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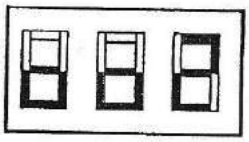
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(2). Press the <ENTER> key to enter parameter programming and to display the first function of the cycle. If the first function is to be deleted, proceed to step (3). Otherwise, press the <ENTER> key as many time as is necessary to display the code corresponding to the function to be deleted. The display shows the function code, and the green lamp corresponding to the function blinks.

(3). Press the <DEL> key to delete the current function from the cycle. The associated parameters are automatically deleted. Immediately after having pressed the <DEL> key, the function following the step which has just been deleted is displayed and its associated green lamp blinks.

(4). Should another step need to be deleted, proceed from step (2) or (3) again.

(5). To exit the program, press the <ENTER> key until the end of cycle is reached and the display returns to standby, or press the <START/STOP> key to return immediately to standby.

Note: It is possible to delete in one go all functions of the cycle, from the current step to the end of cycle. To do so, once the first function to be deleted is displayed (the function code is displayed and the corresponding green lamps blink), press the <END> key. All steps from the current to the end of the program are deleted.

11. REMOTE CONTROL THROUGH RS232 SERIAL INTERFACE

All RC spin coaters can be remote controlled by an external ("host") computer through a RS232C serial interface. Remote control is available as standard on all spin coaters.

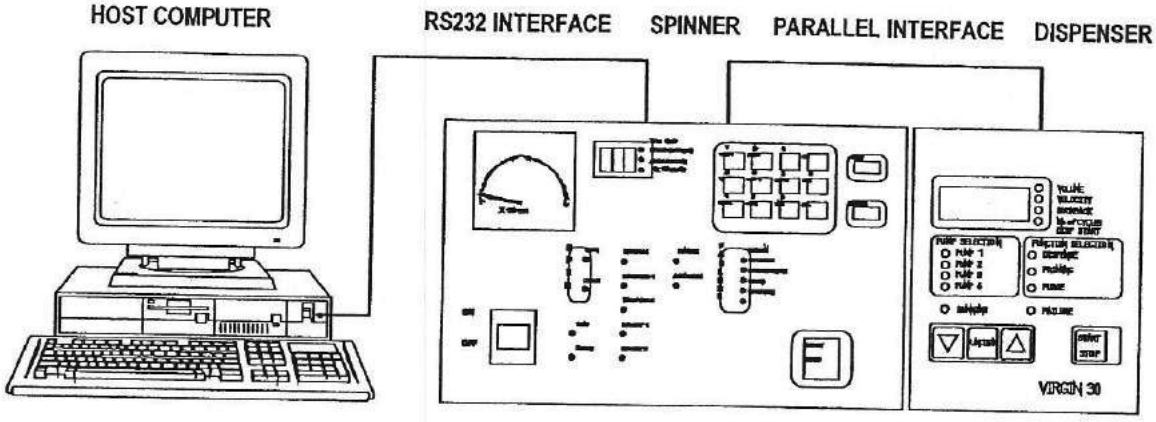


Figure 49: RS232 Interface

This chapter describes:

1. The connection between the host computer and the spin coater.
2. The communication protocol

IMPORTANT REMARKS

In order to be identified by the spin coater, each command must be terminated with the symbol Cr (0x0d). The command acknowledgement is also terminated by the characters CrLf (0x0d 0x0a). If the address of the RS interface is set in the configuration parameters, its ASCII code must come before each remote command.

11.1 CONNECTION

The RS232C connector of the spin coater is an SUBD 15. The following diagram shows the interconnection between this connector and the connector of the host computer. The connector of the host computer can either be an SUBD9 or an SUBD25.

Connector configuration RS 232 C on the spin coater.

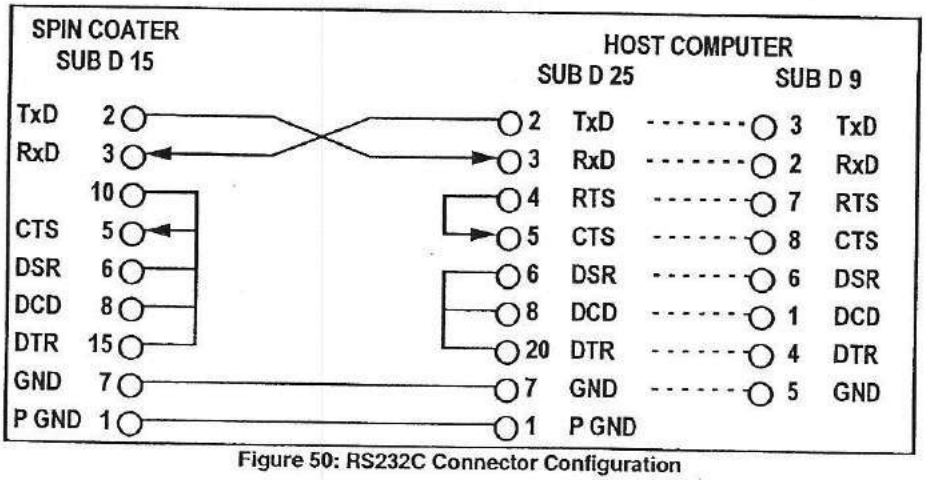


Figure 50: RS232C Connector Configuration

11.2 TRANSMISSION FORMAT

The transmission format is as follows:

8 bits,
1 Stop Bit,
No parity,
9600 Baud.

11.3 PROTOCOL DEFINITION

Each command sent by the host to the spin coater must end with the terminator CarriageReturn (Cr). Each acknowledgement sent by the spin coater to the host ends with the terminator CarriageReturn LineFeed (CrLf). The ASCII code for CarriageReturn is 0x0D (hexadecimal) or 14 (decimal). The ASCII code for LineFeed is 0x0A (hexadecimal) or 10 (decimal).

The remote control commands can be arranged in three categories:

1. Cycle programming commands
2. Cycle execution commands
3. Status commands

The error codes sent to the host computer by the spin coater controller are shown in the 'ERROR LIST' table.

11.3.1 CYCLE PROGRAMMING COMMANDS

To enter programming, the cycle number must be selected (**P0** to **P9**). Then, the controller is ready to receive programming commands.

Note: When programming cycle '1' or cycle '9', which are cycles with a pre-set sequence of functions, only the parameters can be modified through the interface. Refer to the function list, earlier in this manual, for further information about the function description.

To exit programming mode, the host must send the command '**FIN**'. No more than thirty (30) steps can be programmed in a complete cycle (parameters are not to be considered as cycle steps). The number of steps corresponds to the number of function codes included between the command **Px** and the command **FIN**. The following list gives the syntax of the commands for programming a spin coater cycle:

Command Syntax (Host Computer)	Acknowledgement (Spinner)	Description
Px (x= cycle number (0-9))	MPx (x= Cycle number)	Enter the Programming mode, and Select Cycle number
!	C0	Clear function list of the current cycle
1 sss aaa sss= speed aaa= Acceleration	C1	Enter function1 (spinning with cover closed) and its parameters.
2 sss aaa sss= speed aaa= Acceleration	C2	Enter function2 (spinning with cover opened) and its parameters.
12 sss aaa sss= speed aaa= Acceleration	C12	Enter function12 (spinning with cover closed and gyrset opened) and its parameters. This function is available only for spinner with indexed gyrset
3 ttt ttt = time (001-999)	C3	Enter function3 (time) and its parameter.
33	C33	Enter function33 (Wait) with no parameter
4 ttt ttt = time (001-999)	C4	Enter function4 (nitrogen blow-off) and its parameter.
5 ttt ttt = time (001-999)	C5	Enter function5 (Solvent1 dispense) and its parameter.
6 ttt ttt = time (001-999)	C6	Enter function6 (Solvent2 dispense) and its parameter.
55 ttt ttt = time (001-999)	C55	Enter function55 (Solvent3 dispense) and its parameter.
66 ttt ttt = time (001-999)	C66	Enter function66 (Solvent4 dispense) and its parameter.
7	C7	Enter function7 (Dispenser1)
8	C8	Enter function8 (Dispenser2)
77	C77	Enter function77 (Dispenser3)
88	C88	Enter function88 (Dispenser4)
10 xxx yyy xxx=Time between 2 cycles yyy=Number of Processes between 2 cycles	C10	Enter frequency parameters of the automatic machine cleaning cycle. Must be first command of cycle9.
FIN	FCx x=current cycle number (0-9)	Exit the programming mode
?	STEP n : f 111 222 STEP n : f 111 222 Cx n= step (0 to 9) f= function code (1-9) 111= parameter1 (function 1-6) 222= parameter2 (function 1-2) x= number of steps + 1	Request Function List of the Current Cycle. In the acknowledgement, the Cycle Steps are separated with character Cr Lf (0x0d 0x0a).

Note: with a motorised arm, fluid functions need 3 parameters (arm start, arm end and arm speed).

Command Syntax (Host Computer)	Acknowledgement (Spin Coater)	Description
4 sss eee aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C4	Enter function4 (nitrogen blow-off) and its parameter.
5 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C5	Enter function5 (Solvent1 dispense) and its parameter.
6 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C6	Enter function6 (Solvent2 dispense) and its parameter.
55 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C55	Enter function55 (Solvent3 dispense) and its parameter.
66 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C66	Enter function66 (Solvent4 dispense) and its parameter.
7 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C7	Enter function7 (Dispenser1)
8 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C8	Enter function8 (Dispenser2)
77 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C77	Enter function77 (Dispenser3)
88 sss ddd aaa sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C88	Enter function88 (Dispenser4)
9 ff 0/1 ff=fluid code (0..13) 0: nitrogen 1: dispenser 1 (Swinging Resist) 2: dispenser 2 3: dispenser 3 4: dispenser 4 5: solvent 1 (Machine autoclean) 6: solvent 2 (Edge Bead Remover) 7: solvent 3 (Cotton Candy Remover) 8: solvent 4 (Back Side Rinse)	C9	Fluid activation

9: solvent 5 (Dispenser Nozzle Rinse) 10: solvent 6 11: solvent 7 12: solvent 8 (unused) 0/1 = a flag 1: enable fluid (turn valve ON or start dispense) 0: disable fluid (turn valve OFF or wait end of dispense)		
99 ppp sss 0/1 ppp = an absolute position (0.999) sss = a arm speed (0..500) 0/1 = a flag 1: wait trajectory complete (arm stop) 0: start movement and continue on next step	C99	Arm move
56 cc sss ddd aaa cc=code for solvent (1..8) 1: solvent 1 (Machine autoclean) 2: solvent 2 (Edge Bead Remover) 3: solvent 3 (Cotton Candy Remover) 4: solvent 4 (Back Side Rinse) 5: solvent 5 (Dispenser Nozzle Rinse) 6: solvent 6 7: solvent 7 8: solvent 8 (stream) sss=substrate start diameter (0..parameter #16) eee=substrate end diameter (0..parameter #16) aaa=arm speed (0-500)	C56	Solvent

11.3.2 CYCLE EXECUTION COMMANDS

Before executing a cycle, the mode **CY** must be selected. The controller status is **MCY**. Then, the host gives the number of the cycle to start. The controller responds with **Cn** and executes the cycle.

The controller status is: **'EXE'** during execution, **Exx** if an error occurs or **MCY** if the cycle is finished.

The host asks for the controller status with the **ST** command. So the host repeats the **ST** command until the controller status becomes **MCY** (the cycle has finished correctly) or **Exx** (an error has occurred). To exit execution mode, the host must send the command **FIN**. During execution a cycle can be stopped by the host with the **AR** command. It generates the **E99** error.

When an error occurs the host must send the **QE** command. The controller returns **E00** and reinitialises the spin coater. The controller status becomes **IN0** during initialisation then **IN1** when the controller is ready.

Note: Remark: if a cycle is longer than 30 steps, several cycles can be chained without stopping the chuck rotation. To do that a substrate needs to be loaded on the chuck as the controller status is **IN1**. The host enters the mode with the **CY 1** command (the parameter **one** is added to the **CY** command). Then the host sends the number of the first cycle to be executed, asks the status until the controller returns to **MCY**, resumes with the number of the second cycles to be executed, ends the chaining with the **FIN** command.

The following commands control the execution of the cycles.

Command Syntax (Host Computer)	Acknowledgement (Spinner)	Description
CY	MCY	Select Cycle Exec mode
X ST	Cx Start cycle X EXE No Error MCY Cycle x is complete	Execute cycle number #x, error code is returned.
QE	E00 No error was declared E55 Error clearing complete	Clear the error code. Allow to start cycle again
AR	E99 Cycle was still running E55 Cycle was not running	Stop the current cycle execution
FIN	FCY	Exit Cycle Exec mode

11.3.3 STATUS REQUEST COMMANDS

The following commands return the status of the spin coater, such as;

a. Ready to execute a cycle;
b. Cycle execution in progress;
c. Cycle programming in progress; etc

Command Syntax (Host Computer)	Acknowledgement (Spinner)	Description
ST	IN0 Device not initialised. IN1 Device ready. DB Device in debug mode. CL Device in keyboard mode. EXE Cycle execution. MPx Cycle x programming. MCY Cycle selection. Exx Error n° xx (See error list).	Spin coater status
SU	WA0 No substrate on chuck. WA1 Substrate on device	Check substrate presence on spinning chuck. This request can be sent only if system is ready (IN1)

11.3.4 MISCELLANEOUS COMMANDS

These commands are available only if the spinner status is In1.

RD_PIA n

Reads the hardware inputs where **n** is the number of the PIA ©. The parameter n varies between 0 and 4 depending on which IC is read. The Spinner response takes the form **PIA n aa bb** where **n** is the number of the PIA read, **aa** is the value in hexa of port A, and **bb** is the value in hexa of port B.

RD_PAR [nn]

If nn is not entered, this reads the number of configuration parameters. Today, there are 71 parameters but this number may increase.

Otherwise, **nn** represents the number of the parameter whose value is to be read. The acknowledgement is **Pnn ppp min max** where **ppp** is the value of the parameter **nn, min** is the minimum value for the parameter **nn, max** is the maximum value for the parameter **nn**. min and max depends on the hardware configuration and on the value of the others parameters.

WR_PAR nn vvv

This is the command to change the value of parameter **nn** by **vvv. vvv** must be between **min** and **max**. It is a good idea to first read the min and max values of a parameter before writing it. The acknowledgement is the same as for **RD_PAR nn** command.

Example

Command	Acknowledgement
RD_PAR	71
RD_PAR 20	P20 400 0 999
WR_PAR 20 500	P20 500 0 999

VER

Returns the firmware of the CT62: version + date

INIT

Returns **E00** then forces the spinner to initialise as when one powers on. Checks the status to await the end of the initialisation.

REM 0/1

Turns remote control of the spinner OFF/ON. **"REM 1"** returns **"MR1"**, **"REM 0"** returns **"MR0"**.
When control is remote, the keyboard of CT62 is disabled, 3 digit display is OFF, and paddle is disabled. Operator cannot use the spinner by hand. Spinner status becomes **"MRE"**.

11.3.5 VIRGIN PUMP CONTROL THROUGH THE SPINNER RS INTERFACE

The Virgin pump must be connected to the main RS port, host to the auxiliary RS port. Machine parameter v = 3. While the spinner is on stand-by (status = IN1), the host can communicate with the Virgin pump by first sending the character # (ASCII code 23) before a Virgin command. Then it waits the acknowledgement of the Virgin pump. For example, the host sends **"#?S"** to the spinner to request the Virgin status.

11.4 REMOTE CONTROL EXAMPLES

11.4.1 EXAMPLE 1: PROGRAMMING CYCLE '9'

Host Command	Spin Coater Acknowledgement	Comments
ST		Status request.
	IN1	System ready to run.
P9		Enter the Cycle programming mode for cycle9.
	MP9	Cycle9 Programming mode validated.
I	C0	Reset the current cycle.
?		Request for the list of sequence for the current cycle.
	STEP 0: 10 0 0	cleaning cycle disabled.
	STEP 1: 2 0 0	spinning cover opened sequence.
	STEP 2: 5 0	solvent 1 sequence.
	STEP 3: 1 0 0	spinning cover closed sequence for spreading.
	STEP 4: 3 0	delay sequence.
	STEP 5: 1 0 0	spinning cover closed sequence for cleaning and drying.
	STEP 6: 3 0	delay sequence.
	STEP 7: 0	end of cycle.
	C6	
10 60 10		Program function #10 (cleaning cycle parameters) cycle 9 running every 60 seconds or every 10 cycles
	C 10	Command acknowledgement (no error).
2 50 5		Program function2 (Spin with cover open, speed 500 rpm, acceleration 500 rpm/sec).
	C2	Command acknowledgement (no error).
5 10		Program function5 (solvent 1 dispense, duration 10 sec)
	C5	Command acknowledgement (no error)
1 50 5		Program finction1 (spin with cover closed, speed 500 rpm, acceleration 500 rpm/s.
	C1	Command acknowledgement (no error)
3 5		Program function3 (time, duration 5 sec).
	C3	Command acknowledgement (no error).
1 300 30		Program function1 (Spin with cover closed, speed 3000 rpm, acceleration 3000 rpm/sec).
	C1	Command acknowledgement (no error).
3 15		Program function3 (time, duration 15 sec).
	C3	Command acknowledgement (no error).
FIN		exit programming mode
	FP9	
ST		Status Request
	IN1	System ready

11.4.2 EXAMPLE 2: PROGRAMMING CYCLE '5'

Host Command	Spin Coater Acknowledgement	Comments
ST		Status request
	IN1	System ready to operate
P5		Enter the Cycle programming mode for cycle5
	MP5	Cycle5 Programming mode validated
!		Reset the current cycle
	C0	
?		Request for the list of sequence for the current cycle.
	STEP 0: 0	cycle empty.
	C0	End of the list.
ST		Status request
	MP5	System ready to receive a cycle programming command
2 50 50		Program function2 (Spin with cover open)
		speed: 500 rpm, acceleration: 5000 rpm/sec
	C2	Command acknowledgement (no error)
3 10		Program function3 (Delay sequence, t= 10 seconds)
	C3	Command acknowledgement (no error)
?		Request for sequence list for current cycle
	STEP 0: 2 50 60	
	STEP 1: 3 10 0	
	STEP 2: 0	
	C2	Command acknowledgement (no error)
FIN		end of programming
	FP5	
ST		status request
	IN1	

11.4.3 EXAMPLE 3: EXECUTING A CYCLE

Host Command	Spin Coater Acknowledgement	Comments
CY	MCY	Select the Cycle execution mode
		Cycle number entered later
5		Execute the number cycle 5
	Cx	Cycle complete with no error
	Exx	Cycle aborted by error xx
FIN	FCY	Exit the cycle execution mode

12. CYCLE EXECUTION ERRORS

12.1 RC33, RC16 & RC13

ERR	CAUSE	REMEDY
o02	SW7 ON, Lift pins UP abnormally	Pressure, EV8 OFF, CY2 state, SW7 position, Adjust LIM12, LIM13, Power, Wiring, IC
o03	SW7 OFF, Lift pins not UP	Pressure, EV8 ON, CY2 state, SW7 position, Adjust LIM12, LIM13, Power, Wiring, IC
o04	SW8 ON, Lift pins DOWN abnormally	Pressure, EV8 ON, CY2 state, SW8 position, Adjust LIM12, LIM13, Power, Wiring, IC
o05	SW8 OFF, Lift pins not DOWN	Pressure, EV8 OFF, CY2 state, SW8 position, Adjust LIM12, LIM13, Power, Wiring, IC
o06	MA1 ON, Vacuum abnormally Detected	Remove the wafer, MA1 adjust, EV1 OFF, EV2 ON, Power, Wiring, IC
o07	MA1 OFF, Vacuum not detected	Check the wafer position, MA1 adjust, EV1 ON, EV2 OFF, Power, Wiring, IC
o08	M1, Null motor speed not detected	M1, Power, Wiring, IC
o09	SW5 ON, Arm abnormally OUT	Pressure, EV7 OFF, CY4 state, SW5 position, Adjust LIM10, LIM11, Power, Wiring, IC
o10	SW5 OFF, Arm not OUT	Pressure, EV7 ON, CY4 state, SW5 position, Adjust LIM10, LIM11, Power, Wiring, IC
o11	SW6 ON, Arm abnormally IN	Pressure, EV7 ON, CY4 state, SW6 position, Adjust LIM10, LIM11, Power, Wiring, IC
o12	SW6 OFF, Arm not IN	Pressure, EV7 OFF, CY4 state, SW6 position, Adjust LIM10, LIM11, Power, Wiring, IC
o13	End of dispense not detected	Check dispenser connection, Power, Wiring, IC
o14	SW1 ON, Cover abnormally CLOSED	Pressure, EV4-A OFF, EV4-B ON, CY1 state, SW1 position, Adjust LIM4, LIM5, LIM6, LIM7, Power, Wiring, IC
o15	SW1 OFF, Cover not CLOSED	Pressure, EV4-A ON, EV4-B OFF, CY1 state, SW1 position, Adjust LIM4, LIM5, LIM6, LIM7, Power, Wiring, IC
o16	SW2 ON, Cover abnormally OPENED	Pressure, EV4-A ON, EV4-B OFF, CY1 state, SW2 position, Adjust LIM4, LIM5, LIM6, LIM7, Power, Wiring, IC
o17	SW2 OFF, Cover not OPENED	Pressure, EV4-A OFF, EV4-B ON, CY1 state, SW2 position, Adjust LIM4, LIM5, LIM6, LIM7, Power, Wiring, IC
o18	SW9 ON, Chuck Indexer abnormally OUT	Pressure, EV9 OFF, CY3 state, SW9 position, Adjust LIM14, LIM15, Power, Wiring, IC
o19	SW9 OFF, Chuck Indexer not OUT	Pressure, EV9 ON, CY3 state, SW9 position, Adjust LIM14, LIM15, Power, Wiring, IC
o20	SW10 ON, Chuck Indexer abnormally IN	Pressure, EV9 ON, CY3 state, SW10 position, Adjust LIM14, LIM15, Power, Wiring, IC
o21	SW10 OFF, Chuck Indexer not IN	Pressure, EV9 OFF, CY3 state, SW10 position, Adjust LIM14, LIM15, Power, Wiring, IC
o22	MA2 OFF, Air default in mechanism	Line pressure (5 bar), leakage, MA2 adjust, Power, Wiring, IC
o23	SW17 ON, Alarm1	Alarm1 level, SW17 position, Power, Wiring, IC
o24	SW18 ON, Alarm2	Alarm2 level, SW18 position, Power, Wiring, IC
o25	SW19 ON, Alarm3	Alarm3 level, SW19 position, Power, Wiring, IC
o26	SW2 OFF, Cover not locked	Close the cover, Pressure, EV4-B ON, CY1 state, SW2 position, Power, Wiring, IC
o27	SW2 ON, Cover abnormally locked	Open the cover, Pressure, EV4-B OFF, CY1 state, SW2 position, Power, Wiring, IC
o28	M1, Spinning motor braked	M1, Power, Wiring, IC
o29	M1, Spinning motor variator off	M1, Power, Wiring, IC

ERR	CAUSE	REMEDY
o30	SW15 OFF, Safety door not closed	Close the safety door, EV6 OFF, SW15 position, Power, Wiring, IC
o31	SW3 OFF, Back Side Rinse nozzle not up	Pressure, EV5 ON, CY state, SW3 position, Adjust LIM, Power, Wiring, IC
o32	Dispenser arm initialised but bsr nozzle not up	Pressure, EV5 ON, CY state, SW3 position, Adjust LIM, Power, Wiring, IC
o33	Loader at rest not detected	
o34	Loader at work not detected	
o35	Loader at work vacuum not detected	
o36	Parameter out of use	Check machine parameters
o37	Parameter out of range	Check machine parameters
o40	Undefined sequence	Check the selected step, reset cycle.
o41	Speed out of range	Check the selected speed, machine speed limit
o42	Unknown solvent number	Check machine parameters
o43	Unknown dispenser number	Check machine parameters
o44	Unknown fluid number	Check machine parameters
o46	Zero acceleration	Check the selected acceleration.
o47	Incorrect cycle number	Check program number
o48	End of cycle not detected	Check the selected cycle.
o49	Incorrect column number	Check the selected step, reset cycle.
o50	Incorrect hardware configuration	Check configuration switches
o51	Unknown command	Check the selected cycle, reset cycle.
o52	SW13 OFF, Edge Bead Remover nozzle not UP	Pressure, EV9 OFF, CY6 state, SW13 position, Power, Wiring, IC
o53	Incorrect speed parameter	Check the command
o54	Incorrect acceleration parameter	Check the command
o55	Syntax error or use out of context	Check the command
o56	Incorrect time parameter	Check the command
o57	Too many sequences in cycle	Check the cycle, reset cycle
o58	Incorrect menu choice	Try again.
o59	Incorrect configuration of RS232	Check the configuration.
o60	RS232 does not work properly	Check the connection.
o61	Buffer RS232 FULL	Wait for the execution of the previous command
o62	Arm with 2 positions. Position different to 1 or 2.	Check the cycle, reset cycle
o63	Arm with 6 positions. Position different to 1,2,3,4,5 or 6.	Check the cycle, reset cycle
o64	SW9 OFF, Arm with 6 positions. Position 1 not found.	SW9 position, Power, Wiring, IC
o65	SW20 ON, GYRSET locked abnormally detected	Pressure, CY5 state, EV11 OFF, EV12 ON, SW20 position, Adjust LIM8, LIM9, Power, Wiring, IC
o66	SW20 OFF, GYRSET locked not detected	Pressure, CY5 state, EV11 ON, EV12 OFF, SW20 position, Adjust LIM8, LIM9, Power, Wiring, IC
o67	SW21 ON, GYRSET unlocked abnormally detected	Pressure, CY5 state, EV11 ON, EV12 OFF, SW21 position, Adjust LIM8, LIM9, Power, Wiring, IC
o68	SW21 OFF, GYRSET unlocked not detected	Pressure, CY5 state, EV11 OFF, EV12 ON, SW21 position, Adjust LIM8, LIM9, Power, Wiring, IC

ERR	CAUSE	REMEDY
o69	M1, Motor driver not ready. Overload.	M1, Power, Wiring, IC. Power off/on the machine. Service required if the error remains
o70	Incorrect use of the solvent for washing the gyrset	Close the cover before using this solvent
o71	Substrate diameter out of range	Check the selected diameter, machine parameters
o72	Arm speed out of range	Check the selected arm speed, machine parameters
o73	Arm driver not initialised	Power, Wiring, IC. Power off/on the machine. Service required if the error remains
o74	Internal arm driver register out of range	Check machine parameters
o75	SW13 OFF, Time out while searching for arm home position	M2, SW13 position, Power, Wiring, IC
o76	M2, Time out while arm moving	M2, Power, Wiring, IC
o77	SW12 OFF, Reverse travel stop not enabled	M2, SW12 position, Power, Wiring, IC
o78	SW22 OFF, Forward travel stop not enabled	M2, SW22 position, Power, Wiring, IC
o79	Read/write sequence of arm driver is out	Power, Wiring, IC
o80	M2, Arm motor locked	M2, Power, Wiring, IC
o81	Time out during RS232 communication with VIRGIN pump	Check cable connection, machine parameters both spinner and virgin controller
o82	Suss pump acknowledgement mismatches	Check cable connection, Power, wiring, IC
o83	Suss pump doesn't understand the RS command	Check cable connection, Power, wiring, IC
o84	Arm driver detects position error	Check arm movement, tubes, machine parameters
o99	Program stopped with Start/stop key	Press enter key, Avoid rebond key, Check SW16

When an ERROR is displayed the user must acknowledge by pressing the <ENTER> key, correct the ERROR, then press the <START/STOP> key to restart the cycle.

12.2 RC8

ERR	CAUSE	REMEDY
o02	SW5 ON, Lift pins UP abnormally	Pressure, EV7 OFF, CY2 state, SW5 position, Adjust LIM8, LIM9, Power, Wiring, IC
o03	SW5 OFF, Lift pins not UP	Pressure, EV7 ON, CY2 state, SW5 position, Adjust LIM8, LIM9, Power, Wiring, IC
o04	SW6 ON, Lift pins DOWN abnormally	Pressure, EV7 ON, CY2 state, SW6 position, Adjust LIM8, LIM9, Power, Wiring, IC
o05	SW6 OFF, Lift pins not DOWN	Pressure, EV7 OFF, CY2 state, SW6 position, Adjust LIM8, LIM9, Power, Wiring, IC
o06	MA1 ON, Vacuum abnormally Detected	Remove the wafer, MA1 adjust, EV1 OFF, EV2 ON, Power, Wiring, IC
o07	MA1 OFF, Vacuum not detected	Check the wafer position, MA1 adjust, EV1 ON, EV2 OFF, Power, Wiring, IC
o08	M1, Null motor speed not detected	M1, Power, Wiring, IC
o09	SW3 ON, Arm abnormally OUT	Pressure, EV5 OFF, CY4 state, SW3 position, Adjust LIM6, LIM7, Power, Wiring, IC
o10	SW3 OFF, Arm not OUT	Pressure, EV5 ON, CY4 state, SW3 position, Adjust LIM6, LIM7, Power, Wiring, IC
o11	SW4 ON, Arm abnormally IN	Pressure, EV5 ON, CY4 state, SW4 position, Adjust LIM6, LIM7, Power, Wiring, IC
o12	SW4 OFF, Arm not IN	Pressure, EV5 OFF, CY4 state, SW4 position, Adjust LIM6, LIM7, Power, Wiring, IC
o13	End of dispense not detected	Check dispenser connection, Power, Wiring, IC
o14	SW1 (SW15 with manual cover)) ON, Cover abnormally CLOSED	Pressure, EV4-A OFF, EV4-B ON, CY1 state, SW1 (SW15) position, Adjust LIM4, LIM5, Power, Wiring, IC
o15	SW1 (SW15 with manual cover) OFF, Cover not CLOSED	Pressure, EV4-A ON, EV4-B OFF, CY1 state, SW1 (SW15) position, Adjust LIM4, LIM5, Power, Wiring, IC
o16	SW2 ON, Cover abnormally OPENED	Pressure, EV4-A ON, EV4-B OFF, CY1 state, SW2 position, Adjust LIM4, LIM5, Power, Wiring, IC
o17	SW2 OFF, Cover not OPENED	Pressure, EV4-A OFF, EV4-B ON, CY1 state, SW2 position, Adjust LIM4, LIM5, Power, Wiring, IC
o18	SW7 ON, Chuck Indexer abnormally OUT	Pressure, EV8 OFF, CY3 state, SW7 position, Adjust LIM10, LIM11, Power, Wiring, IC
o19	SW7 OFF, Chuck Indexer not OUT	Pressure, EV8 ON, CY3 state, SW7 position, Adjust LIM10, LIM11, Power, Wiring, IC
o20	SW8 ON, Chuck Indexer abnormally IN	Pressure, EV8 ON, CY3 state, SW8 position, Adjust LIM10, LIM11, Power, Wiring, IC
o21	SW8 OFF, Chuck Indexer not IN	Pressure, EV8 OFF, CY3 state, SW8 position, Adjust LIM10, LIM11, Power, Wiring, IC
o22	MA2 OFF, Air default in mechanism	Line pressure (5 bar), leakage, MA2 adjust, Power, Wiring, IC
o23	SW16 ON, Alarm1	Alarm1 level, SW16 position, Power, Wiring, IC
o24	SW17 ON, Alarm2	Alarm2 level, SW17 position, Power, Wiring, IC
o25	SW18 ON, Alarm3	Alarm3 level, SW18 position, Power, Wiring, IC
o26	SW2 OFF, Cover not locked	Close the cover, Pressure, EV4-B ON, CY1 state, SW2 position, Power, Wiring, IC
o27	SW2 ON, Cover abnormally locked	Open the cover, Pressure, EV4-B OFF, CY1 state, SW2 position, Power, Wiring, IC
o28	M1, Spinning motor braked	M1, Power, Wiring, IC
o29	M1, Spinning motor variator off	M1, Power, Wiring, IC
o30	SW19 OFF, Safety door not closed	Close the safety door, EV9 OFF, SW19 position, Power, Wiring, IC

ERR	CAUSE	REMEDY
o31	SW3 OFF, Back Side Rinse nozzle not up	Pressure, EV5 ON, CY state, SW3 position, Adjust LIM, Power, Wiring, IC
o32	Dispenser arm initialised but back side rinse nozzle not up	Pressure, EV5 ON, CY state, SW3 position, Adjust LIM, Power, Wiring, IC
o33	Loader at rest not detected	
o34	Loader at work not detected	
o35	Loader at work vacuum not detected	
o36	Parameter out of use	Check machine parameters
o37	Parameter out of range	Check machine parameters
o40	Undefined sequence	Check the selected step, reset cycle.
o41	Speed out of range	Check the selected speed, machine speed limit
o42	Unknown solvent number	Check machine parameters
o43	Unknown dispenser number	Check machine parameters
o44	Unknown fluid number	Check machine parameters
o46	Zero acceleration	Check the selected acceleration.
o47	Incorrect cycle number	Check program number
o48	End of cycle not detected	Check the selected cycle.
o49	Incorrect column number	Check the selected step, reset cycle.
o50	Incorrect hardware configuration	Check configuration switches
o51	Unknown command	Check the selected cycle, reset cycle.
o52	SW9 OFF, Edge Bead Remover nozzle not UP	Pressure, EV6 OFF, CY6 state, SW9 position, Power, Wiring, IC
o53	Incorrect speed parameter	Check the command
o54	Incorrect acceleration parameter	Check the command
o55	Syntax error or use out of context	Check the command
o56	Incorrect time parameter	Check the command
o57	Too many sequences in cycle	Check the cycle, reset cycle
o58	Incorrect menu choice	Try again.
o59	Incorrect configuration of RS232	Check the configuration.
o60	RS232 does not work properly	Check the connection.
o61	Buffer RS232 FULL	Wait for the execution of the previous command
o62	Arm with 2 positions. Position different to 1 or 2.	Check the cycle, reset cycle
o63	Arm with 6 positions. Position different to 1,2,3,4,5 or 6.	Check the cycle, reset cycle
o64	SW9 OFF, Arm with 6 positions. Position 1 not found.	SW9 position, Power, Wiring, IC
o65	SW20 ON, GYRSET locked abnormally detected	Pressure, CY5 state, EV11 OFF, EV12 ON, SW20 position, Power, Wiring, IC
o66	SW20 OFF, GYRSET locked not detected	Pressure, CY5 state, EV11 ON, EV12 OFF, SW20 position, Power, Wiring, IC
o67	SW21 ON, GYRSET unlocked abnormally detected	Pressure, CY5 state, EV11 ON, EV12 OFF, SW21 position, Power, Wiring, IC
o68	SW21 OFF, GYRSET unlocked not detected	Pressure, CY5 state, EV11 OFF, EV12 ON, SW21 position, Power, Wiring, IC
o69	M1, Motor driver not ready. Overload.	M1, Power, Wiring, IC. Power off/on the machine. Service required if the error remains

ERR	CAUSE	REMEDY
o70	Incorrect use of the solvent for washing the gyrset	Close the cover before using this solvent
o71	Substrate diameter out of range	Check the selected diameter, machine parameters
o72	Arm speed out of range	Check the selected arm speed, machine parameters
o73	Arm driver not initialised	Power, Wiring, IC. Power off/on the machine. Service required if the error remains
o74	Internal arm driver register out of range	Check machine parameters
o75	SW12 OFF, Time out while searching for arm home position	M2, SW12 position, Power, Wiring, IC
o76	M2, Time out while arm moving	M2, Power, Wiring, IC
o77	SW10 OFF, Reverse travel stop not enabled	M2, SW10 position, Power, Wiring, IC
o78	SW22 OFF, Forward travel stop not enabled	M2, SW22 position, Power, Wiring, IC
o79	Read/write sequence of arm driver is out	Power, Wiring, IC
o80	M2, Arm motor locked	M2, Power, Wiring, IC
o81	Time out during RS232 communication with VIRGIN pump	Check cable connection, machine parameters both spinner and virgin controller
o82	Suss pump acknowledgement mismatches	Check cable connection, Power, wiring, IC
o83	Suss pump doesn't understand the RS command	Check cable connection, Power, wiring, IC
o84	Arm driver detects position error	Check arm movement, tubes, machine parameters
o99	Program stopped with Start/stop key	Press enter key, Avoid rebond key, Check SW23

When an ERROR is displayed the user must acknowledge by pressing the <ENTER> key, correct the ERROR, then press the <START/STOP> key to restart the cycle.

WARNINGS

If connected to a Virgin controller by the RS422, take care of the EPROM version.

CT62V07 is designed to function with version VG30A11 or higher.

VIRGIN serial mode must be RS422.

VIRGIN address must be the same as the address of the dispensers used with the CT62 controller.

VIRGIN host mode must be 2.

APPENDIX I: SPECIFIC SET-UP PARAMETER VALUES

	DESCRIPTION	LIMITS	USUAL	SET
1	Motor type (Time, Acceleration)	1..6	6	
2	Spin Motor Reduction Gear (Time, Speed, Acceleration)	1..999		
3	Maximum spin speed with cover closed (Speed, Close)	0..max speed	700	
4	Maximum spin speed with cover open (Speed, Open)	0..max speed	100	
5	Rotation speed of chuck during indexing sequence (Speed)	10..90 (rpm)	30	
6	Maximum speed of the chuck on the cover closing (Speed, Open, Close)	0..50	0	
7	Maximum acceleration allowed (Acceleration)	1..200	50	
8	Type of the indexed gyrset (Acceleration, Open, Close)	0, 1		
9	Use o the lift pins (Open, Close)	0..3	1	
10	Use of the serial interface ports (Time, Dispenser1, Dispenser2)	0..6	5	
11	Address of the RS232 interface port (Remote)	0..9	0	
12	Number of alarm sensors fitted	0..3	0	
13	Dispense Arm Positioning Type (All leds in 3rd column)	2, 6, 999	999	
14	Number of counts by unity for the arm positions (Arm speed, Substrate size)	1..999	56	
15	Dispenser Arm Home Position (Speed, Substrate Size)	0..999	20	
16	Maximum diameter allowed in mm (Substrate size)	1..999	280	
17	Number of dispenser lines fitted (Dispenser1, Dispenser2)	0..4	3	
18	Machine Auto Clean Solvent1 - Set up (Solvent1, Solvent2)	0..2	1	
19	Arm position for nitrogen blow-off (Nitrogen)	0..999	365	
20	Arm position for Dispenser1 (Dispenser1)	0..999	385	
21	Arm position for Dispenser2 (Dispenser2)	0..999	400	
22	Arm position for Dispenser3 (Dispenser1)	0..999	415	
23	Arm position for Dispenser4 (Dispenser2)	0..999		
24	Arm position for Solvent1 (Solvent1)	0..999	415	
25	Arm position for Solvent2 (Solvent2)	0..999	385	
26	Arm position for Solvent3 (Solvent1)	0..999	400	
27	Arm position for Solvent4 (Solvent2)	0..999	365	
28	Candy Cotton Remover Solvent3 - Set up (Nitrogen, Solvent1)	0..2	1	
29	Edge Bead Remover Solvent2 - Set up (Nitrogen, Solvent2)	0..2	1	
30	Arm speed for the edge bead remover (Arm speed)	1..500		
31	Servicing position (Time, Substrate Size)	0..999	230	
32	Back Side Rinse Solvent4 - Set up (Time, Solvent1))	0..2	1	
33	Return position of the bsr nozzle (Speed, Solvent1)	0..999	100	
34	Dispenser Nozzle Rinse Solvent5 - Set up (Solvent1, Solvent2, Dispenser1)	0..2	0	
35	Arm position to rinse Dispenser1 (Solvent1, Dispenser1)	0..999		
36	Arm position to rinse Dispenser2 (Solvent1, Dispenser2)	0..999		
37	Arm position to rinse Dispenser3 (Solvent1, Dispenser1)	0..999		
38	Arm position to rinse Dispenser4 (Solvent1, Dispenser2)	0..999		
39	Swinging Resist Dispenser1 – Set up (Nitrogen, Dispenser1)	0..2	0	
40	Speed of the swinging resist (Autoclean, Arm speed)	1..500		
41	Index of the swinging resist (Remote, Arm speed)	0..999		
42	Type of Dispenser 1 (Speed, Dispenser1)	0..2	1	
43	Type of Dispenser 2 (Speed, Dispenser2)	0..2	1	
44	Type of Dispenser 3 (Speed, Dispenser1)	0..2	1	
45	Type of Dispenser 4 (Speed, Dispenser2)	0..2		
46	Remote address for the controller of dispenser1 (dispenser1)	1..9	1	
47	Remote address for the controller of dispenser2 (dispenser2)	1..9	1	

	DESCRIPTION	LIMITS	USUAL	SET
48	Remote address for the controller of dispenser3 (dispenser1)	1..9	1	
49	Remote address for the controller of dispenser4 (dispenser2)	1..9		
50	Delay between begin of dispense 1 and arm moving 1/10 S (Time, Dispenser1	0..250	0	
51	Delay between begin of dispense 2 and arm moving 1/10 S (Time, Dispenser2)	0..250	0	
52	Delay between begin of dispense 3 and arm moving 1/10 S (Time, Dispenser1)	0..250	0	
53	Delay between begin of dispense 4 and arm moving 1/10 S (Time, Dispenser2)	0..250		
54	Delay between end of dispense 1 and arm moving 1/10 S (Acc, Dispenser1)	0..250	0	
55	Delay between end of dispense 2 and arm moving 1/10 S (Acc, Dispenser2)	0..250	0	
56	Delay between end of dispense 3 and arm moving 1/10 S (Acc, Dispenser1)	0..250	0	
57	Delay between end of dispense 4 and arm moving 1/10 S (Acc, Dispenser2)	0..250		
58	Type of loader (Time, remote)	0..2		
59	Type of spinning power (Time, Acceleration, Nitrogen)	0..1	1	
60	Edge bead remover delay (Time, Solvent1)	0..250	0	
61	Back side rinse delay (Time, Solvent2)	0..250	0	
62	Maximum deceleration allowed (Acceleration)	1,.200	20	
63	Arm position for solvent5 (Solvent1)	0..999		
64	Use of solvent6 (Acc, Solvent2)	0..2	2	
65	Arm position for solvent6 (Solvent2)	0..999	410	
66	Use of the solvent7 (Acc, Solvent1)	0..2	2	
67	Arm position for solvent7 (Solvent1)	0..999	420	
68	Use of the solvent8 (Acc, Solvent2)	0..2	0	
69	Arm position for solvent8 (Solvent2)	0..999		
70	Period in minute for refilling solvent (Speed, Remote)	0..999		
71	Duration in second for refilling solvent (Time, Remote)	0..999		

Switches (OFF)

1=Chuck index

2=Automatic arm

3=Automatic cover

4= Cover fitted

Motor type

1=10000 rpm

2=5000 rpm

3=infranor

4=3000

5=7000

6=GYRSET config

Use of the RS

0=without

1=Virgin KSF414

2=host KSF414

3=Virgin 414 + host 455

4=host KSF 455

5=Virgin 455 + host 414

6= host KSF 455 + Dispense TTL

Use of the lift pins

0=whithout

1=robot

2=manual

3=fitted but not used

Type of dispenser

0 = Suss Pump : Virgin, Vulcan, Mp25

1 = use TTL signal for dispense, no pre-dispense

2 = use TTL signal for pre-dispense + dispense

3 = use TTL signal for "start of dispense", countdown a delay (p54,...,p57)

Type of loader

0 = No loader

1 = Manual loader

2 = Manual not used

Solvent#	1	2	3	4	5	6	7	8
Function	Bowl cleaning	Edge Bead Remover	Cotton Candy Remover	Back Side Rinse	Dispenser Nozzle Rinse	Standard	Standard	Solvent Stream

apu = arm position unit. Related to parameter 14.

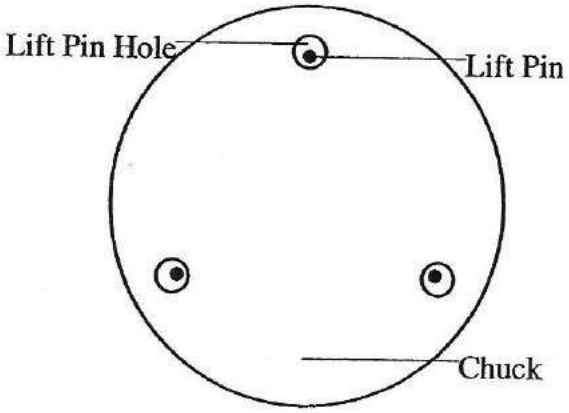
asu = arm speed unit

* depends on dispenser type. If set to 3 then delay is in seconds.

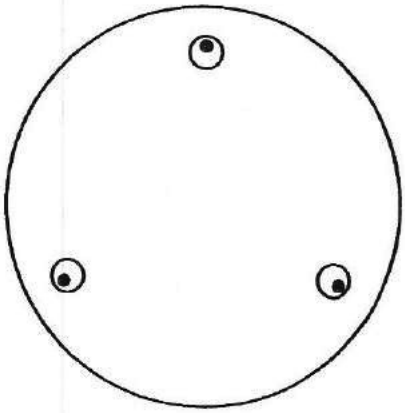
APPENDIX II: LIFT PIN ADJUSTMENT FOR WAFERS AND MASKS

When changing the configuration of the spin coater between 4" wafer and mask frame, the lift pins have to be re-positioned.

The position for the wafer is:



The position for the mask frame is:



To move from one to the other, take the chuck off, then do the following for each pin

1. Lift the pin up.
2. Turn it through 180°
3. Let it drop.

Each pin is spring loaded so will fall automatically back into place.

APPENDIX III: DECLARATION OF CONFORMITY

APPENDIX IV: MACHINE SPECIFICATIONS AT SHIPMENT

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