WSG Profibus

Interface Manual

Firmware Version 2.3.0

December 2011

Contents

1 Introduction

The WSG family of grippers provides an interface to Profibus DP V0. Profibus is a widely spread field bus protocol for industrial automation. It supports both single and multiple Master modes. Every device is represented by an I/O register space that is periodically synchronized with the Profibus Master.
The following manual assumes that you are familiar with the Profibus technology and the Siemens SIMATIC software.

2 Profibus Interface

Each Profibus slave has an I/O register space that is periodically updated and read by the Profibus Master. This I/O-Space of the WSG is pre-configured at master-side by using the device profile that can be found on the companion CD or can be downloaded from the WSG's Web Interface.

2.1 Installing the GSD File in Siemens STEP7

The GSD file is provided as a ZIP-compressed package that contains the following files:

- WEIS5555.gsd (device description file)
- WSG_D.bmp (visualization file)
- WSG_R.bmp (visualization file)
- WSG_S.bmp (visualization file)
- install.txt (installation notes)

Follow these steps to install the GSD file in Siemens STEP7:

1. Unzip the package and store the files above to your disk
2. Open the STEP7 Hardware Manger
3. Select "Extras->GSD-Dateien installieren…"
4. Point to the location where you stored the unzipped package on your disk.
5. You will now find the WSG in the Device Catalog under
   "PROFIBUS-DP->weitere FELDGERÄTE->Antriebe->Weiss Robotics"

2.2 Interface Description

The WSG's Profibus interface is implemented as an 8-Byte output and a 12-Byte input register space as described in the following paragraphs.

2.2.1 Output Registers (PLC to WSG)

The Output Registers are transferred from the Profibus Master to the WSG. They consist of Command flags, User Flags and three parameters and are used to control the gripper. Due to the register-space-oriented nature of Profibus, only a subset of the WSG's command set is available via this interface. The register arrangement is given in Table 1.

<table>
<tr><th>Byte Number</th><th>Register Name</th><th>Description</th></tr>
<tr><td>0</td><td>CMDFLAGS</td><td>
Command Flags
A command is issued when changing the corresponding bit from 0 to 1 (raising edge). Please see the following chapters for a detailed description.
<table>
<tr><th>Bit Index:</th><th>Name</th><th>Description</th></tr>
<tr><td>Bit 0:</td><td>MOVE</td><td>Initiate a pre-position movement</td></tr>
<tr><td>Bit 1:</td><td>GRASP</td><td>Grasp a part</td></tr>
<tr><td>Bit 2:</td><td>RELEASE</td><td>Release a part</td></tr>
<tr><td>Bit 3:</td><td>HOMING</td><td>Home the gripper</td></tr>
<tr><td>Bit 4:</td><td>STOP/ACK</td><td>Stop, but do not turn off the motor / Acknowledge a FAST STOP</td></tr>
<tr><td>Bit 5:</td><td>FASTSTOP</td><td>Stop and turn off the motor.</td></tr>
<tr><td>Bit 6:</td><td>JOG+</td><td>Jog-Mode in positive direction</td></tr>
<tr><td>Bit 7:</td><td>JOG-</td><td>Jog-Mode in negative direction</td></tr>
</table>
If the FASTSTOP or STOP/ACK bit is set to '1', the motion commands are disabled.
</td></tr>
<tr><td>1</td><td>IF</td><td>
User Flags (input)
Free programmable flags that can be used in conjunction with the Script Interpreter.
<table>
<tr><th>Bit Index:</th><th>Name</th><th>Description</th></tr>
<tr><td>Bit 0:</td><td>IF1</td><td>Input User Flag 1</td></tr>
<tr><td>Bit 1:</td><td>IF2</td><td>Input User Flag 2</td></tr>
<tr><td>Bit 2:</td><td>IF3</td><td>Input User Flag 3</td></tr>
<tr><td>Bit 3:</td><td>IF4</td><td>Input User Flag 4</td></tr>
<tr><td>Bit 4:</td><td>IF5</td><td>Input User Flag 5</td></tr>
<tr><td>Bit 5:</td><td>IF6</td><td>Input User Flag 6</td></tr>
<tr><td>Bit 6:</td><td>IF7</td><td>Input User Flag 7</td></tr>
<tr><td>Bit 7:</td><td>IF8</td><td>Input User Flag 8</td></tr>
</table>
</td></tr>
</table>

2..3	WIDTH	*Command parameter "Width"* New finger opening width in 1/100 millimeters (i.e. a value of 1220 means 12.20 mm). Encoded as INT (signed).
4..5	SPEED	*Command parameter "Speed"* Current movement speed in 1/100 millimeters per second (i.e. a value of 3005 means 30.05 mm/s), given as finger speed relative to each other. Encoded as WORD (unsigned). **Setting this parameter to a value beyond the system limits and triggering a motion-related function using it raises a FAST STOP.**
6..7	FORCELIMIT	*Command parameter "Force Limit"* New grasping force limit in 1/100 Newton (i.e. a value of 1050 means 10.50 N). The grasping force is twice the nominal force that is applied to the part to be grasped. Encoded as INT (signed), only positive values are allowed. **Setting this parameter to a value beyond the system limits and triggering a motion-related function using it raises a FAST STOP.**

Table 1: WSG Output Register

To initiate a command, the command parameters have to be set up and the respective command flag has to be changed from 0 to 1 (i.e. a raising transition). Jog Mode flags are level-sensitive. A detailed description of the specific commands can be found in Chapter 2.2.2.

If more than one command flag was changed simultaneously, only the command with the lowest bit number is executed (i.e. setting both MOVE and GRASP flags from 0 to 1 will result in a MOVE command).

Changing parameters while fingers are moving (i.e. MOVING in the system flags is 1) will result in a FAST STOP.

2.2.2 Input Registers (WSG to PLC)

The Input Register Space (see Table 2) is transferred from the WSG to the Profibus Master each Profibus cycle. It contains the current gripper parameters, its operating and grasping state, user defined flags as well as an status code representing the result of the last command.

<table>
<tr><th>Byte Number</th><th>Register Name</th><th>Description</th></tr>
<tr><td>0</td><td>GSTATE</td><td>Grasping State
These flags encode the current grasping state as below and are intended to be used to monitor the grasping process:
<table><tr><th>Bit Index:</th><th>Name</th><th>Description</th></tr><tr><td>Bit 0:</td><td>IDLE</td><td>Waiting for new command</td></tr><tr><td>Bit 1:</td><td>GRASPING</td><td>Fingers moving towards the part</td></tr><tr><td>Bit 2:</td><td>NO_PART</td><td>No part found</td></tr><tr><td>Bit 3:</td><td>PART_LOST</td><td>Part was grasped but then lost</td></tr><tr><td>Bit 4:</td><td>HOLDING</td><td>Holding a part</td></tr><tr><td>Bit 5:</td><td>RELEASING</td><td>Fingers moving away from the part</td></tr><tr><td>Bit 6:</td><td>POSITIONING</td><td>Fingers moving due to a pre-position command (MOVE)</td></tr><tr><td>Bit 7:</td><td>RES7</td><td>reserved</td></tr></table></td></tr>
<tr><td>1</td><td>OF</td><td>User Flags (output)
Freely programmable flags that can be used to interact between the PLC code and a running WSG Script.
<table><tr><th>Bit Index:</th><th>Name</th><th>Description</th></tr><tr><td>Bit 0:</td><td>OF1</td><td>Output User Flag 1</td></tr><tr><td>Bit 1:</td><td>OF2</td><td>Output User Flag 2</td></tr><tr><td>Bit 2:</td><td>OF3</td><td>Output User Flag 3</td></tr><tr><td>Bit 3:</td><td>OF4</td><td>Output User Flag 4</td></tr><tr><td>Bit 4:</td><td>OF5</td><td>Output User Flag 5</td></tr><tr><td>Bit 5:</td><td>OF6</td><td>Output User Flag 6</td></tr><tr><td>Bit 6:</td><td>OF7</td><td>Output User Flag 7</td></tr><tr><td>Bit 7:</td><td>OF8</td><td>Output User Flag 8</td></tr></table></td></tr>
</table>

<table>
<tr>
<td>2..5</td>
<td>SYSSTATE</td>
<td>
System State
Current system state of the gripper encoded as a bit vector. Please see Appendix B for a description of the single bits. This register is updated every bus cycle with the system state flags regardless of the currently processed command.
<table>
<tr><th>Bit Index:</th><th>Name</th></tr>
<tr><td>Bit 0</td><td>REFERENCED</td></tr>
<tr><td>Bit 1</td><td>MOVING</td></tr>
<tr><td>Bit 2</td><td>BLOCKED_MINUS</td></tr>
<tr><td>Bit 3</td><td>BLOCKED_PLUS</td></tr>
<tr><td>Bit 4</td><td>SOFT_LIMIT_MINUS</td></tr>
<tr><td>Bit 5</td><td>SOFT_LIMIT_PLUS</td></tr>
<tr><td>Bit 6</td><td>AXIS_STOPPED</td></tr>
<tr><td>Bit 7</td><td>TARGET_POS_REACHED</td></tr>
<tr><td>Bit 8</td><td>OVERDRIVE_MODE</td></tr>
<tr><td>Bit 9</td><td>FORCECNTL_MODE</td></tr>
<tr><td>Bit 10</td><td>reserved</td></tr>
<tr><td>Bit 11</td><td>reserved</td></tr>
<tr><td>Bit 12</td><td>FAST_STOP</td></tr>
<tr><td>Bit 13</td><td>TEMP_WARNING</td></tr>
<tr><td>Bit 14</td><td>TEMP_FAULT</td></tr>
<tr><td>Bit 15</td><td>POWER_FAULT</td></tr>
<tr><td>Bit 16</td><td>CURR_FAULT</td></tr>
<tr><td>Bit 17</td><td>FINGER_FAULT</td></tr>
<tr><td>Bit 18</td><td>CMD_FAILURE</td></tr>
<tr><td>Bit 19</td><td>SCRIPT_RUNNING</td></tr>
<tr><td>Bit 20</td><td>SCRIPT_FAILURE</td></tr>
<tr><td>Bit 21</td><td>reserved</td></tr>
<tr><td>Bit 22</td><td>reserved</td></tr>
<tr><td>Bit 23</td><td>reserved</td></tr>
<tr><td>Bit 24</td><td>reserved</td></tr>
<tr><td>Bit 25</td><td>reserved</td></tr>
<tr><td>Bit 26</td><td>reserved</td></tr>
<tr><td>Bit 27</td><td>reserved</td></tr>
<tr><td>Bit 28</td><td>reserved</td></tr>
<tr><td>Bit 29</td><td>reserved</td></tr>
<tr><td>Bit 30</td><td>reserved</td></tr>
<tr><td>Bit 31</td><td>reserved</td></tr>
</table>
</td>
</tr>
<tr>
<td>6..7</td>
<td>WIDTH</td>
<td>
Current Opening Width
Current opening width of the fingers in 1/100 millimeters (i.e. a value of 1220 means 12.2 mm). Encoded as INT.
This register is updated every bus cycle with the current opening width regardless of the currently processed command.
</td>
</tr>
</table>

8..9	Grasping Force	*Current Grasping Force* Current grasping force in 1/100 Newton (i.e. a value of 405 means a grasping force of 40.5 N). This is twice the nominal force that is currently applied to a part. Encoded as INT. This register is updated every bus cycle with the current grasping force regardless of the currently processed command. **If no Force Measurement Finger is installed on the WSG, this value is approximated using the motor current.**
10..11	Status Code	*Result of the last Command* This field holds its state, until a new command is issued. Please see Appendix A for a description of possible status codes.

Table 2: WSG Input Register

2.3 Profibus Diagnosis Messages

The WSG will send diagnosis messages containing the current System State Flags as the first double word to the Profibus Master (PLC) if at least one of the following error-related flags of its System State was raised (i.e. changes from 0 to 1):

- SF_SOFT_LIMIT_MINUS
- SF_SOFT_LIMIT_PLUS
- SF_FAST_STOP
- SF_TEMP_FAULT
- SF_POWER_FAULT
- SF_CURR_FAULT
- SF_FINGER_FAULT
- SF_CMD_FAILURE
- SF_SCRIPT_FAILURE

Please see Appendix B for a more detailed description of these flags.

The format of the diagnosis message is as follows:

Byte Number	Description
0..3	*Standard Diagnostic Data* Diagnostic Data as defined by the Profibus Specification

4..5	*Slave Ident-No.* Slave Identification Number. This is 0x5555 for the WSG.
6	*Length of Diagnostic Message* Diagnosis messages of the WSG are always 10 Bytes = 0x0A.
7..10	*System State* Current system state of the gripper encoded as a bit vector. Same coding as SYSSTATE in Table 2.
10..15	*reserved* This area is reserved for future use.

Table 3: WSG Diagnosis Messages

3 Commands

3.1 Move the fingers in positioning mode (MOVE)

This command can be used to pre-position the gripper fingers to a defined width before issuing a grasp command. The command is intended to speed up grasping of sensitive parts when the gripper fingers have to travel a larger distance due to process constraints.
MOVE can only be issued, if the gripper is idle, i.e. Grasping State is IDLE and the fingers are not moving, i.e. the system state Flag “MOVING” is 0).

Command Flag Position:

Bit 0

Parameters used:

WIDTH, SPEED, FORCELIMIT

Status Code

The Status Code register is set to E_CMD_PENDING upon start of the movement and set to the command’s result when it has finished.

Grasping State

The grasping state changes to POSITIONING when starting to move and back to IDLE when finished.

System State

Various transitions will occur. You should use the Grasping State to evaluate the current state of the grasping process, unless you have very special requirements.

3.2 Grasp a part (GRASP)

Grasp a part using its nominal width, the speed and the force limit at which the part should be grasped. When the command is issued, the gripper moves its fingers to the nominal part width and tries to clamp the expected part with the previously set grasping force. If the gripper can establish the desired grasping force within the defined clamping travel, a part is grasped. If the fingers fall through the clamping travel without establishing the grasping force, no part was found and the grasping state is updated accordingly. The clamping travel can be set using the WSG's Web interface. The grasping state is updated with the result of this operation (either PART_HOLDING or NO_PART) as well as the grasping statistics. If no part was found, the command's result is set to E_CMD_FAILED.
After successfully grasping a part, the integrated part monitoring is enabled which supervises the grasping force. If a part is removed from the gripper without releasing it first, the gripper detects it and changes the grasping state to PART_LOST.

You may reduce the grasping speed with sensitive parts to limit the impact due to the mass of the gripper fingers and the internal mechanics.

The Grasping State reflects the current state of the grasping process.

Command Flag Position:

Bit 1

Parameters used:

WIDTH, SPEED, FORCELIMIT

Status Code

The Status Code register is set to E_CMD_PENDING upon start of the movement and set to the command's result when it has finished. If no part was found, the status code is set to E_CMD_FAILED.

Grasping State

During finger movement, the Grasping State is set to GRASPING. If a part was found, it changes to HOLDING. If no part was found, the Grasping State is set to NO_PART. If a part was removed after it was clamped, the Grasping state is set to PART_LOST.

System State

Various transitions will occur. You should use the Grasping State to evaluate the current state of the grasping process, unless you have very special requirements.

3.3 Release a part (RELEASE)

Release a part by opening the fingers with a given speed and width. The RELEASE command does not pinch the part. This is ensured by successively increasing the internal force limit only when moving away from it. The part monitoring is disabled before releasing it. The gripper's nominal force is used for release.

Command Flag Position:

Bit 3

Parameters used:

WIDTH, SPEED

Status Code

The Status Code register is set to E_CMD_PENDING upon start of the movement and set to the command's result when it has finished.

Grasping State

During finger movement, the Grasping State is set to RELEASING. When the end position is reached (or in case of an error), the grasping state is set to IDLE.

System State

Various transitions will occur. You should use the Grasping State to evaluate the current state of the grasping process, unless you have very special requirements.

3.4 Referencing the gripper (HOMING)

This command references the gripper by executing a homing sequence. During homing, the fingers will move to the mechanical end stop. The homing sequence has to be configured on the "Settings->Motion Configuration" page of the WSG's Web Interface.
You can set the direction of homing (inbound or outbound) as well as enable automatic homing on startup.

Homing is required prior to any motion-related command. The best positioning performance will be achieved if homing is done into the direction in which the better positioning accuracy is required.

During homing, soft limits are disabled. Obstacles in the movement range of the fingers and collision with these during homing may result in a wrong reference point for the finger position!

Command Flag Position:

Bit 3

Parameters used:

none

Status Code

The Status Code register is immediately set to E_CMD_PENDING and to the command's result when it has finished.

Grasping State

During homing, the grasping state is IDLE.

System State

During movement, the MOVING flag is set to 1. If the gripper is referenced, the REFERENCED flag is set to 1.

3.5 Stop movement or acknowledge a FAST STOP (STOP/ACK)

Stop any pending movement immediately without disabling the drive. When stopping during holding (i.e. the grasping state is HOLDING), the part monitor will be disabled and the grasping force will not be applied anymore.

Acknowledging a FAST STOP condition:

If the WSG is in FAST STOP mode, a transition from 0 to 1 is required on this flag to acknowledge and to return in normal operating mode. You have to reset the FASTSTOP flag before acknowledging it!

Command Flag Position:

Bit 4

Parameters used:

none

Status Code

Set to E_SUCCESS.

Grasping State

The grasping state is set to IDLE.

System State

The AXIS_STOPPED flag is set to 1. If acknowledging a FAST STOP, the FASTSTOP flag is cleared.

3.6 Raise a Fast Stop (FAST STOP)

This function is similar to an “Emergency Stop”. It immediately stops any movement the fastest way, disables the drive and prevents further movement commands from being executed. The FAST STOP state can only be left by issuing a FAST STOP Acknowledge (see chapter 3.5). All motion-related commands are prohibited during FAST STOP and will produce an E_ACCESS_DENIED error.
The FAST STOP state is indicated in the System Flags and logged in the system’s log file, so this command should in general be used to react on certain error conditions.

To simply stop the current movement, you may want to use the STOP command instead.

In addition to the STOP/ACK flag, the FAST STOP can be cleared interactively using the Web Interface, too. This will enable the drive again; however, it is required to reset the FAST STOP flag on the Profibus interface to enable motion-related commands again.

Command Flag Position:

Bit 5

Parameters used:

none

Status Code

Set to E_SUCCESS.

Grasping State

The grasping state is set to IDLE.

System State

The FASTSTOP flag is set to 1.

3.7 Jog Mode (JOG+ and JOG-)

To setup a process, it may be required to move the fingers of the WSG manually. This can be done using the Jog Mode Flags. These flags are evaluated level-sensitive and allow a constant speed drive of the fingers using two switches on the PLC. The flags are decoded as given in the following table:

JOG+	JOG-	Movement direction
0	0	Jog Mode is disabled*
1	0	positive with SPEED
0	1	negative with SPEED
1	1	Stop

*) If the Jog flags change to both 0, the Jog mode is left and the drive is stopped.

The force limit (current controlled only) as well as the speed can be passed as parameters. You may consider using a hand wheel to control them. Please be aware that high movement speed may interfere with a low force limit setting.

In contrast to other motion-related commands, the SPEED Parameter can be set to 0 resulting in an internal clamping of the value to the minimum gripper speed.

The Jog Mode is intended for setting up a process, only. Do not use the Jog Mode in normal operation of the gripper!

Command Flag Position:

Bit 6 and 7

Parameters used:

SPEED, FORCELIMIT

Status Code

The Status Code register is set to E_CMD_PENDING upon start of the movement and set to the command's result when it has finished.

Grasping State

During finger movement, the Grasping State is set to RELEASING. When the end position is reached (or in case of an error), the grasping state is set to IDLE.

System State

Various transitions will occur. You should use the Grasping State to evaluate the current state of the grasping process, unless you have very special requirements.

4 WSG Profibus Monitor

The WSG has a built-in Profibus Monitor that can be accessed via the WSG's Web Interface (select Diagnosis->Profibus Monitor from the menu). The monitor displays the current content of the input and output registers belonging to the WSG and gives some basic information about the bus state, thus making it easy to embed it in a Profibus-based industrial environment.

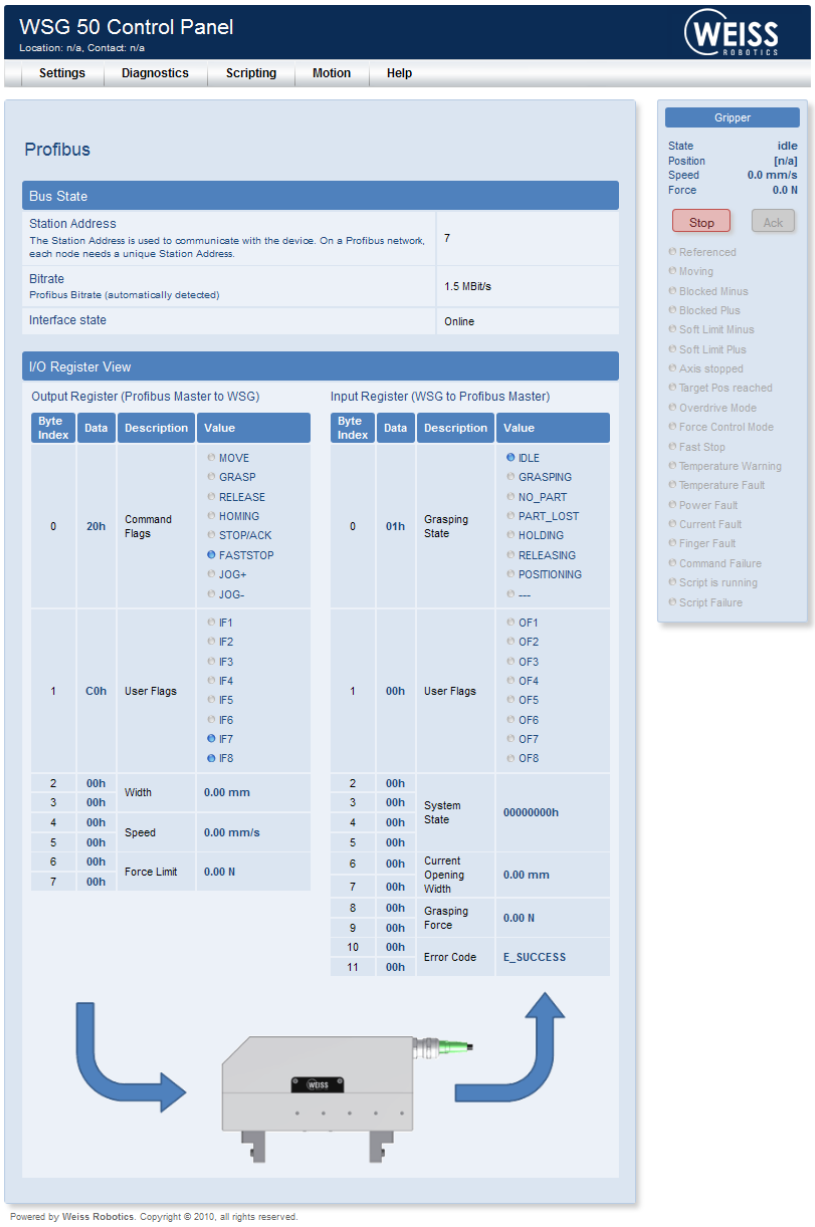

Figure 1: Screenshot of the WSG Profibus Monitor

5 Appendix A: Status Codes

Status Code	Symbol name	Description
0	E_SUCCESS	No error occurred, operation was successful
1	E_NOT_AVAILABLE	Function or data is not available
2	E_NO_SENSOR	No measurement converter is connected
3	E_NOT_INITIALIZED	Device was not initialized
4	E_ALREADY_RUNNING	The data acquisition is already running
5	E_FEATURE_NOT_SUPPORTED	The requested feature is currently not available
6	E_INCONSISTENT_DATA	One or more parameters are inconsistent
7	E_TIMEOUT	Timeout error
8	E_READ_ERROR	Error while reading data
9	E_WRITE_ERROR	Error while writing data
10	E_INSUFFICIENT_RESOURCES	No more memory available
11	E_CHECKSUM_ERROR	Checksum error
12	E_NO_PARAM_EXPECTED	A Parameter was given, but none expected
13	E_NOT_ENOUGH_PARAMS	Not enough parameters for executing the command
14	E_CMD_UNKNOWN	Unknown command
15	E_CMD_FORMAT_ERROR	Command format error
16	E_ACCESS_DENIED	Access denied
17	E_ALREADY_OPEN	Interface is already open
18	E_CMD_FAILED	Error while executing a command
19	E_CMD_ABORTED	Command execution was aborted by the user
20	E_INVALID_HANDLE	Invalid handle
21	E_NOT_FOUND	Device or file not found
22	E_NOT_OPEN	Device or file not open
23	E_IO_ERROR	Input/Output Error
24	E_INVALID_PARAMETER	Wrong parameter
25	E_INDEX_OUT_OF_BOUNDS	Index out of bounds

26	E_CMD_PENDING	No error, but the command was not completed, yet. Another return message will follow including a status code, if the function has completed.
27	E_OVERRUN	Data overrun
28	E_RANGE_ERROR	Range error
29	E_AXIS_BLOCKED	Axis blocked
30	E_FILE_EXISTS	File already exists

6 Appendix B: System State Flags

The System State Flags are arranged as a 32-bit wide integer value that is provided via the Profibus Input Registers. Each bit has a special meaning listed below.

Bit No.	Flag Name	Description
D31..21	reserved	These bits are currently unused but may be used in a future release of the WSG firmware.
D20	SF_SCRIPT_FAILURE	**Script Error.** An error occurred while executing the script and the script was aborted. This flag is reset when starting a script.
D19	SF_SCRIPT_RUNNING	**A script is currently running.** The flag is reset if the script either terminated normally, a script error occurred or the script was terminated manually by the user.
D18	SF_CMD_FAILURE	**Command Error.** The last command returned an error.
D17	SF_FINGER_FAULT	**Finger Fault.** The status of at least one finger is different from “operating” and “not connected”. Please check the finger flags for a more detailed error description.
D16	SF_CURR_FAULT	**Engine Current Error.**

D15	SF_POWER_FAULT	**Power Error.** The power supply is outside the valid range.
D14	SF_TEMP_FAULT	**Temperature Error.** The gripper hardware has reached a critical temperature level. All motion-related commands are disabled, until the temperature falls below the critical level.
D13	SF_TEMP_WARNING	**Temperature Warning.** The gripper hardware will soon reach a critical temperature level.
D12	SF_FAST_STOP	**Fast Stop.** The gripper was stopped due to an error condition. You have to acknowledge the error in order to reset this flag and to re-enable motion-related commands.
D11..10	reserved	These bits are currently unused but may be used in a future release of the WSG firmware.
D9	SF_FORCECNTL_MODE	**Force Control Mode.** True Force Control is currently enabled by using the installed Force Measurement Finger (WSG-FMF). If this flag is not set, the grasping force is controlled by approximation based on the motor current.
D8	SF_OVERDRIVE_MODE	**Overdrive Mode.** Gripper is in overdrive mode and the grasping force can be set to a value up to the overdrive force limit. If this bit is reset, the grasping force cannot be higher than the gripper's nominal grasping force value.
D7	SF_TARGET_POS_REACHED	**Target position reached.** Set after a Move or Grasp command, if the target position was successfully reached. This flag is reset on the next movement command.
D6	SF_AXIS_STOPPED	**Axis stopped.** A previous movement command was aborted using the stop command. This flag is reset on the next movement command.

D5	SF_SOFT_LIMIT_PLUS	**Positive direction soft limit reached.** The fingers reached the defined soft limit in positive moving direction. A further movement into this direction is not allowed anymore. This flag is cleared, if the fingers have been moved away from the soft limit position.
D4	SF_SOFT_LIMIT_MINUS	**Negative direction soft limit reached.** The fingers reached the defined soft limit in negative moving direction. A further movement into this direction is not allowed anymore. This flag is cleared, if the fingers have been moved away from the soft limit position.
D3	SF_BLOCKED_PLUS	**Axis is blocked in positive moving direction.** You may use this flag to detect that a part was grasped.
D2	SF_BLOCKED_MINUS	**Axis is blocked in negative moving direction.** You may use this flag to detect that a part was grasped.
D1	SF_MOVING	**The Fingers are currently moving.** This flag is reset automatically if the movement stops.
D0	SF_REFERENCED	**Fingers Referenced.** If set, the gripper is referenced and accepts movement commands.