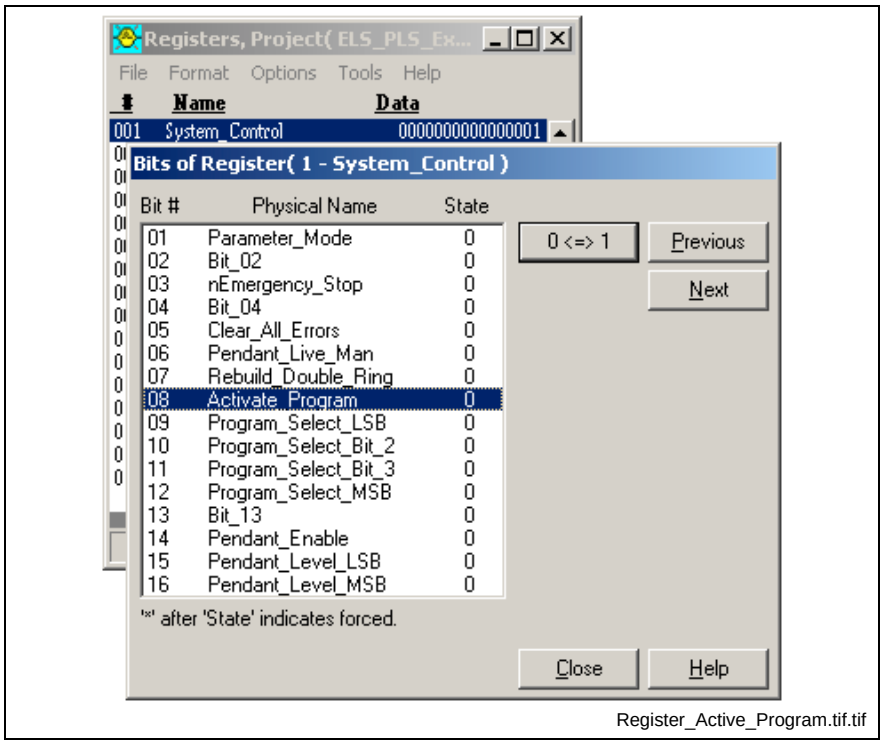


Fig. 3-12: Setting Register Bits

465 Drive %d config. error, see ext. diag.

Cause:

Drive %d (where %d = drive number) does not support a product-specific option or a drive configuration calculation has failed. Product-specific options include ELS, single-axis motion, or I-O cards. Extended diagnostics can be viewed by selecting ***Diagnostics*** ⇒ ***System*** in VisualMotion Toolkit.

Remedy:

1. The extended diagnostic describes the error in more detail. It often shows the parameter that failed along with a short message describing the error. If it indicates that a parameter is invalid or a configuration is not supported, check the axis configuration with the drive hardware or software.
2. If the extended diagnostic indicates an error such as ‘Handshake time-out’ or ‘Drive is not responding’, the SERCOS ring may have been disconnected during initialization. Check the fiber optic connections and the addresses of the drives on the ring.

467 Invalid ELS Master Option

Cause:

An option in the ELS/INIT command is invalid, not supported, or inconsistent with the other options. VisualMotion is initializing all of the ELS axes in the program and has come across an axis parameter **A-0-0004** option that is invalid

Remedy:

Search the program for the axis in fault and verify that the axis options in parameter A-0-0004 are correct and within range. Refer to the VisualMotion 9 Functional Description for an explanation of axis parameter A-0-0004.

468 ELS adjustment out of bounds

Cause:

The phase offset or fine ratio adjustment exceeded the bounds allowed by the drive. The fine adjust must be between -100 and 300%.

Remedy:

Use the show program flow <F7> function to find the ELS phase adjust or Cam phase adjust icon in fault. Correct the value entered in degrees, percentage, or the variable if programmed using variables.

ELS Phase Adjust

Cam Phase

470 Axis %d velocity > maximum

Cause:

The velocity programmed for axis %d (where %d = axis number) exceeds the maximum velocity axis parameter **A-0-0020**.

Remedy:

Change the velocity value programmed in the velocity icon or the variable label being used in the velocity icon to a value less than parameter A-0-0020.

474 Drive %d cyclic data size too large

Cause:

Too much data is configured in the SERCOS cyclic telegram. The drives currently support up to 16 bytes of configurable data.

Remedy:

Remove I/O or registration options from the parameter or program configuration.

478 Calc: operand out of range

Cause:

The operand of a calculation function is out of the range of valid arguments.

The following examples apply:

- Square root of a negative number
- Logarithmic of a negative number
- Arcsine and Arccosine value must be -1, 0, 1
- Raising to a power a non integer number (fraction)

Remedy:

Use show program flow <F7> feature to locate Calc icon with error and correct. If variables are being use to represent a value, correct the variable value from within ***Data ⇒ Variables***.

483 Parameter Init. Error: see Task %c diag.

There is an error in the parameter initialization or bit initialization instruction; which is executed when exiting parameter mode. The parameter format, parameter number, or stored value may be invalid.

A communication error message is displayed in the diagnostic message for the task %c (where %c = task letter) in which the error occurred (***T-0-0122***). Information on the actual parameter number that caused the error is provided in extended diagnostics (***C-0-0124***).

Cause:

In many cases, this error is issued when a drive is not on the SERCOS ring or the drive parameter is not found for a type of drive.

Remedy:

1. Make sure that all drives on the SERCOS ring are powered up and enabled.
2. Check fiber optic connections.

484 Control SYSTEM ERROR

Cause:

This error indicates a problem in the control executive firmware.

Remedy:

See the extended diagnostics parameter (***C-0-0124***) for more information or select ***Diagnostics ⇒ System*** within VisualMotion Toolkit, and call the Bosch Rexroth service department for assistance.

486 SERCOS Device %d is not a drive

Cause:

The SERCOS device %d (where %d = SERCOS address) was enabled in the user program or parameterized as an axis, but an I/O slave or other type of slave was detected.

Remedy:

Check the VisualMotion program for any instances where the device (not a drive, but maybe an I/O station) number is being configured as a drive and modify the program accordingly. Once corrected, Save, Compile and Download the modified program.

487 Cam %d is invalid or not stored

Cause:

In the CAM/activate command, the selected CAM %d (where %d = CAM number) is not stored on the control's memory or does not contain valid data.

Remedy:

Check the variable or constant that selects the CAM. Check that there is a valid CAM with index %d stored on the control.

488 Cam Error: See Task %c diag.

Cause:

An error was issued during a CAM command in task %c (where %c = task letter).

Remedy:

Refer to the task diagnostic message (***T-0-0122***) for a description. See also the extended message under ***Diagnostics*** ⇒ ***Tasks*** for additional information.

489 More than %d cam axes selected

Cause:

The control limits the number of axes configured as control Cam Axes. The maximum number of control CAMs allowed on the control's memory is 40. The maximum number of control CAMs running in the program is 4.

Remedy:

Check the program and modify it so that the number of control CAMs running is less than the number specified in this diagnostic message.

490 System Memory Allocation Error

Cause:

The dynamic memory space on the control has been exhausted. This diagnostic message is related to the amount of memory consumed by the compiled program as well as operations being performed dynamically, such as index CAM builds. The amounts of configured memory in the sizing icon directly effect the amount of system memory available.

Remedy:

1. The amount of memory available in the system can be viewed under menu selection ***Diagnostics ⇒ System***. One way to decrease memory usage would be to verify that all the items being selected within the sizing icon are necessary.
2. ***Example:*** If only 3 event functions are used in the current VisualMotion program but 10 events are reserved in memory within the sizing icon, then the addition 7 events use up unnecessary memory resources. Decrease each field within the sizing icon to free up memory space.
3. If the problem persists, contact Bosch Rexroth Service for assistance.

492 Programs were lost, see ext. diag.

Cause:

User programs and data have been erased from the control's memory. This can be due to a new firmware version or a size change in the number of parameters in the system. In addition to these reasons, commanding a C-0-0996 (Clear Programs and Data Memory) can also generate a 492 error.

Note: If the control's memory was cleared by using C-0-0996, the diagnostic log will contain the warning message *211 Programs and Memory Cleared*.

Refer to the extended diagnostic message **C-0-0124** for an explanation. Extended diagnostics and diagnostic log can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit. The following extended diagnostic messages are possible:

Extended Diagnostic C-0-0124	Description
Firmware Version String Changed	A new GPP or GMP firmware version was copied to the control's memory card.
Parameter Table Size Changed	A different parameter table size was detected from the last time the control was power up.

Table 3-8: Programs were lost Extended Diagnostics

Remedy:

Perform the following steps to reestablish communication with the control:

1. Start VisualMotion Toolkit and open an existing project.
2. Changed the control's baud rate setting to 9600 (default) in offline mode. Select ***Tools ⇒ Control Selection*** and click the ***Configure*** button.
3. Switch the project to online mode by selecting the online icon  , ***File ⇒ Online*** or by pressing the ***F9*** key.

496 Can't execute this instruction from an event

Cause:

This user program instruction (icon) cannot be executed from within an event function. See the task error descriptions and the current program instruction. Some operations, such as sequencer initialization, cannot take place during an event.

Remedy:

Move the instruction (icon) into a main user task or subroutine.

497 Limit switch config. error, see ext. diag.

Cause:

This error is issued at activation of a program when one of the PLS parameters defined in the program is invalid. It is also issued when the ELS setup is incorrect for PLS operation.

Remedy:

Parameter ***C-0-0124*** provides a detailed description of the error as an extended diagnostic message. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

498 Drive %d Shutdown Warning

Cause:

This error is issued when any drive %d (where %d = drive number) has a Class 2 shutdown warning. The tasks that stop for errors switch into manual mode and perform a controlled stop of all axes. A drive warning indicates a condition that will later cause a shutdown, but is serious enough to require immediate attention.

Note: Class 2 warnings may not be detected by the control if drive parameter S-0-0012 is being continuously read by the user interface or user program, since the diagnostic change bit is reset whenever this parameter is read.

Remedy:

1. Since the warning may have already been cleared on the drive, the extended diagnostic (***C-0-0124***) latches the class 2 diagnostic bits (drive parameter S-0-0012) from the drive so that this condition can be corrected. Extended diagnostic can be view under ***Diagnostics ⇒ System.***
2. Using VisualMotion Toolkit, open DriveTop under menu selection ***Commission ⇒ Drive Overview*** and view the status line for a description of the drive error. Refer to the drive manual for more information.

499 Axis number %d not supported in this version

Cause:

Axis 5d (where %d = axis number) is outside the range of the number of axes allowed. VisualMotion 9 supports a maximum of 40 axes.

Remedy:

Check the program for an axis value greater than 40 or a variable label given to an axis with a value greater than 40.

500 Axis %d is not referenced

Cause:

Axis %d (where %d = axis number) has not been homed, the reference position has not been set, or the reference position has been lost. The reference position bit in drive parameter S-0-0403 is zero. To enable or disable this error, use parameter **A-0-0006**. If parameter A-0-0006, bit 1 is set to (1), then VisualMotion will display this error.

Remedy:

1. Stop the VisualMotion program. Reinitialize the program by switching to manual mode and then back to auto mode. This process will reinitialize the program back to the ***Start*** icon. If the homing command instruction is at the beginning of the program, re-start the program to home the axis again.
2. Verify homing options within the Drive Parameter Editor if using GPP08 firmware. ***Commission ⇒ Drive Overview ⇒ Configure ⇒ Drive Reference.***
3. For GPP09 firmware, using DriveTop, select ***Commission ⇒ Drive Overview ⇒ Drive Functions ⇒ Homing/set absolute measurement***.
4. If the drive controlled homing procedure still does not occur, contact Bosch Rexroth Service for assistance.

501 Drive %d comm. error, see ext. diag.

Cause:

An error in drive communication has occurred while the control was reading or writing a service channel parameter for an internal operation.

Remedy:

Parameter **C-0-0124**, extended diagnostics, has a detailed description of the error. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

502 ELS and cams not supported in this version

Cause:

The ELS and CAM features in the currently active VisualMotion program are not supported in this version of GPP firmware.

Remedy:

The control contains a firmware version that is not capable of performing ELS and Cam functions. Verify the version of firmware in control parameter **C-0-0100** or using VisualMotion Toolkit under menu selection ***Diagnostics ⇒ System***. Contact Bosch Rexroth Service for assistance.

504 Communication Timeout

Cause:

During a timed serial port transmission, the serial port has not responded within the time set in parameter **C-0-0016**. Timed transmissions are used for jogging through VisualMotion.

Remedy:

If this error occurs, increase the timeout value in **C-0-0016**.

Using VisualMotion Toolkit, switch to online mode and select ***Data ⇒ Parameters*** from the main menu. Refer to Parameters, for instructions.

505 Axis %d is not configured

Cause:

A user program command was issued to Axis %d (where %d = axis number), but the axis is not configured in the program.

Remedy:

Modify the user program so that the correct axis is addressed, or exclude the axis from the system using Axis parameter **A-0-0007**.

506 I/O Mapper initialization error

Cause:

The I/O Mapper was invalid at initialization, due to loss of memory or an incompatibility in the Mapper version. During the initial system setup an I/O Mapper file should have been created and saved with the extension ***.iom**.

Remedy:

1. Reinstall the I/O Mapper file (***.iom**) using the following VisualMotion Toolkit procedure.

Note: Only qualified trained personnel who can verify that the I/O Mapper file being selected is the correct file for the system should perform this procedure.

---

2. Select ***Commission ⇒ I/O Mapper*** while VisualMotion Toolkit is in service mode.
3. From the Ladder Editor screen, select ***File ⇒ Get Ladder from control.***
4. Once the I/O Mapper file is loaded, the I/O Mapper strings can be viewed and verified by selecting ***Windows ⇒ Boolean Equations***.
5. Once verified, select ***File ⇒ Send Ladder to control*** and answer “Yes” to the popup window warning.
6. Switch VisualMotion Toolkit to online mode. VisualMotion will automatically detect the change and request that the project be downloaded.

Note: If the *.iom file does not upload from the control, use *File ⇒ Open* from the Ladder Editor screen and open a valid *.iom file.

---

7. If the error is still encountered, contact Bosch Rexroth Service for assistance.

508 User Watchdog Timeout

Cause:

The user watchdog timer enforces a time constraint on a user task or a user interface.

Every time a nonzero timeout value is written to **C-0-0021**, a timer is triggered in the control. If the timeout expires, the error "**508 User Watchdog Timeout**" is issued. The timer is checked by the control every 50ms.

If C-0-0021 is set to zero, the watchdog timer is disabled. If it is nonzero, it is active when the control is in run mode, there are no errors, and the task specified in **C-0-0022** is running.

In a user program task, parameter C-0-0021 can be written to via a parameter transfer at the beginning of the main processing loop. If the VisualMotion system tasks or the user program events are consuming too much processor time, the time set in C-0-0021 will elapse, and error 508 will be issued. The programmer can then adjust the timing of the events, or increase the SERCOS or I/O cycle times to allow more time for the user task.

Remedy:

1. If this feature is intentionally set and the user's desired elapse time, programmed in parameter C-0-0021, can be increased, the user can modify the value in parameter C-0-0021.
2. If this feature is **not** desired but a value other than zero appears in parameter C-0-0021, change this value to zero to disable this feature.

509 Control System Timing Error (%d)

Cause:

When the control is powered up, a timer monitors high-level control task and generates this error if the system timing overlaps.

The cause for timeout can also result from electromagnetic interference on serial communications.

Remedy:

1. The default SERCOS cycle time is 2000 µsec. Applications that require multiple functionality, such as coordinated motion using Fieldbus interface across serial communications, should double the value of control parameter **C-0-0099** (SERCOS Cycle Time). Switch the system in and out of parameter mode to update the SERCOS ring.
2. If the increase in SERCOS Cycle Time does not help, contact Bosch Rexroth Service for assistance.
3. Check or replace the Serial Communication cable.

515 PLC Communications Error

Cause:

After initialization, the control monitors the PLC's heartbeat by means of an internal life counter. The control reads the lifecounter value every SERCOS cycle and compares it to the previous value. This error is issued if the life counter value does not change after 10 cycles.

Remedy:

Cycle power to the entire VisualMotion system and reestablish communication between the PLC and the control.

516 More than %d registration functions enabled

Cause:

The maximum of 4 registration instructions has been exceeded in the active VisualMotion program. Up to 4 axes can use the registration function at the same time. This error will be issued at compile time.

Remedy:

Make certain that the active VisualMotion program is only using the maximum of 4 registration instructions.

519 Lost Fieldbus/PLC Connection

Cause:

A Lost Fieldbus connection is issued when cyclic communications between the slave and master fieldbus interfaces are no longer present. This message is issued when register 19 bit 4 transitions from high (1) to low (0). The error is hardware related and is normally caused by…

1. a bad or disconnected cable.
2. an unused fieldbus interface that is installed but not used.
3. a hardware related problem with the Fieldbus interface on the control.

Note: Shutdown message **519** is only issued while in phase 4 if the Fieldbus Error Reaction in the Fieldbus Slave Configuration window for GPP.

Remedy:

4. Check and verify all cable connects between the slave and master Fieldbus connections.
5. Set **C-0-2635**, Fieldbus Error Reaction, from 0x0000 (shutdown) to 0x0002 (ignore).
6. Contact Bosch Rexroth Service for assistance.

520 Fieldbus Mapping Timeout

Cause:

The Fieldbus Mapper continually scans the system for sufficient resources to process the cyclic data mapping list (2600-list). If 10 out of 10 attempts of the mapping list update are missed, the system is considered to have insufficient resources. Error 520 Fieldbus Mapper Timeout is generated if the selected error reaction is set as "Shutdown (default)," (Parameter **C-0-2635**), in the Fieldbus Slave Configuration window. Motion to all axes will stop based on the selected error reaction at each drive.

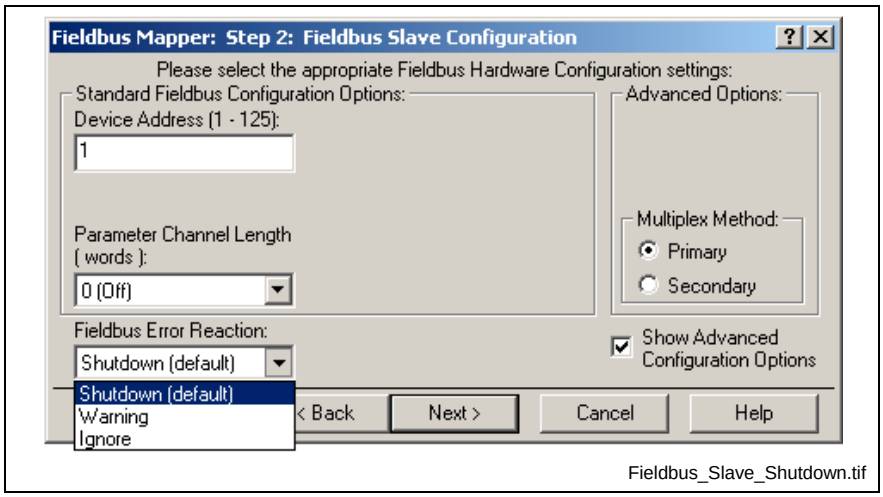


Fig. 3-13: Fieldbus Shutdown Error Reaction

Remedy:

PPC controls currently run the fieldbus mapper at a fixed 4ms SERCOS scan time. If this error occurs, contact Bosch Rexroth Service for assistance.

521 Invalid Virtual Master ID: %d

Cause:

This diagnostic is displayed if an ID number (%d) other than 1 or 2 is used to identify a Virtual Master. The selection of Virtual Master ID number other than 1 or 2 is only possible if written in text code language outside of VisualMotion Toolkit.

Remedy:

Verify that the correct ID number (1 or 2) is programmed when referring to a Virtual Master.

522 Invalid ELS Master ID: %d

Cause:

This diagnostic is displayed when an ELS Master ID number (%d) is greater than six, (the maximum number allowed in a Rotary Event and triggered in a program).

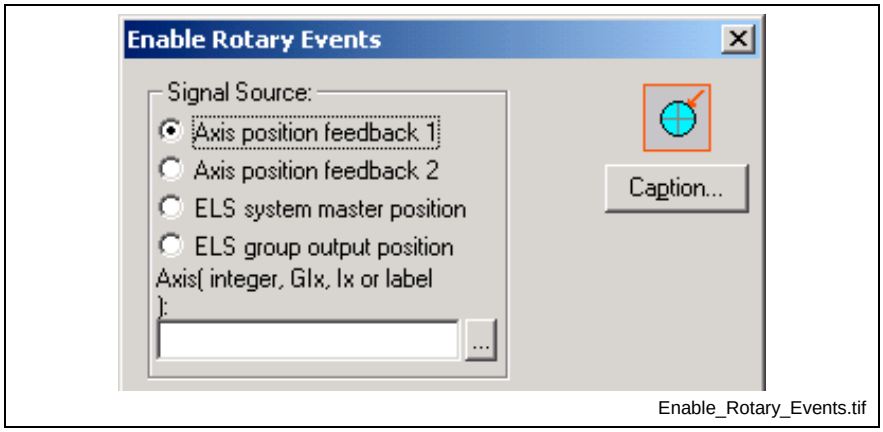


Fig. 3-14: Enable Rotary Event Setup Window

Remedy:

1. Verify that the ELS Master ID is valid in the Enable Rotary Event setup window.
2. If an integer or label is used, verify that a valid ID number is being used.

523 IFS status, facility = 0x%x

Cause:

A problem has occurred during file initialization, save, creation, or compression.

Remedy:

Clear the errors. If clearing the errors does not work, restart the system. If restart does not resolve the problem, erase the files to remove the corrupted files.

524 Hardware Watchdog timeout

Cause:

The Watchdog timer in the control monitors the performance of the hardware. This diagnostic is issued when the Watchdog times-out, indicating a control hardware problem or failure.

Remedy:

Bring all motion to a stop and cycle power to the control. If the problem persist, contact Bosch Rexroth Service for assistance.

525 I/O Configuration error, see ext. diag.

Cause:

This diagnostic is displayed when the I/O User Configuration **C-0-2017** does **not** match the actual I/O configuration on the machine (Visible I/O Stations, **C-0-2013**). The I/O User Configuration is compared to the actual I/O configuration during initialization of the control, and when switched in and out of parameter mode. When the control switches from SERCOS phase 2 to phase 3 and a change has occurred in the I/O configuration, due to a replacement, modification or hardware communication failure, a *525 I/O Configuration error* is issued. This diagnostic can also occur after downloading an invalid I/O User Configuration to the control.

Example: Configuring an I/O module or drive number that does not exist on the machine.

Remedy:

1. Since many areas of an I/O configuration can cause an error, refer to the extended diagnosis for detailed information as to the root cause of the problem.
2. To view extended diagnostics using VisualMotion Toolkit, select ***Diagnostics ⇒ System***. Extended diagnostic text is displayed at the bottom of the window.

526 SERCOS Multiplex Channel Config, see ext. diag.

Cause:

The SERCOS multiplex channel is enabled by either the selection of the Drive PLS Fast Write feature or the detection that the AT or MDT has exceeded the 16-byte limit. **526 SERCOS Multiplex Channel Config, see ext. diag.** is followed by one of the following extended diagnostics (examples: D%d = D01 for Drive 01, %s = S-0-0258).

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
D%d: Ident %s not supported in S-370	Through Parameters **A-0-0180**..182, a parameter was entered which is not supported by the SERCOS MDT Multiplex Channel.
D%d: Ident %s not supported in S-371	Through Parameters **A-0-0185** and 186, a parameter was entered which is not supported by the SERCOS AT Multiplex Channel.
D%d: Probe not allowed in Single Axis Mode	With the SERCOS Multiplex Channel enabled, the Probe option is not available in Single Axis mode.
D%d: Multiple probe idents in telegram	With the SERCOS Multiplex Channel enabled, only one probe ident is allowed in the multiplex channel.
D%d: PLS Idents cannot be entered directly by user	The PLS Fast Write feature, **A-0-0004** bit 8 set, automatically addresses the necessary idents for PLS write in the SERCOS Multiplex Channel.
Maximum Quantity of Multiplex Drives Exceeded	The limit of how many drives the GPP control can support with the SERCOS Multiplex Channel enabled has been exceeded.

Table 3-9: SERCOS Multiplex Channel Extended Diagnostics

527 Control Initialization Error, see ext. diag.

Cause:

527 Control Initialization Error, see ext. is followed by an extended diagnostic, for example: D%d = D01 for Drive 01, %s = S-0-0258. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
D%d: Ident %s is not supported in cyclic channel	The SERCOS Multiplex channel is being configured and an ident was selected that has a variable length.

Table 3-10: Control Initialization Extended Diagnostics

528 System Event %d Occurred

Cause:

This diagnostic can only be viewed using VisualMotion's diagnostic log. It monitors status information and also functions as a debugging log for unexpected firmware errors related to the File System. The File System consists of…

- Downloaded VisualMotion user programs # 1-10,
- I/O Mapper (**C-0-3000**),
- Fieldbus object mapping list 2600 and 2700,
- I/O User Configuration (**C-0-2017**),
- Control CAMs # 1-40.

Remedy:

If system problems result due to lost parameters within the File System and this diagnostic is found within the Diagnostic Log, contact Bosch Rexroth Service for assistance.

529 Invalid ELS Group ID: %d

Cause:

This diagnostic is displayed when an ELS Group ID %d (where %d = ELS Group number) greater than the maximum of eight is programmed in a Rotary Event and triggered in a program.

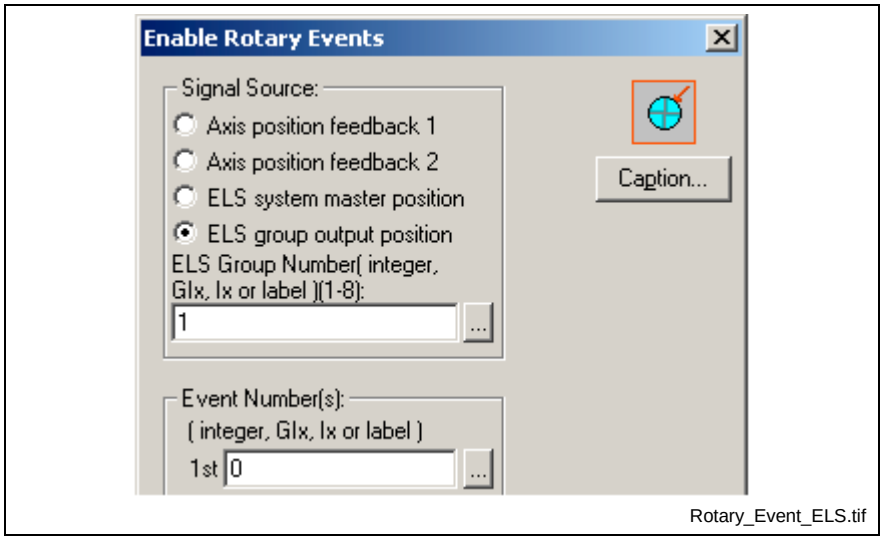


Fig. 3-15: Rotary Event ELS Group ID

Remedy:

1. Verify that the ELS Group ID (%d) is valid in the Enable Rotary Event setup window.
2. If an integer or label is used, verify that a valid ID number is being used.

530 Cam %d is active, can't overwrite

Cause:

This error is displayed during Phase 4 (automatic mode) initialization and is a result of trying to assign an already active CAM %d (where %d = cam number) to a new build.

Remedy:

Make sure the selected CAM number for the new build is unique in the active VisualMotion program.

531 Invalid variable for Fieldbus/PLC Mapping

Cause:

In order for Fieldbus Mapping list to function properly, all cyclic and non-cyclic program variables (floats, integers) used in the Fieldbus Mapper must match existing program variable in the VisualMotion user program. This error is issued when activating a different VisualMotion program containing program variables that are invalid in the current Fieldbus mapping list.

Example: Program integer 1000 is used but the program only contains 500 integers.

Remedy:

1. Make the appropriate program variable modifications in the VisualMotion user program that correspond to the program variables used in the current Fieldbus Mapping list.
2. If the VisualMotion user program contains the desired program variables, then make the appropriate modifications to the Fieldbus Mapping list or load a different Fieldbus Mapping list using the Fieldbus Mapper.

532 Power fail brown out condition detected

Cause:

The PPC-R hardware trigger interrupt has detected a drop in power causing a brown out condition. If the condition is not corrected within 1.5 to 10 ms, the control shuts down and the error is logged in the Diagnostic log. All motion to slave axes will stop based on the selected error reaction in each drive.

Remedy:

Pressing the S2 reset button found below the PSM memory card on the PPC-R can clear this error.

533 Multiple instances of index cam: %d found

Cause:

A CAM Indexer can be assigned to any ELS Group or to any slave axis within an ELS Group as long as the same CAM Indexer is not used more than once. This error is issued when the active VisualMotion program encounters a CAM Indexer %d (where %d = CAM Indexer number) that is already being used somewhere else in the program.

Remedy:

Verify that the current VisualMotion program is not using the same CAM Indexer number in more than one instance.

534 Hardware Version Not Supported

Cause:

The control has detected an older version of PPC-R hardware (PPC-R0*.1) that is not supported by the current version of GPP firmware.

Remedy:

Upgrade your current PPC hardware to a newer version (PPC-R0*.2 or later) for support of the current GPP firmware. Contact Bosch Rexroth service for assistance.

539 Invalid Parameter Number

Cause:

A Procedure command was instructed using the Command Icon with an invalid parameter number. Allowable procedure command parameters are as follows:

For Control: **C-0-2903** and **C-0-2905**.

For Drive: A list of allowable drive procedure command parameters can be found in drive parameter S-0-0025.

Remedy:

Modify the parameter used in the Command icon. Next, compile and download the user program.

540 Option Card PLS error

Cause:

General error message for Option Card PLS. It will always be accompanied by an extended error message.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics*** ⇒ ***System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
002: Command locked *xx*	A command to the Option Card PLS could not be executed due to current operation. This can happed during phase switching.
007: PLS could not synchronize *xx*	The hardware synchronization between the Option Card PLS and the PPC failed. The SERCOS time must be between 2 and 8 ms.
008: Unknown output *xx*	The number for the output is unknown / illegal. Number must be in the range of 1 to 32.
011: Unknown master axis mode	
012: Offset is larger than resolution *xx*	The offset of the PLS master axis is bigger than its resolution. Reduce number in C-0-2943.
014: Illegal master axis, see C-0-2941 *xx*	The number of a master for a Option Card PLS master is not valid. Check entries in parameter C-0-2941.
015: Master axis is not active *xx*	The PLS master axis is used, but this axis is not defined.
018: Run time error occurred *xx*	A software failure occurred on the Option Card PLS.
020: Unknown output byte number	
031: Initialization error on PLS	The Option Card PLS could not initialize

Extended Diagnostic C-0-0124	Description
032: Synchronization error	The Option Card PLS software could not synchronize to the PPC.
0*yy*: Maximum PLS speed exceeded at axis *zz*	The maximum speed of 3500 RPM had been exceeded. yy is an error number between 33 and 40; zz is the PLS master axis number that exceeded the speed limit.
041: Cyclic handshake error	The software handshake between the PLS and the PPC failed.
042: PLS internal error	The PLS had an unrecoverable error. Power cycle is necessary.
Parameter D*y.z*, code=*w*, task=PLS evt=0	When the PLS needs to know further information from drives it will request the applicable parameter. This error reflects errors from this request. *y* references the drive number where the error occurred, *z* the S-parameter and *w* an internal error code
063: Wrong encoder type	For real drives, only encoder of type 1 (primary encoder) or type 2 (secondary encoder) exists.
Wrong master type	See C-0-2940. Masters can only be of type ELS-master (1), ELS-group (2) or drives (3).

Table 3-11: Option Card PLS Extended Diagnostics

541 Link Ring Error, see ext. diag.

Cause:

.When a Link Ring error occurs, the H1 display on the PPC-R will display "541, *Link Ring Error* ". For detailed information, refer to the extended diagnostic message in Table 3-13. Link ring errors are clear with a low-to-high (0-1) transition of Bit 5 in *System_Control* register 001.

PPC-R H1 Display	Diagnostic Code C-0-0123	Diagnostic Message C-0-0122
E541	541	541 Link Ring Error

Table 3-12: Link Ring Diagnostic Code

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
Other Link Master already active	There is more than on Link Master in the Link Ring.
Link not possible	The hardware combination of PPC-R and DAQ does not permit a control link.
Transmission path defective	The link participant has detected a fiber optic cable break in the Link Ring.
Master position fault (MDT)	The transmission of the master axis position by the Link Master to the link subscriber is experiencing problems.
Master position fault (AT)	The transmission of the master axis position by the Link Slave to the Link Master is experiencing interference.
Selected link address not permitted	The Link Ring address, as set by control's Unit Number parameter (C-0-0002), must be between 1 and 32.
DAQ: SERCOS interface – ASIC: initialization error	A hardware error occurred during the initialization of the DAQ card.

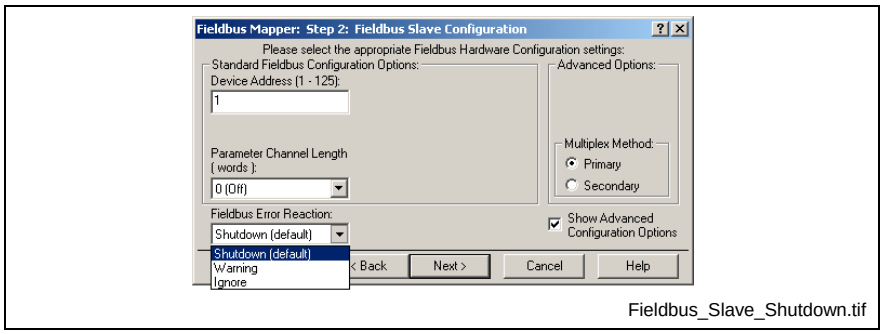
Table 3-13: Link Ring Extended Diagnostics

542 PLC Cyclic Mapping Timeout

Cause:

The Fieldbus Mapper continually scans the system for sufficient resources to process the PLC cyclic data mapping list **C-0-2600**. If 10 out of 10 attempts of the mapping list update are missed, the system is considered to have insufficient resources. This error message is issued when control parameter **C-0-2635** (*Fieldbus/PLC Error Reaction*) is set to shutdown (0x0000) and **C-0-2613** (*Fieldbus/PLC Cyclic Channel: Timeout Counter*) increments by 1.

Motion to all axes will stop based on the selected error reaction at each drive.



Fieldbus_Slave_Shutdown.tif

Fig. 3-16: Fieldbus Slave Shutdown Error

Remedy:

The control's mapping list is scanned every 4 ms for GPP09 and fixed at 8 ms for GPP08. If this error occurs, contact Bosch Rexroth Service for assistance.

543 PLC Runtime Error

Cause:

This error is issued when trying to download a PLC program while the control is in phase 4.

Remedy:

Switch the control to phase 2 before downloading a PLC program.

544 RECO I/O Failure, see ext. diag.

Cause:

The RECO I/O module has reported a fatal error. VisualMotion acknowledges fatal errors if bits 6 and 7 in the control parameter C-0-0010 (System Options) are set as follows:

Bit 6	Bit 7	Reaction
x	1	Fatal Error (default)

Table 3-14: RECO I/O Error Reaction Bit Settings (C-0-0010)

If Bit 7 is both set to 1, VisualMotion will detect a fatal error.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
Module Initialization Error, Slot 2, RECO3	An error occurred during the initialization of the I/O module in slot 2 of the SERCOS RECO controller rack at SERCOS address 3.
Cyclic Communications Error, Slot 3, RECO 0	A cyclic communications error occurred with the I/O module in slot 3 of the Local RECO I/O controller rack.
Incorrect Module, Slot 4, RECO 3	The I/O module found in slot 4 of the SERCOS RECO I/O controller rack at SERCOS address 3 is not consistent with the controller's configuration. Hot-swapping I/O modules will result in this error and could cause permanent damage.
24V Error, Slot 3, RECO 0	A 24V error exists at the RECO I/O module in slot 3 of the Local RECO I/O controller rack.
Module Error Code 7, Slot 3, RECO 0	The I/O module in slot 3 of the Local RECO rack is reporting error code 7
Unknown Error, RECO 3	An undefined error has occurred on the SERCOS RECO I/O controller at SERCOS address 3.

Table 3-15: RECO I/O Extended Diagnostics

545 Invalid Coordinated Articulation Function ID: %d

Cause:

This error is issued by the firmware compiler and indicates that the Coordinated Articulation (CA) function ID %d (where %d = CA number) is not in the range of 1 to 2.

546 Multiple Instance of Coordinated Articulation Function with ID: %d

Cause:

The selected Coordinated Articulation (CA) function ID %d (where %d = CA number) is already being used by another icon.

547 Task %c Coordinated Articulation Error, see ext. diag.

Cause:

This error is issued by runtime code during firmware initialization for task %c (where %c = task letter). Refer to the extended diagnostics in Table 3-16 for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
Invalid % Axis Minimum/Maximum Limits	The Max limit is not greater than the Min limit
% Axis Target Position Exceeds Minimum/Maximum Limit	The commanded synchronized move or the manual mode commanded move is outside the defined axis limits
Invalid ELS Group ID Number: %d	The selected ELS group ID is not in the range 1 to 8
Invalid CAM ID Number: %d	The CAM ID is either not in range 1 to 40 or the CAM has not been defined
Invalid Axis Number: %d	The axis is not found in the SERCOS ring

Table 3-16: Coordinated Articulation Error Extended Diagnostics

548 Invalid Kinematic Number: %d

Cause:

The selected kinematic ID number (%d) is not within the existing kinematic table size.

549 Fieldbus Initialization Error

Cause:

A problem has occurred during Fieldbus initialization.

Remedy:

If this error occurs, contact Bosch Rexroth Service for assistance. Reference the three-digit diagnostic message in the error code displayed under menu selection ***Diagnostic ⇒ System***.

550 User Initialization Task Timeout

Cause:

Task could not be completed before the 300 seconds (5 mins.) timeout.

Remedy:

Return to parameter mode and review your program to determine why the task requires longer than 300 seconds to run.

551 Master Slip Config. Error, see ext. diag

Cause:

A Slip Monitoring configuration error has occurred. Refer to the extended diagnostic message for details.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostics C-0-0124	Description
Invalid Master Selected	The Primary or Secondary ELS Master selected in the Slip Monitoring configuration is invalid (the masters must be between 1 and 6 and must be active).
Max. Dev. Window Out of Range	The Maximum Deviation Window value must be in the range: -90.0 <= MaxDevWin <= 90.0
Mast. Pos. Offset Out of Range	The Master Position Offset value must be in the range: -180.0 < MastPosOff <= 180.0

Table 3-17: Master Slip Config. Error Extended Diagnostics

552 Excessive Master Position Slip Deviation

Cause:

The slip between the Primary and Secondary ELS Masters has exceeded the value of the Maximum Deviation Window variable *ELS_MSTR_SLIP_WINDOW*.

553 Invalid Parameter Detected, see C-0-2002

This communication error is issued if a wrong CRC(**C**yclic **R**edundancy **C**heck: a mathematical method to verify data validity) has been detected. The calculation of a CRC is only necessary when writing a parameter that has to be stored permanently. This narrows the number of parameters to those, which are stored in autostore. To ensure data consistency during a power failure, a buffer mechanism is used. Each parameter has its own CRC. All CRCs are checked either on boot up, or every time the system is switched from Phase 2 to Phase 4. The user must fix any invalid parameter by writing to it (even if the same value is written to it) before he can switch successfully to Phase 4.

554 Excessive Deviation in PGM%d, see ext. diag.

The Position Group Monitoring (PGM) function executes every SERCOS cycle. Each group is scanned to see if it is ENABLED. If enabled, then the groups Master_Position_Window is calculated. Afterwards this value is compared to each of the slave's positions (plus their Offsets) to see if it exceeds the Master_Position_Window value. This error is issued when an excessive deviation is encountered in the Master_Position_Window of PMG%d (where %d = PGM number).

555 PLC Register Mapping Timeout

The control and PLC can communicate across the DPR's register channel. The rate in which each device accesses the register channel varies by device and control firmware.

- PPC-R with GPP09 firmware uses set I/O Mapper scan time
- PPC-P11.1 with GMP09 firmware uses SERCOS Cycle time C-0-0099
- PLC uses program cycle time

If the control attempts to read or write to the register channel while the PLC is currently reading or writing data, control parameter C-0-2651 (*PLC Register Channel: Current number of misses)* is incremented by a count of 1. When C-0-2651 reaches a maximum of 10 misses, C-0-2653 (*PLC Register Channel: Timeout counter)* increments by 1.

Cause:

This warning error message is issued when control parameter C-0-2635 (*Fieldbus/PLC Error Reaction*) is set to shutdown (0x0000) and the PLC Register Channel: Timeout counter (C-0-2653) increments by 1.

556 PLC Lifecounter Timeout

The PLC life counter is incremented by 1 every PLC program cycle. Every increment is an indication that the PLC is functioning and communicating properly. The control monitors the PLC life counter value every SERCOS cycle. If the control does not read a different PLC life counter value, then C-0-2643 (*PLC Lifecounter Check: number of retries*) increments by a count of 1. When C-0-2643 reaches the user-defined maximum number of misses, C-0-2646 (*PLC Lifecounter Check: number of timeouts*) increments by 1.

Cause:

This warning error message is issued when control parameter C-0-2635 (*Fieldbus/PLC Error Reaction*) is set to shutdown (0x0000) and the PLC Lifecounter Check: number of timeouts (C-0-2643) increments by 1.

557 PMG%d Maximum allowed deviation window is Zero

Cause:

During PMG group enabling (control register 86), the group's deviation window is checked for a non-zero value. This error is issued when the group is enabled and the deviation window is 0 for PMG%d (where %d = PMG number).

Remedy:

Disable the PMG group and modify the deviation window by selecting ***Commission*** ⇒ ***Position Monitoring Group***, double clicking on the group number and entering a non-zero value. This value can also be changed by modifying control parameter C-0-32x1, where x = group # starting at 0.

Example: Group 1 would be C-0-3201 and Group 2 would be C-0-3211, and so on.

558 PMG%d Only 1 axis parameterized

During system initialization, all parameterized PMG axes are checked. This error is issued if only one axis was configured for the given PMG%d (where %d = PMG number).

559 PMG%d Number of offsets does not match number of Axis

During PMG group enabling (control register 86), all parameterized PMG offsets are checked. This error is issued if the number of offsets doesn't match the number of parameterized PMG axes for PMG%d (where %d = PMG number).

560 PMG%d Max. allowed dev. window is larger than 25% of Modulo

During PMG group enabling (control register 86), all parameterized PMG deviation windows are checked. The parameterized allowed deviation window is checked against the modulo value. This error is issued if the deviation window value is greater than 25% of the modulo value for PMG%d (where %d = PMG number).

561 PMG%d Offset is larger than Modulo

During PMG group enabling (control register 86), the parameterized offsets are checked. If modulo is active within a group, the parameterized offsets is checked against the modulo value. If the value is greater than the modulo value for PMG%d (where %d = PMG number), this error is displayed.

562 PMG%d Parameterized Axis is not in system

During system initialization, all PMG axes number are verified. PMG%d (where %d = PMG number) is using an invalid axis number.

563 Invalid Task Specified, Must be A-D

This error is issued if an axis is assigned to the initialization task. This error is more probable when downloading a VisualMotion textual language program to the control. The axis configuration icons for both single axis and ELS configurations use a drop-down list when assigning a task to the axis. The only allowable selections are task A-D.

564 PMG%d Invalid configuration, see ext. diag.

Each Position Monitor Group is configured using the PMG Configuration parameter (C-0-32x6), where x = group # starting at 0.

Example: Group 1 would be C-0-3206 and Group 2 would be C-0-3216, and so on.

Only bits 1-4 of the configuration parameter are used to configure a PMG group.

During PMG group enabling (control register 86), each PMG group's configuration parameter is checked. This error is issued if a bit other than the allowable bits was used for PMG%d (where %d = PMG number). Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

565 Axis %d: Configuration error, see ext. diag.

This error is issued to indicate that an error has occurred in the drive's measuring wheel function. A new parameter (S-0-0386, Active position value) has been introduced in DIAX04 firmware ELS05V32 and ECODRIVE03 firmware SGP03V22 and SGP20V11. This parameter uses the measuring wheel's position (set A-0-0004, bit 5=1 and bit 11=0) as the active feedback position. When configured properly, S-0-0386 is placed in the AT telegram instead of S-0-0051 or S-0-0053. An extended diagnostic message helps pinpoint the error.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostics C-0-0124	Description
Measuring wheel config error, S-0-0386 not found	This message appears if an invalid drive firmware is used.
Optional encoder not configured as measuring wheel encoder, P-0-0185	P-0-0185 is not set to 3 (Optional Encoder as Measuring Wheel)
Encoder type 2 not configured, P-0-0075	Improper configuration of P-0-0075

Table 3-18: Axis %d: Configuration Error Extended Diagnostics

566 Filter sample rate and cutoff frequency mismatch

To ensure a stable system when using feedback device as a positioning signal for a Real master or PID loop, the following calculation should be used for the Digital Filter Cutoff Frequency.

$$\text{Cutoff Frequency} \leq \frac{1}{2 * \text{Sampling Rate(sec.)}}$$

The sampling rate for a Real Master axis is the set phase 4 SERCOS cycle time (S-0-0002), entered in seconds.

The sampling rate for a PID loop is the set PID Loop Time, entered in seconds.

This error will be issued and the cutoff frequency will be set to the maximum allowed value if the equation is violated.

567 ELS Config. Error, see ext. diag.

Due to the nature of rotary motion, the proper operation of ELS is limited to velocities less than 180° per SERCOS cycle. Therefore, both the generation and processing of motion in ELS are being limited to velocities less than 180° per SERCOS cycle.

The maximum ELS velocity limit is calculated as a function of the current SERCOS cycle time.

SERCOS Cycle Time	Max. ELS Velocity Limit (180° / SERCOS Cycle)	Max. ELS Velocity Limit Less 1 RPM
2 ms	15,000 RPM	14,999 RPM
4 ms	7,500 RPM	7,499 RPM
8 ms	3,750 RPM	3,749 RPM
16 ms	1,875 RPM	1,874 RPM

Table 3-19: Maximum ELS Velocities

Cause:

The maximum velocity VM#_MAX_VEL (where # = Virtual Master number) for the specified Virtual Master exceeds the Maximum ELS Velocity for the current SERCOS cycle time. This error is issued with an extended diagnostic.

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description
Virtual Master %d Max. Vel. Exceeds %.f RPM	%d = Virtual Master number 1 or 2 %.f = Max. ELS velocity less 1 RPM

Table 3-20: ELS Config. Error Extended Diagnostic

Remedy:

To correct the problem, the Virtual Master's maximum velocity program variable VM#_MAX_VEL (where # = Virtual Master number) must be set to a value that does not exceed the calculated Max ELS Velocity Limit less 1 RPM.

568 Axis %d: Assigned Task is Not Defined

Cause:

This error is issued when an axis (or axes) is assigned to a user task that has not be defined in a single axis application. Axis assignments are made in the Axis icon of the Initialization task.

Remedy:

Modify the Axis icon and change the assigned task to one that exists.

570 ELS Max. Vel. Exceeded, see ext. diag.

Due to the nature of rotary motion, the proper operation of ELS is limited to velocities less than 180° per SERCOS cycle. Therefore, both the generation and processing of motion in ELS are being limited to velocities less than 180° per SERCOS cycle.

The maximum ELS velocity limit is calculated as a function of the current SERCOS cycle time.

SERCOS Cycle Time	Max. ELS Velocity Limit (180° / SERCOS Cycle)	Max. ELS Velocity Limit Less 1 RPM
2 ms	15,000 RPM	14,999 RPM
4 ms	7,500 RPM	7,499 RPM
8 ms	3,750 RPM	3,749 RPM
16 ms	1,875 RPM	1,874 RPM

Table 3-21: Maximum ELS Velocities

Cause:

The maximum ELS velocity for the current SERCOS cycle time has been exceeded. This error is issued with an extended diagnostic.

Remedy:

Refer to the extended diagnostics for details. Extended diagnostics can be viewed by selecting ***Diagnostics ⇒ System*** in VisualMotion Toolkit.

Extended Diagnostic C-0-0124	Description	Remedy
Sys. Mstr. **%d** Input > **%.f** RPM	The signal from the Real Master feeding the specified ELS System Master has exceeded the Maximum ELS Velocity for the current SERCOS cycle time.	The velocity of the Real Master needs to be decreased such that it does not exceed the Maximum ELS Velocity.
Sys. Mstr. **%d** With Gear Ratio > **%.f** RPM	The velocity of the specified ELS System Master exceeded the Max. ELS Velocity when combined with the gear ratio.	The velocity of the Real Master needs to be decreased or the gear ratio needs to be reduced such that velocity does not exceed the Max. ELS Velocity.
Sys. Mstr. **%d** With Dead Time Comp. > **%.f** RPM	The velocity of the specified ELS System Master exceeded the Max. ELS Velocity when combined with Dead Time Compensation.	The velocity of the Real Master needs to be decreased, the gear ratio needs to be reduced, or Dead Time Compensation needs to be disabled such that velocity does not exceed the Max. ELS Velocity.
Group **%d** Vel. + Dyn. Sync. Vel. > **%.f** RPM	The velocity of the specified ELS Group exceeded the Max. ELS Velocity when combined with the Group's Synchronization Velocity (G#_SYNC_VEL) during a Dynamic Synchronization.	The velocity of the Group Masters or the Group's Synchronization Velocity needs to be decreased such that velocity does not exceed the Max. ELS Velocity during Dynamic Synchronizations.
Group **%d** Output > **%.f** RPM	The output velocity of the specified ELS Group exceeded the Max. ELS Velocity. All of the following Group items should be examined as possible sources of the excessive velocity: Gear Ratio, Master and Slave Phase Adjusts, and the Cam.	The Group's configuration should be adjusted such that its velocity does not exceed the Max. ELS Velocity.
%d *= System Master or ELS Group number* ***%.f*** *= Max. ELS velocity less 1 RPM*		

Table 3-22: ELS Max. Vel. Exceeded Extended Diagnostics

571 No Program Found

Cause:

This error is issued at power up if no user program is found on the control's memory. Lost of programs can be a result of clearing all programs using ***Build ⇒ Program Management*** in online or service mode. If programs are lost due to new firmware or commanded using control parameter C-0-0996 (*Clear Program and Data Memory*), error 492 Programs were lost, see ext. diag. has priority.

Remedy:

Download a user program to the control by opening an existing project and switching to online mode. After the program is downloaded, the error will automatically clear.

3.6 Communication Error Codes and Messages

!01 SERCOS Error Code # xxxx (xxxx = Error code)

This is the code set in the data status word of the drive if SERCOS communication is invalid. Call Bosch Rexroth Service if this error occurs.

!02 Invalid Parameter Number

The requested or sent parameter does not exist on the control or the drive, or the format of the parameter is incorrect.

!03 Data is Read Only

The data in this parameter may not be modified.

!04 Write Protected in this mode/phase

The data in this parameter can not be written in this mode or communication phase. Switch into parameter mode (phase 2) to enter the parameter.

!05 Greater than maximum value

The parameter exceeds the maximum allowed value.

!06 Less than minimum value

The parameter is less than the minimum allowed value.

!07 Data is Invalid

Parameter data is invalid, or the format of the parameter is invalid. See the drive or control system Parameter Descriptions.

!08 Drive was not found

The requested drive was not found on the SERCOS ring.

!09 Drive not ready for communication

The requested drive or the SERCOS ring has not been initialized.

!10 Drive is not responding

The drive did not respond to a service channel request. Check system diagnostics for the state of the SERCOS ring.

!11 Service channel is not open

When switching between initialization phases, data from the drive is momentarily invalid, and this message is sent instead of the requested data.

!12 Invalid Command Class

A serial port command is invalid or not supported at this time.

!13 Checksum Error: xx (xx= checksum that control calculated)

The control detected an invalid or missing checksum in data that was sent to it. As a debugging aid, the checksum that the control calculated on the incoming data is also sent with this message.

!14 Invalid Command Subclass

A serial port command option is invalid or not supported.

!15 Invalid Parameter Set

The parameter set number (task or axis) is invalid.

!16 List already in progress

An attempt has been made to start a parameter or program list that is already in progress.

!17 Invalid Sequence Number

The sequence number of a parameter or program list is invalid or has been sent out of order.

!18 List has not started

A parameter or program list has not been initiated (i.e., sequence number was sent before list was started).

!19 List is finished

This is an acknowledgment that a parameter or program list is complete. It does not indicate an error.

!20 Parameter is a List

This parameter is a variable-length list, and its data cannot be displayed as a normal parameter.

!21 Parameter is not a List

Only Variable-Length List parameters can use the Parameter List sequence.

!22 Invalid Variable Number

The variable mnemonic was not 'I' or 'F', or the variable number is greater than the maximum number of variables allocated.

!23 Insufficient Program Space

This message is sent after the control receives a "P W" program header if not enough contiguous memory is left on the control to store the program. Other programs may need to be deleted or their order rearranged. Check system parameters **C-0-0091**, **C-0-0092** and **C-0-0093** for system memory status.

!24 Maximum number of files exceeded

The control allows up to 10 programs resident in the control. This error message is sent when the control receives a "PW" program header and there are already 10 stored programs. One of the control resident program files must be deleted to make room to download the program.

!25 Invalid Program Header

The format of the program header sent to the control is invalid, or this command is not available for reading or writing.

!26 Checksum Error in Program

This message is sent at the end of a download if the checksum of the data does not match the checksums sent in the program or program header.

!27 Invalid Program Handle

The format of the handle is incorrect, or this command is not available for reading or writing.

!28 Function not Implemented

The function being request is not supported in this version.

!29 Program not found on Control

A program corresponding to the requested program handle was not found (e.g., the program is not resident in the control).

!30 Invalid I/O Register or Bit Number

The I/O register mnemonic is invalid or a register number greater than the maximum number of registers was sent.

!31 Invalid Table Index

The ABS, REL, or EVT table name was incorrect, or the index number was greater than the maximum number of points or events.

!32 Communication Port Error

The serial port receive buffer has overflowed. Make sure communication is set to half-duplex.

!33 Invalid Data Format

The format of the data received by the control is invalid (e.g., non-digits are sent in a decimal number).

!34 Active program can't be deleted

The active program cannot be deleted at any time. To delete an active program, first stop program and then delete.

!35 Parameter mode is required

The action requested can only be performed in Parameter Mode.

!36 Invalid Event Number

The event number selected in the ABS or REL point table is out of the range of the total number of events.

!37 Invalid Event Function

The function name selected in the event table does not exist on the control or is not defined as an event function.

!38 Program file version mismatch

The version of the file system on the control does not match that of the downloaded file. Upgrade to the latest version of VisualMotion Toolkit.

!39 Can't activate while program running

A new program cannot be activated unless all user tasks are stopped.

!40 No programs are active

No programs are active on the control. Download a program to the control's memory.

!41 System Error: pSOS #XXXX

This is an internal system error. Call Bosch Rexroth Service for assistance.

!42 Mapper: invalid operator

An invalid Boolean operator was found in I/O Mapper when it was sent to the control.

!43 Mapper: too many operations

The maximum number of Boolean operations allowed by the control I/O Mapper has been exceeded.

!44 Mapper: invalid register

A register exceeds the maximum number of registers or is 0.

!45 Mapper: invalid bit or mask

The bit number or mask sent exceeds 16 bits.

!46 Mapper: register is read-only

An assignment to a read-only register or bit was made (e.g., attempting to write to a control status register).

!47 Invalid Unit Number

The unit number (second character in string) is not a number between '1' and 'F' or an ASCII space character.

!50 Invalid Download Block

The block sent during a program download is incorrect in length or is not in hexadecimal format.

!52 Invalid Axis

The parameter set for the requested axis does not exist. Either this axis is disabled or the control does not support this number of axes.

!53 Waiting for service channel

When switching between drive initialization phases, data from the drive is momentarily invalid. This message is sent instead of the requested data. This message will also be issued whenever a service channel transaction cannot be completed. Continue to retry the message until a valid response is returned.

!54 List or String is too short

The text string or parameter list is smaller than the minimum length allowed by the control or the drive, or the size of a value does not match the attributes sent from the drive.

!55 List or String is too long

The text string or parameter list exceeds the maximum length allowed by the control or the drive, or the size of a value does not match the attributes sent from the drive.

!56 PC Communication Handshake Error

The control is not responding to an ASCII message. Check the address configuration on both the PC (config.sys and system.ini) and the control (address jumper switches).

!57 I/O Mapper: Max file size on Control Exceeded

The system memory that was allocated for I/O Mapper strings (8Kbytes for GPP7 and 128Kbytes for GPP8 and GPP9) has been exhausted. Optimize the mapping program so that it fits into memory.

!58 Cannot store CAM: already active for axis %d

Cam data cannot be changed unless no axes are currently using it. Deactivate the CAM for axis '%d', then send the CAM again.

!59 SERCOS handshake/busy timeout

This is an internal error generated by the SERCOS ASIC. Change modes or reset the control. If it happens again, call Bosch Rexroth Service.

!60 Executable program is too large (ddK)

The executable portion of the user program downloaded to the control exceeds the maximum limit, which is indicated in the message ('dd') in kilobytes. Optimize the program and download it again, or update the firmware to a version that has a larger program limit.

!61 System Memory Allocation Error

The dynamic memory space on the control has been exhausted. Call Bosch Rexroth Service for assistance.

!62 Cam X data is < 0 or greater than 360

All values in the x-column (right hand column) of the CAM file sent to the control must be between zero and the modulo value of the master.

!63 X-Column does not start at 0 or end at 360

In the CAM file sent to the control, the first point must be zero and the last point must be the modulo value of the master. Check the beginning and end of the CAM file.

!64 Not supported in user prog file version 1.1

The requested feature is not present in the file version of the user program from which the data was requested or sent. To use this feature, a compiler upgrade is necessary.

!72 Program does not include a PLS

PLS data was requested from a program that does not support the Programmable Limit Switch functions or does not have any PLSs configured.

!73 Invalid ABS or REL point index (%d)

Point %d is zero or is greater than the allocated maximum number of points for the selected point table.

!74 Error in command execution

A procedure command set in the control or drive parameter has not been successfully completed.

!75 Comm. port buffer overflow

The serial port received buffer has overflowed. To avoid this error, the host must communicate in half duplex or use XON-XOFF handshaking correctly.

!78 Service channel in use

The SERCOS service channel is being used by a user program task or by an internal process, and has suspended the transmission of a list or text string. See the description of parameter **C-0-0010** bit 12.

!79 PID block number does not exist

This error is issued when the selected PID block is not initialized in the user program.

!80 Invalid Object Number

The Fieldbus object number being transmitted to the control by way of serial communications has become corrupted and is in an invalid format. Fieldbus object numbers must always begin with a 5, e.g., 5F02.

!81 Invalid Mapping(s)

The Data Type selected in the Fieldbus Mapper is invalid. Fieldbus object number can be mapped to a Variable, Register, Card parameter, Axis parameter, or Task Parameter. The Data Types mentioned above becomes an invalid mapping if the type being selected can not be mapped or is read only. This will normally occur when mapping object numbers to parameters.

!82 Write protected by password

The SERCOS parameter being modified is password protected. This password protection is reserved for Bosch Rexroth Service personnel.

!83 Valid ELS Group numbers are 1 through 8

The ELS Group number being transmitted to the control by way of serial communications has become corrupted and is an invalid. Valid ELS Group numbers are 1 through 8.

!84 ELS Group is not currently active

The ELS Group number being transmitted to the control by way of serial communications is currently not active or is invalid. Valid ELS Group numbers are 1 through 8. Verify that the request number is existing and active in the user program.

!85 Data not limited to a specific ELS Master

The data being requested from the control by way of serial communications is not specific to any one ELS master.

!86 No ELS Masters are currently active

The ELS Master number being transmitted to the control by way of serial communications is currently not active or is invalid. Valid ELS Master numbers are 1 through 6. Verify that the request number is existing and active in the user program.

!87 Valid Virtual Master numbers are 1 and 2

The Virtual Master number being transmitted to the control by way of serial communications has become corrupted and is invalid. Valid Virtual Master numbers are 1 and 2.

!88 No Virtual Master are currently active

The Virtual Master number being transmitted to the control by way of serial communications is currently not active or is invalid. Valid Virtual Master numbers are 1 and 2. Verify that the request number is existing and active in the user program.

!89 Unsupported Parameter for mapping

The Fieldbus mapping list being transmitted to the control by way of serial communications contains a parameter(s) that is not supported as a Fieldbus mapping object.

!90 Invalid variable for mapping

The Fieldbus mapping list being transmitted to the control by way of serial communications contains invalid variables (program float or integers) that are not present in the active user program.

!91 CAM build: float table start index

The CAM build float table start index (starting float variable) being requested from the control by way of serial communications is less than 1 or greater than the allowable range in the sizing instruction.

!92 CAM build: float table end index

The CAM build float table end index (end float variable) being requested from the control by way of serial communications is beyond the maximum range (number) in the sizing instruction.

!93 CAM build: float table size

The CAM build float table size (range of float variables) is larger than or out of range of the allowed number of floats in the sizing instructions.

!96 Duplicate Message Sequence Number (MSN)

This communication error is reserved for future development.

!97 Requested operation prohibited from network

This communication error is issued when an attempt is made to access a control, across the Ethernet network, when access is not allowed. Network access to a control is configured using control parameter **C-0-0405**.

!99 Request in Progress

This communication error is issued when a second request is made to flash global variables, using C-0-0082, before the initial request is done.

!100 Reset Command Parameter

Global variables are flashed to memory by setting C-0-0082 to a binary 3. This communication error is issued when a second binary 3 is set in C-0-0082 without first setting the parameter to 0.

!101 Read only From This Port

This communication error is issued when an attempt is made to access a control set to read-only.

!102 Does Not Match Password Requirements

This communication error is issued when an invalid character is used while entering the password to change the access level of a serial or network connection.

!103 Bit combination not valid

This communication error is issued if A-0-0004 bit 5=1 (Enable Measuring Wheel Services) and bit 11=1(Position using Secondary Encoder). When enabling a secondary encoder as the primary feedback device for an axis, the position bit (11) can not be set to 1. This would cause a conflict in positioning for the secondary encoder.

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5 Service & Support

5.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

- telefonisch: **+49 (0) 9352 40 50 60**
  über Service Call Entry Center Mo-Fr 07:00-18:00
- per Fax: **+49 (0) 9352 40 49 41**
- per e-Mail: **service@boschrexroth.de**

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- by phone: **+49 (0) 9352 40 50 60**
  via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm
- by fax: **+49 (0) 9352 40 49 41**
- by e-mail: **service@boschrexroth.de**

5.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

+49 (0) 171 333 88 26
oder **+49 (0) 172 660 04 06**

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26
or **+49 (0) 172 660 04 06**

5.3 Internet

Ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen unserer Service- und Vertriebsbüros finden Sie unter **www.boschrexroth.com** – einige Angaben in dieser Dokumentation können inzwischen überholt sein.

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit Ihrem lokalen Ansprechpartner auf.

Verkaufsniederlassungen
Niederlassungen mit Kundendienst

Additional notes about service, repairs and training as well as the **actual** addresses of our sales- and service facilities are available on the Internet at **www.boschrexroth.com** – some information in this documentation may meanwhile be obsolete.

Please contact the sales & service offices in your area first.

sales agencies
offices providing service

5.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

detaillierte Beschreibung der Störung und der Umstände.

Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.

Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the nameplate of the affected products, especially typecodes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

5.5 Kundenbetreuungsstellen - Sales & Service Facilities

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