

MMCWHP C# Library Wrapper Class

Rev 0.0.0.1

2010-10-29

**Engineering
RSAutomation**

Revision History

Date	Revision	Description	Draft
2010-10-29	Rev. 0.0.0.1	1 st release	SK Kang

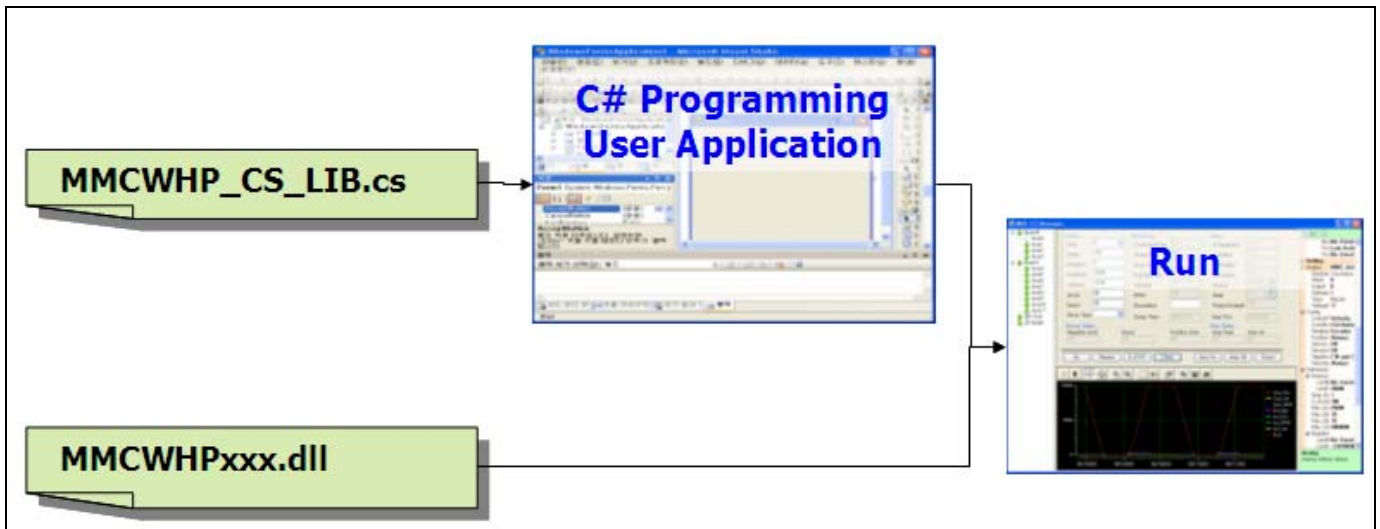
1. MMCWHP C# Library Overview

1.1 Overview

C# 용 Library 는 기존 C native dll 을 C#에서 사용 가능 하도록 Wrapping class 형태로 제공 된다.

따라서 mmcwhpxxx.dll (xxx 는 version 임) 을 c#에서 사용하기 위해서는 아래의 2개의 파일이 필요하다.

- (1) mmcwhpxxx.dll – dll file (System32 folder 안에 copy 되어 있어야 함 – 혹은 system path에 있어야 함)
- (2) MMC_CS_LIB.cs – C#용 wrapping class

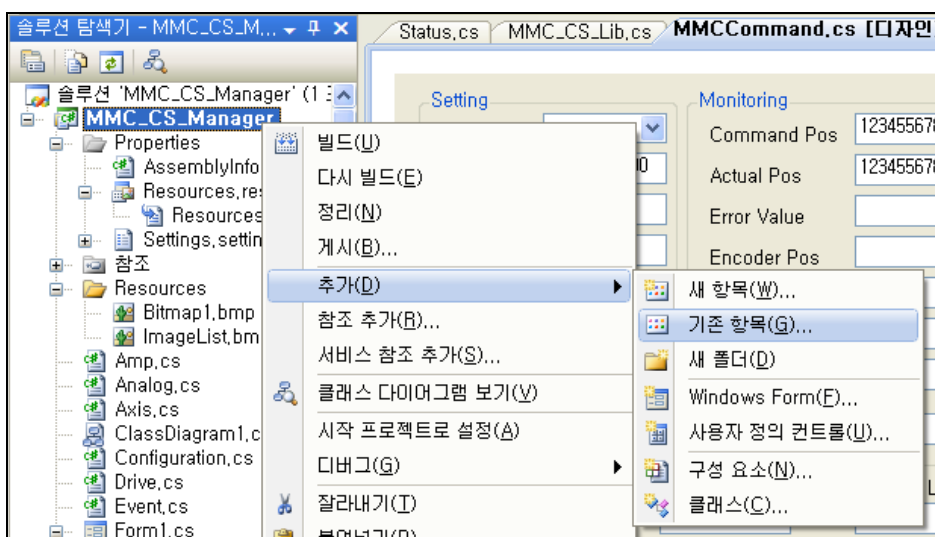


[Fig1] Overview of programming of MMC Library in C#.

1.2 설치 및 사용 방법

1.2.1 프로젝트에 MMCWHP_CS_LIB.cs 파일 추가하기

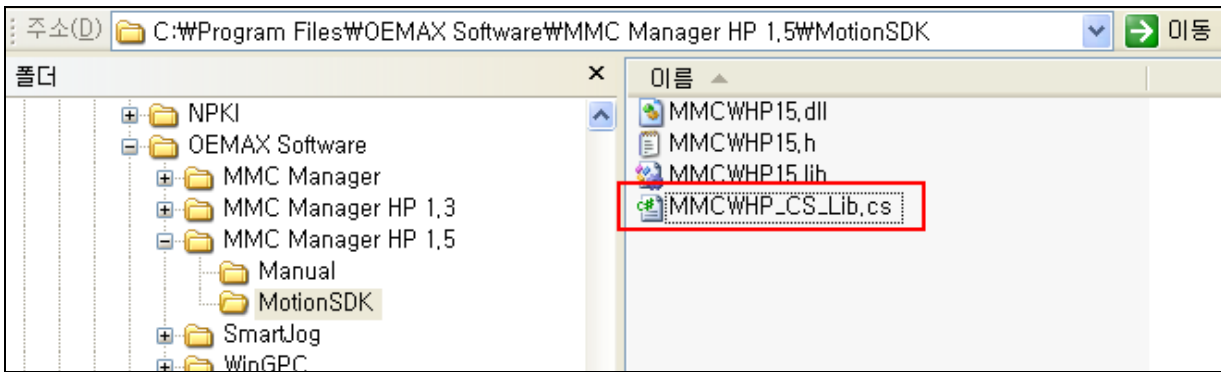
- (1) 솔루션 탐색기 선택
- (2) 솔루션 이름에서 오른쪽 클릭 하여 추가 -> 기존 항목 선택



[Fig2. C# project 에 MMC C#용 Wrapping class 파일 추가

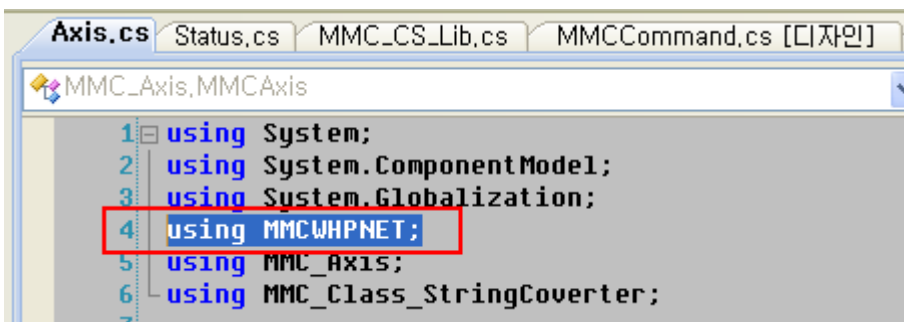
- (3) program files\WOEMAX Software\MMC Manager HP 1.xx\WMotionSDK\MMCWHP_CS_LIB.cs 선택

(본 파일을 프로젝트 폴더에 복사하여 복사된 경로에 있는 파일을 사용 하여도 무방함)



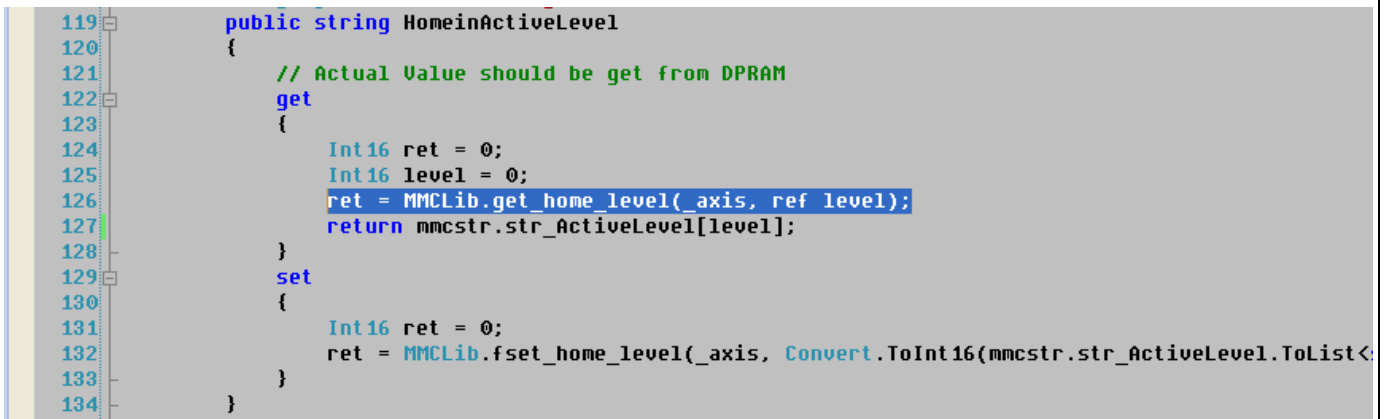
[Fig3. MMCWHP_CS_Lib.cs 경로]

(4) 사용하고자 하는 CS 파일에 using MMCWHPNET 을 사용하여 Name space 사용 가능 하도록 함.



[Fig4. MMCWHPNET namespace 사용]

(5) MMCLib.API_name_xxx()로 API 함수 사용 가능.



[Fig5. MMCWHP 의 API 함수 사용]

1.2.2 MMCWHPxxx.dll 을 windows SYSTEM32 folder 에 설치하기

MMCWHP를 Install 하게 되면, Install 시 MMCWHPxxx.dll 이 system32 folder 에 설치됨.

Manual 로 사용하고자 하는 경우는 [디폴트 설정 경로] program files\WOEMAX Software\MMC Manager HP 1.xx\MotionSDK 에 dll 파일을 실행 경로로 복사하여 사용 가능.

2. MMCWHP_CS_Lib 포함 내용 설명

2.1 MMCLib

MMCLib 는 namespace로 MMCWHPNET 을 사용 하고 있다.

그 안에는 아래와 같이 3개의 영역으로 나누어져 있다.

```
9 namespace MMCWHPNET
10 {
11
12     /// <summary> ...
16     public partial class MMCLib
17     {
18         // DLL name should be specified what you have.
19         public const string MMC_DLL_NAME = "mmcwhp153.dll";
20         // axis_source status
21         public enum MMCSTS : int...
47         // MMC Definition
48         public enum MMCDef...
194     }
195 }
196
197 namespace MMCWHPNET
198 {
199
200     // MMC Library APIs
201     public partial class MMCLib...
1169 }
1170
1171 namespace MMCWHPNET
1172 {
1173     // MMC String class
1174     public class MMCString...
1317 }
```

2.1.1 MMCLib functions

API 함수들의 Wrapping function

C#에서 dll에 있는 API를 호출하여 사용 할 수 있도록 함.

사용 예) bd number를 가지고 오는 함수

```
Int16 ret ;
ret = MMCLib.get_bd_num() ;
```

2.1.2 MMCLib.MMCDef

MMC 에서 사용 하고 있는 상수들에 대해서 enum 형태로 정의 해 놓음.

enum 형태의 변수를 정수로 바꾸기 위해서는 아래와 같이 사용해야 함.

사용 예) Off 값을 정수로 사용 (0)

```
Int16 i ;
i = Convert.ToInt16(MMCLib.MMCDef.Off) ;
```

2.1.3 MMCLib.MMCSTS

axis_source()로 받는 MMC Axis 의 status source를 구분하기 위한 enum 변수 입니다.

사용 예)

```
if ((Convert.ToInt32(sts) & Convert.ToInt32(MMCLib.MMCSTS.ST_POS_LIMIT)) ==  
    Convert.ToInt32(MMCLib.MMCSTS.ST_POS_LIMIT))  
{  
    this.Edit_Positive.Text = "On";  
}
```

2.2 MMCString

mmc에서 사용하는 string 을 정의해 놓은 변수 입니다.

프로그램을 작성할 때 문자열 비교나 표시에 사용하면 편리 합니다.

사용 예)

```
private MMCString mmcstr = new MMCString();  
public string AmpFaultOn  
{  
    // Actual Value should be get from DPRAM  
    get  
    {  
        _amp_fault = MMCLib.amp_fault_switch(_axis); // TRUE = High, FALSE = Low  
        return mmcstr.str_OnOff[_amp_fault];  
    }  
}
```

3. API List

Index	Function Name
1	short get_bd_num();
2	short get_axis_num();
3	get_velocity
4	get_version
5	short save_boot_frame();
6	short set_abs_encoder(short ax);
7	short mmc_axes(short bdNum, ref short axes);
8	short mmc_all_axes();
9	short get_stepper(short ax);
10	short fget_stepper(short ax);
11	short get_micro_stepper(short ax);
12	short fget_micro_stepper(short ax);
13	short set_stepper(short ax);
14	short fset_stepper(short ax);
15	short set_micro_stepper(short ax);
16	short fset_micro_stepper(short ax);
17	short set_servo(short ax);
18	short fset_servo(short ax);
19	short set_feedback(short ax, short device);
20	short fset_feedback(short ax, short device);
21	short get_feedback(short ax, ref short device);
22	short fget_feedback(short ax, ref short device);
23	short set_closed_loop(short ax, short loop);
24	short fset_closed_loop(short ax, short loop);
25	short get_closed_loop(short ax, ref short loop);
26	short fget_closed_loop(short ax, ref short loop);
27	short set_unipolar(short ax, short state);
28	short fset_unipolar(short ax, short state);
29	short get_unipolar(short ax);
30	short fget_unipolar(short ax);
31	short set_axis_runstop(short bd_num, short mode);
32	short get_axis_runstop(short bd_num, ref short mode);
33	short set_coordinate_direction(short ax, short direc);
34	short fset_coordinate_direction(short ax, short direc);
35	short get_coordinate_direction(short ax, ref short direc);
36	short fget_coordinate_direction(short ax, ref short direc);

37	short set_encoder_direction(short ax, short direc);
38	short fset_encoder_direction(short ax, short direc);
39	short get_encoder_direction(short ax, ref short direc);
40	short fget_encoder_direction(short ax, ref short direc);
41	short set_amp_fault(short ax, short act);
42	short fset_amp_fault(short ax, short act);
43	short get_amp_fault(short ax, ref short act);
44	short fget_amp_fault(short ax, ref short act);
45	short set_amp_fault_level(short ax, short level);
46	short fset_amp_fault_level(short ax, short level);
47	short get_amp_fault_level(short ax, ref short level);
48	short fget_amp_fault_level(short ax, ref short level);
49	short set_amp_reset_level(short ax, short level);
50	short fset_amp_reset_level(short ax, short level);
51	short get_amp_reset_level(short ax, ref short level);
52	short fget_amp_reset_level(short ax, ref short level);
53	short set_inposition_level(short ax, short level);
54	short fset_inposition_level(short ax, short level);
55	short get_inposition_level(short ax, ref short level);
56	short fget_inposition_level(short ax, ref short level);
57	short set_inposition_required(short ax, short inposflag);
58	short fset_inposition_required(short ax, short inposflag);
59	short get_inposition_required(short ax, ref short inposflag);
60	short fget_inposition_required(short ax, ref short inposflag);
61	short controller_idle(short ax);
62	short controller_run(short ax);
63	short set_encoder_filter_num(short ax, short fn);
64	short fset_encoder_filter_num(short ax, short fn);
65	short get_encoder_filter_num(short ax, ref short fn);
66	short fget_encoder_filter_num(short ax, ref short fn);
67	short set_system_io(short ax, short onoff);
68	short get_system_io(short ax, ref short onoff);
69	short get_analog(short channel, ref short value);
70	short set_dac_output(short ax, short voltage);
71	short get_dac_output(short ax, ref short voltage);
72	short set_analog_offset(short ax, short voltage);
73	short fset_analog_offset(short ax, short voltage);
74	short get_analog_offset(short ax, ref short voltage);
75	short fget_analog_offset(short ax, ref short voltage);

76	short set_analog_limit(short ax, int voltage);
77	short fset_analog_limit(short ax, int voltage);
78	short get_analog_limit(short ax, ref int voltage);
79	short fget_analog_limit(short ax, ref int voltage);
80	short set_position_lowpass_filter(short ax, double hz);
81	short fset_position_lowpass_filter(short ax, double hz);
82	short get_position_lowpass_filter(short ax, ref double hz);
83	short fget_position_lowpass_filter(short ax, ref double hz);
84	short set_velocity_lowpass_filter(short ax, double hz);
85	short fset_velocity_lowpass_filter(short ax, double hz);
86	short get_velocity_lowpass_filter(short ax, ref double hz);
87	short fget_velocity_lowpass_filter(short ax, ref double hz);
88	short set_position_notch_filter(short ax, double hz);
89	short fset_position_notch_filter(short ax, double hz);
90	short get_position_notch_filter(short ax, ref double hz);
91	short fget_position_notch_filter(short ax, ref double hz);
92	short set_velocity_notch_filter(short ax, double hz);
93	short fset_velocity_notch_filter(short ax, double hz);
94	short get_velocity_notch_filter(short ax, ref double hz);
95	short fget_velocity_notch_filter(short ax, ref double hz);
96	short set_analog_direction(short ax, short dac_dir);
97	short fset_analog_direction(short ax, short dac_dir);
98	short get_analog_direction(short ax, ref short dac_dir);
99	short fget_analog_direction(short ax, ref short dac_dir);
100	set_enc_open_check_para
101	get_enc_open_check_para
102	short set_amp_enable_level(short ax, short level);
103	short fset_amp_enable_level(short ax, short level);
104	short get_amp_enable_level(short ax, ref short level);
105	short fget_amp_enable_level(short ax, ref short level);
106	short set_amp_enable(short ax, short state);
107	short get_amp_enable(short ax, ref short state);
108	short amp_fault_reset(short ax);
109	short amp_fault_set(short ax);
110	short set_control(short ax, short control);
111	short fset_control(short ax, short control);
112	short set_pulse_ratio(short ax, short pgratio);
113	short fset_pulse_ratio(short ax, short pgratio);
114	short get_pulse_ratio(short ax, ref short pgratio);

115	short fget_pulse_ratio(short ax, ref short pgratio);
116	short get_control(short ax, ref short control);
117	short fget_control(short ax, ref short control);
118	short set_electric_gear(short ax, double ratio);
119	short fset_electric_gear(short ax, double ratio);
120	short get_electric_gear(short ax, ref double ratio);
121	short fget_electric_gear(short ax, ref double ratio);
122	short set_step_mode(short ax, short mode);
123	short fset_step_mode(short ax, short mode);
124	short get_step_mode(short ax, ref short mode);
125	short fget_step_mode(short ax, ref short mode);
126	short set_sync_map_axes(short Master, short Slave);
127	short set_sync_control(short condition);
128	short get_sync_control(ref short condition);
129	short set_sync_gain(int syncgain);
130	short fset_sync_gain(int syncgain);
131	short get_sync_gain(ref int syncgain);
132	short fget_sync_gain(ref int syncgain);
133	short set_sync_control_ax(short ax, short enable, short master_ax, int gain);
134	short get_sync_control_ax(short ax, ref short enable, ref short master_ax, int[] gain);
135	short set_pause_control(short bn, short enable, int io_bit);
136	short compensation_pos(short len, short[] ax, double[] pos, short[] acc);
137	short version_chk(short bn, ref short ver);
138	short mmcsww_version_chk(ref short ver);
139	short set_mmcsww_version(short bn);
140	short set_mmc_led_num(short bn);
141	short get_mmc_led_num(short bn, ref short led_num);
142	short set_mmc_parameter_init(short ax);
143	short mmc_dwell(short ax, int duration);
144	short mmc_io_trigger(short ax, short bitNo, short state);
145	short mmcDelay(int duration);
146	short get_gain(short ax, out int[] coeff);
147	short fget_gain(short ax, out int[] coeff);
148	short set_gain(short ax, ref int[] coeff);
149	short fset_gain(short ax, ref int[] coeff);
150	short get_v_gain(short ax, out int[] coeff);
151	short fget_v_gain(short ax, out int[] coeff);
152	short set_v_gain(short ax, ref int[] coeff);
153	short fset_v_gain(short ax, ref int[] coeff);

154	short set_p_integration(short ax, short mode);
155	short fset_p_integration(short ax, short mode);
156	short get_p_integration(short ax, ref short mode);
157	short fget_p_integration(short ax, ref short mode);
158	short set_v_integration(short ax, short mode);
159	short fset_v_integration(short ax, short mode);
160	short get_v_integration(short ax, ref short mode);
161	short fget_v_integration(short ax, ref short mode);
162	short set_friction_gain(short ax, int gain);
163	short fset_friction_gain(short ax, int gain);
164	short get_friction_gain(short ax, ref int gain);
165	short fget_friction_gain(short ax, ref int gain);
166	short set_friction_range(short ax, double range);
167	short fset_friction_range(short ax, double range);
168	short get_friction_range(short ax, ref double range);
169	short fget_friction_range(short ax, ref double range);
170	short set_home(short ax, short act);
171	short fset_home(short ax, short act);
172	short get_home(short ax, ref short act);
173	short fget_home(short ax, ref short act);
174	short set_home_level(short ax, short level);
175	short fset_home_level(short ax, short level);
176	short get_home_level(short ax, ref short level);
177	short fget_home_level(short ax, ref short level);
178	short set_index_required(short ax, short index);
179	short fset_index_required(short ax, short index);
180	short get_index_required(short ax, ref short index);
181	short fget_index_required(short ax, ref short index);
182	uint get_linear_address(short bd_num); // for flashrom down;
183	string _error_message(short code);
184	short mmc_initx(short len, long[] dp_addr);
185	short get_mmc_init_chkx();
186	short set_mmc_init_chkx(short bn, short val);
187	short io_interrupt_enable(short bn, short state);
188	short fio_interrupt_enable(short bn, short state);
189	short io_interrupt_on_stop(short ax, short state);
190	short fio_interrupt_on_stop(short ax, short state);
191	short io_interrupt_on_e_stop(short ax, short state);
192	short fio_interrupt_on_e_stop(short ax, short state);

193	short io_interrupt_pcirq(short bn, short state);
194	short fio_interrupt_pcirq(short bn, short state);
195	short io_interrupt_pcirq_eoi(short bn);
196	short set_timer(short bn, int time);
197	short get_timer(short bn, ref int time);
198	short set_control_timer(short bn, short time);
199	short fset_control_timer(short bn, short time);
200	short get_control_timer(short bn, ref short time);
201	short fget_control_timer(short bn, ref short time);
202	short set_control_timer_ax(short ax, double time);
203	short fset_control_timer_ax(short ax, double time);
204	short get_control_timer_ax(short ax, ref double time);
205	short fget_control_timer_ax(short ax, ref double time);
206	short frames_interpolation(short ax);
207	short set_interpolation(short Len, short[] ax, int[] idelt_s, short flag);
208	short get_io_num(short ax, ref short val);
209	short home_switch(short ax);
210	short pos_switch(short ax);
211	short neg_switch(short ax);
212	short amp_fault_switch(short ax);
213	short set_io(short port, int value);
214	short get_io(short port, ref int value);
215	short get_out_io(short port, ref int[] value);
216	short set_bit(short bitNo);
217	short reset_bit(short bitNo);
218	short set_io_mode(short bd_num, short mode);
219	short fset_io_mode(short bd_num, short mode);
220	short get_io_mode(short bd_num, ref short mode);
221	short fget_io_mode(short bd_num, ref short mode);
222	short position_compare(short index_sel, short index_num, short bitNo, short ax1, short ax2, short latch, short function, short out_mode, double pos, int time);
223	short position_compare_interval(short dir, short ax, short bitNo, double startpos, double limitpos, int interval, int time);
224	short position_compare_enable(short bn, short flag);
225	short position_compare_index_clear(short bn, short index);
226	short position_compare_init(short index_sel, short ax1, short ax2);
227	short position_compare_read(short index_sel, short ax, ref double pos);
228	short position_io_onoff(short pos_num, short bitNo, short ax, double pos, short encflag);
229	short position_io_allclear(short ax);

230	short position_io_clear(short ax, short pos_num);
231	short set_positive_sw_limit(short ax, double limit, short action);
232	short fset_positive_sw_limit(short ax, double limit, short action);
233	short get_positive_sw_limit(short ax, ref double limit, ref short action);
234	short fget_positive_sw_limit(short ax, ref double limit, ref short action);
235	short set_negative_sw_limit(short ax, double limit, short action);
236	short fset_negative_sw_limit(short ax, double limit, short action);
237	short get_negative_sw_limit(short ax, ref double limit, ref short action);
238	short fget_negative_sw_limit(short ax, ref double limit, ref short action);
239	short get_accel_limit(short ax, ref short limit);
240	short fget_accel_limit(short ax, ref short limit);
241	short set_accel_limit(short ax, short limit);
242	short fset_accel_limit(short ax, short limit);
243	short get_vel_limit(short ax, ref double limit);
244	short fget_vel_limit(short ax, ref double limit);
245	short set_vel_limit(short ax, double limit);
246	short fset_vel_limit(short ax, double limit);
247	short set_positive_limit(short ax, short act);
248	short fset_positive_limit(short ax, short act);
249	short get_positive_limit(short ax, ref short act);
250	short fget_positive_limit(short ax, ref short act);
251	short set_negative_limit(short ax, short act);
252	short fset_negative_limit(short ax, short act);
253	short get_negative_limit(short ax, ref short act);
254	short fget_negative_limit(short ax, ref short act);
255	short set_in_position(short ax, double pos);
256	short fset_in_position(short ax, double pos);
257	short get_in_position(short ax, ref double pos);
258	short fget_in_position(short ax, ref double pos);
259	short set_error_limit(short ax, double limit, short action);
260	short fset_error_limit(short ax, double limit, short action);
261	short get_error_limit(short ax, ref double limit, ref short action);
262	short fget_error_limit(short ax, ref double limit, ref short action);
263	short set_positive_level(short ax, short level);
264	short fset_positive_level(short ax, short level);
265	short get_positive_level(short ax, ref short level);
266	short fget_positive_level(short ax, ref short level);
267	short set_negative_level(short ax, short level);
268	short fset_negative_level(short ax, short level);

269	short get_negative_level(short ax, ref short level);
270	short fget_negative_level(short ax, ref short level);
271	short AxisPowerOnCheck(short ax);
272	short start_move(short ax, double pos, double vel, short acc);
273	short move(short ax, double pos, double vel, short acc);
274	short start_r_move(short ax, double pos, double vel, short acc);
275	short r_move(short ax, double pos, double vel, short acc);
276	short start_s_move(short ax, double pos, double vel, short acc);
277	short s_move(short ax, double pos, double vel, short acc);
278	short start_rs_move(short ax, double pos, double vel, short acc);
279	short rs_move(short ax, double pos, double vel, short acc);
280	short start_t_move(short ax, double pos, double vel, short acc, short dcc);
281	short t_move(short ax, double pos, double vel, short acc, short dcc);
282	short start_ts_move(short ax, double pos, double vel, short acc, short dcc);
283	short ts_move(short ax, double pos, double vel, short acc, short dcc);
284	short start_tr_move(short ax, double pos, double vel, short acc, short dcc);
285	short tr_move(short ax, double pos, double vel, short acc, short dcc);
286	short start_trs_move(short ax, double pos, double vel, short acc, short dcc);
287	short trs_move(short ax, double pos, double vel, short acc, short dcc);
288	short start_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc);
289	short move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc);
290	short start_s_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc);
291	short s_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc);
292	short start_t_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc, short[] dcc);
293	short t_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc, short[] dcc);
294	short start_ts_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc, short[] dcc);
295	short ts_move_all(short len, short[] ax, double[] pos, double[] vel, short[] acc, short[] dcc);
296	short wait_for_done(short ax);
297	short wait_for_all(short len, short[] ax);
298	short v_move(short ax, double vel, short acc);
299	short v_move_stop(short ax);
300	short map_axes(short n_axes, short[] map_array);
301	short set_move_speed(double speed);
302	short set_move_accel(short acc);
303	short set_arc_division(double degrees);
304	short all_done();
305	short set_spl_auto_off(short bd_num, short mode);
306	short move_2(double x, double y);
307	short move_2ax(short ax1, short ax2, double x, double y, double vel, short acc);

308	short move_2axgr(short gr, short ax1, short ax2, double x, double y, double vel, short acc);
309	short move_3(double x, double y, double z);
310	short move_3ax(short ax1, short ax2, short ax3, double x, double y, double z, double vel, short acc);
311	short move_3axgr(short gr, short ax1, short ax2, short ax3, double x, double y, double z, double vel, short acc);
312	short move_4(double x, double y, double z, double w);
313	short move_4ax(short ax1, short ax2, short ax3, short ax4, double x, double y, double z, double w, double vel, short acc);
314	short move_4axgr(short gr, short ax1, short ax2, short ax3, short ax4, double x, double y, double z, double w, double vel, short acc);
315	short move_n(double[] x);
316	short move_nax(short len, short[] ax, double[] pos, double vel, short acc);
317	short smove_2(double x, double y);
318	short smove_2ax(short ax1, short ax2, double x, double y, double vel, short acc);
319	short smove_2axgr(short gr, short ax1, short ax2, double x, double y, double vel, short acc);
320	short smove_3(double x, double y, double z);
321	short smove_3ax(short ax1, short ax2, short ax3, double x, double y, double z, double vel, short acc);
322	short smove_3axgr(short gr, short ax1, short ax2, short ax3, double x, double y, double z, double vel, short acc);
323	short smove_4(double x, double y, double z, double w);
324	short smove_4ax(short ax1, short ax2, short ax3, short ax4, double x, double y, double z, double w, double vel, short acc);
325	short smove_4axgr(short gr, short ax1, short ax2, short ax3, short ax4, double x, double y, double z, double w, double vel, short acc);
326	short smove_n(double[] x);
327	short smove_nax(short len, short[] ax, double[] pos, double vel, short acc);
328	short arc_2(double x_center, double y_center, double angle);
329	short arc_2ax(short ax1, short ax2, double x_center, double y_center, double angle, double vel, short acc);
330	short arc_3(double x_center, double y_center, double angle, double[] pos);
331	short arc_3ax(short ax1, short ax2, short ax3, double x_center, double y_center, double angle, double[] pos, double vel, short acc);
332	short spl_line_move1(double[] pnt, double vel, short acc);
333	short spl_line_move1ax(short ax1, double[] pnt, double vel, short acc);
334	short spl_auto_line_move1ax(short ax1, double[] pnt, double vel, short acc, short auto_flag);
335	short spl_line_move2(double[] pnt, double vel, short acc);
336	short spl_line_move2ax(short ax1, short ax2, double[] pnt, double vel, short acc);
337	short spl_auto_line_move2ax(short ax1, short ax2, double[] pnt, double vel, short acc, short auto_flag);
338	short spl_line_move3(double[] pnt, double vel, short acc);

339	short spl_line_move3ax(short ax1, short ax2, short ax3, double[] pnt, double vel, short acc);
340	short spl_auto_line_move3ax(short ax1, short ax2, short ax3, double[] pnt, double vel, short acc, short auto_flag);
341	short spl_line_movenax(short len, short[] ax, double[] pnt, double vel, short acc);
342	short spl_auto_line_movenax(short len, short[] ax, double[] pnt, double vel, short acc, short auto_flag);
343	short spl_arc_move2(double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
344	short spl_arc_deg_move2(double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
345	short spl_arc_move2ax(short ax1, short ax2, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
346	short spl_arc_deg_move2ax(short ax1, short ax2, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
347	short spl_auto_arc_move2ax(short ax1, short ax2, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
348	short spl_auto_arc_deg_move2ax(short ax1, short ax2, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
349	short spl_arc_move3(double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
350	short spl_arc_deg_move3(double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
351	short spl_arc_move3ax(short ax1, short ax2, short ax3, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
352	short spl_arc_deg_move3ax(short ax1, short ax2, short ax3, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
353	short spl_auto_arc_move3ax(short ax1, short ax2, short ax3, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
354	short spl_auto_arc_deg_move3ax(short ax1, short ax2, short ax3, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
355	short spl_arc_movenax(short len, short[] ax, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
356	short spl_arc_deg_movenax(short len, short[] ax, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir);
357	short spl_auto_arc_movenax(short len, short[] ax, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
358	short spl_auto_arc_deg_movenax(short len, short[] ax, double x_center, double y_center, double[] pnt, double vel, short acc, short cdir, short auto_flag);
359	short rect_move(short ax1, short ax2, double[] pnt, double vel, short acc);
360	short spl_move_data(short spl_num, short len, short ax1, short ax2, short ax3, double[] pnt1, double[] pnt2, double[] pnt3, double vel, short acc);
361	short spl_movex(short spl_num, short ax1, short ax2, short ax3);

362	short spl_move(short len, short ax1, short ax2, short ax3, double[] pnt1, double[] pnt2, double[] pnt3, double vel, short acc);
363	short get_spline_move_num(short bd_num, ref short num);
364	short set_sensor_auto_off(short ax, short off);
365	short fset_sensor_auto_off(short ax, short off);
366	short get_sensor_auto_off(short ax, ref short off);
367	short fget_sensor_auto_off(short ax, ref short off);
368	short set_servo_linear_flag(short ax, short l_flag);
369	short fset_servo_linear_flag(short ax, short l_flag);
370	short get_servo_linear_flag(short ax, ref short l_flag);
371	short fget_servo_linear_flag(short ax, ref short l_flag);
372	short in_sequence(short ax);
373	short in_motion(short ax);
374	short in_position(short ax);
375	short motion_done(short ax);
376	short axis_done(short ax);
377	short axis_state(short ax);
378	short axis_source(short ax);
379	long axis_sourcex(short ax);
380	short clear_status(short ax);
381	short frames_clear(short ax);
382	short frames_left(short ax);
383	short set_endless_rotationax(short ax, short status, short resolution);
384	short fset_endless_rotationax(short ax, short status, short resolution);
385	short get_endless_rotationax(short ax, ref short status);
386	short fget_endless_rotationax(short ax, ref short status);
387	short set_endless_linearax(short ax, short status, short resolution);
388	short fset_endless_linearax(short ax, short status, short resolution);
389	short get_endless_linearax(short ax, ref short status);
390	short fget_endless_linearax(short ax, ref short status);
391	short set_endless_range(short ax, double range);
392	short fset_endless_range(short ax, double range);
393	short get_endless_range(short ax, ref double range);
394	short fget_endless_range(short ax, ref double range);
395	short set_linear_all_stop_flag(short bd_num, short mode);
396	short get_linear_all_stop_flag(short bd_num, ref short mode);
397	short axis_all_status(short ax, ref short[] istatus, ref int[] lstatus, ref double[] dstatus);
398	short set_stop(short ax);
399	short set_stop_rate(short ax, short rate);

400	short fset_stop_rate(short ax, short rate);
401	short get_stop_rate(short ax, ref short rate);
402	short fget_stop_rate(short ax, ref short rate);
403	short set_e_stop(short ax);
404	short set_e_stop_rate(short ax, short rate);
405	short fset_e_stop_rate(short ax, short rate);
406	short get_e_stop_rate(short ax, ref short rate);
407	short fget_e_stop_rate(short ax, ref short rate);
408	short get_counter(short ax, ref double pos);
409	short get_sync_position(ref double pos_m, ref double pos_s);
410	short set_position(short ax, double pos);
411	short get_position(short ax, ref double pos);
412	short get_fast_position(short ax, ref double pos);
413	short set_command(short ax, double pos);
414	short get_command(short ax, ref double pos);
415	short get_error(short ax, ref double error);
416	short get_com_velocity(short ax);
417	short get_act_velocity(short ax);
418	short arm_latch(short bn, short state);
419	short latch_status(short bn);
420	short get_latched_position(short ax, ref double pos);
421	short latch(short bn);
422	short get_command_rpm(short ax, ref short rpm_val);
423	short get_encoder_rpm(short ax, ref short rpm_val);
424	short set_abs_encoder_type(short ax, short type);
425	short get_abs_encoder_type(short ax, ref short type);
426	short set_amp_resolution(short ax, short resolution);
427	short fset_amp_resolution(short ax, short resolution);
428	short get_amp_resolution(short ax, ref short resolution);
429	short fget_amp_resolution(short ax, ref short resolution);
430	short set_amp_resolution32(short ax, int resolution);
431	short fset_amp_resolution32(short ax, int resolution);
432	short get_amp_resolution32(short ax, ref int resolution);
433	short fget_amp_resolution32(short ax, ref int resolution);
434	short set_collision_prevent_flag(short bd_num, short mode);
435	short get_collision_prevent_flag(short bd_num, ref short mode);
436	short set_collision_prevent(short max, short sax, short add_sub, short non_equal, double c_pos);
437	short set_collision_prevent_ax(short ax, short enable, short slave_ax, short add_sub, short non_equal, double c_pos, short type);

438	short get_collision_prevent_ax(short ax, ref short enable);
439	short get_collision_position(short ax, ref double position);
440	short get_teachposition(short ax, ref double position);
441	short set_fast_read_encoder(short ax, short status);
442	short get_fast_read_encoder(short ax, ref short status);
443	short set_encoder_ratioa(short ax, short ratioa);
444	short fset_encoder_ratioa(short ax, short ratioa);
445	short get_encoder_ratioa(short ax, ref short ratioa);
446	short fget_encoder_ratioa(short ax, ref short ratioa);
447	short set_encoder_ratiob(short ax, short ratiob);
448	short fset_encoder_ratiob(short ax, short ratiob);
449	short get_encoder_ratiob(short ax, ref short ratiob);
450	short fget_encoder_ratiob(short ax, ref short ratiob);
451	short Find_Bd_Jnt(short ax, ref short board, ref short joint);
452	short motion_fpga_version_chk(short bn, ref short ver);
453	short option_fpga_version_chk(short bn, ref short ver);
454	short set_option_io(short port, int value);
455	short get_option_io(short port, ref int value);
456	short get_option_out_io(short port, ref int[] value);
457	short set_option_bit(short bitNo);
458	short reset_option_bit(short bitNo);
459	short position_compare_reset(short bn);
460	short position_compare_bit(short bdNum, short bitNum, short OnOff);
461	short set_mpg_velocity(short mpg_vel);
462	short get_mpg_velocity(ref short mpg_vel);
463	short set_mpg_enable(short ax, short state);
464	short get_mpg_enable(short ax, ref short state);