

Command Set GENESIS CU Central Control Unit GENESIS RSP

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1. Revision Control

Version	Date	Author	Description of document changes	FW Version
1.6	03.04.1995	HPR	Corresponds to released Version 1.00 of GENESIS CU FW	GENESIS CU V1.00
1.7	18.09.1995	HPR	Corresponds to released Version 1.10 of GENESIS CU FW	GENESIS CU V1.10
1.8	21.02.1996	HPR	Corresponds to released Versions 1.20 and 1.21 of GENESIS CU FW	GENESIS CU V1.21
2.0	23.08.1996	HPR	The GENESIS CU Command Set is now a separate document. The communication manual is located in the Firmware System Design manual.	GENESIS CU V1.22
2.1	05.02.1997	HPR	Changing and extensions described in the Update History. (2) V1.22 & V1.23 to V1.30	GENESIS CU V1.30
2.5	24.11.1998	HPR	Changing and extensions described in the Update History. (2) V1.30 to V1.50	GENESIS CU V1.50
2.6	11.06.1999	HPR	Changing and extensions described in the Update History. (2) V1.50 to V1.51	GENESIS CU V1.51
2.7	13.05.2000	HPR	Changing and extensions described in the Update History. (2) V1.51 to V1.52. This release is for WorkCell only.	GENESIS CU V1.52
2.8	24.07.2000	HPR	Same as V1.52. This release is for all types of GENESIS.	GENESIS CU V1.53
2.9	25.04.2001	HPR	Changing and extensions described in the Update History. (2) V1.52/1.53 to V1.60	GENESIS CU V1.60
3.0	26.07.2001	HPR	Changing and extensions described in the Update History. (2) V1.60 to V1.61	GENESIS CU V1.61
3.1	20.12.2001	HPR	Changing and extensions described in the Update History. (2) V1.61 to V1.62	GENESIS CU V1.62
3.2	10 .07.2002	RSt	Changing and extensions described in the Update History. (2) V1.61 to V1.63	GENESIS CU V1.6204
3.3	08.11.2002	RSt	Add Smooth Move comment to <SSX> command ROMA rotator width are safeable with <SOW> command. Change Limits for <SSZ> command	GENESIS CU V1.6205
3.4	19.11.2002	RSt	Change minimum slowspeed for Y-axis	GENESIS CU V1.6206
3.5	12.12.2002	RSt	Change: Lower Diti eject releases now, when no X-axis is installed	GENESIS CU V1.6207
3.6	25.02.2003	RSt	Change Version Number to release	GENESIS CU V1.63
3.7	02.07.2007	HaRo	AGT supports now a retract switch	GENESIS CU V1.65

2. Command Set of Machine #M

2.1. Report Commands:

RHW Report Instrument Hardware Version:

RHW

This command reports the actual instrument hardware version.

EXAMPLE: #M1RHW

Reports the instrument hardware.

RESPONSE: If answer is 0 or 1, it is a standard GENESIS instrument. In case of answer equal 2, it is a GENESIS Freedom multi-arm instrument.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RFV Report Firmware Version:

RFV n

This command reports the Firmware and Bootware Version. Also the instrument serial number can be reported.

n: 0 = Firmware Version.
 1 = Bootware Version.
 2 = Instrument Serial Number.
 10 = Expected HEX file name for firmware download.

EXAMPLE: #M1RFV

Reports the actual firmware version.

"GENESIS-Vx.xx-MM/YYYY"

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RMA Report Overall Machine Limitation X-Axis Only:

RMA

The **RMA** command reports the physical limitation range for the X-axis of the instrument. This is the value, set by the **SMA** command.

EXAMPLE: #M1RMA

Report machine limitation of X-axis in 1/10 mm.

RESPONSE: X machine range in 1/10 mm

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

REE Report Extended Error Code:

REE

Get device specific error codes after using the **PIS** command. If an error occurs while using the **PIS** command, the failed device can be evaluated by this function. Errors will be reported of the devices LIHA #A, PosId #P and ROMA #R. To visualize the error codes as ASCII characters, an offset of 40Hex is added to the error value. CAUTION: A not installed device, for example the ROMA, generates a "device not implemented" error.

EXAMPLE: #M1REE

RESPONSE: #A, #P, #R
 @ @ @

Means that all devices are OK.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RSD Report System Devices:

RSD Selector, Type

Reports the number of devices connected to the system in binary or decimal format.

Selector:

- 0 = Report number of **A**rms.
- 1 = Report number of **D**iluters.
- 2 = Report number of **O**ptions.
- 3 = Report number of **P**osId.
- 4 = Report number of **R**oma.
- 5 = Report number of **U**niPort.
- 6 = Report number of **T** Options.
- 7 = Report number of **V** Options.
- 8 = Report number of **C** Options.
- 9 = Report number of **W** Options.
- 10 = Report number of **Q** Options.
- 11 = Report number of **S** Options.
- 12 = Report number of **E** Diluters.

Type:

- 0 = binary format [0..255] (default)
- 1 = decimal format [0..7]

EXAMPLE: #M1RSD1, 1

Report the number of Diluters in decimal format.

RESPONSE: see Type

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RSS Report Supported System Devices as String:

RSS

This command reports the supported system devices as a string in order of the **RSD** command enumeration.

EXAMPLE: #M1RSS

Reports the system device as a string.

RESPONSE: "ADOPRUTVCWQSE".

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RCR Report Collision Avoidance Status Between LIHA And ROMA:

RCR

This command reports the status of the collision avoidance between LIHA and ROMA. The collision avoidance can be disabled or enabled by the set **SCR** command.

EXAMPLE: #M1RCR

Reports the status of the collision avoidance.

RESPONSE: 0 = Off, 1 = On.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RNV Report New Device #V Node Detected:

RNV

This command is used to detect a new installed device with the Id "V". Since these devices do not have an address switch, the software must configure the node. If a new device could be detected,

the answer returned is one. The new node can be defined by the **SNV** command to the desired location. This function is basically used during installation and configuration of a new instrument. If once defined, the new node is stored automatically in non-volatile memory and must never be changed.

CAUTION: Only one device “V” can be configured at the time. If more than one device is connected to the system, one after the other must be handled.

EXAMPLE: #M1RNV

Reports if a new device with the Id “V” was detected.

RESPONSE: 0 = no new device could be detected; 1 = a new device has been detected.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

ROW Read Parameters From EPROM:

ROW

This command reads all parameters set by the following commands from the EEPROM (non-volatile memory) into the working memory (volatile memory).

- #M **SMA** command: Overall machine range, X-axis only.
- #M **SGD** command: Set global data.
- #A **SRA** command: Absolute range LIHA.
- #A **SOX, SOY, SOZ** command: Init offset X, Y, Z-axis LIHA.
- #A **SFX, SFY, SFZ** command: Speed and acceleration X, Y, Z-axis LIHA.
- #A **SDA** command: Liquid detection acceleration of Z-axis.
- #A **SAX, SAY, SAS** command: Scale adjust factor X, Y-axis LIHA.
- #A **SYS** command: Y-space distance and space type.
- #A **SYB** command: Backlash distance.
- #A **SST/CST** command: Splash free diti eject logical positions.
- #A **SMT** command: X-axis motor type.
- #A **SSM** command: X-axis smooth move mode.
- #R **SRA** command: Absolute range ROMA.
- #R **SOX, SOY, SOZ, SOR, SOG** command: Init offset X, Y, Z, R, G-axis ROMA.
- #R **SFX, SFY, SFZ, SFR, SFG** command: Speed and acceleration X, Y, Z, R, G-axis ROMA.
- #R **SAX, SAY, SAZ, SAR** command: Scale adjust factor X, Y, Z, R-axis ROMA.
- #R **SGG** command: Gripper parameter.
- #R **SOD** command: Rotator width and Fixon.
- #R **SMX** command: X-axis motor gear type.
- #R **SMG** command: Gripper-axis motor encoder type.

EXAMPLE: #M1ROW

Reading of all Machine, LIHA and ROMA parameters.

RESPONSE: none.

GENERATED ERRORS: (13) no access to serial EEPROM.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RGD Read Global Data:

RGD n

This command reads global data from volatile memory. A maximum of 128 variables (type of integer) can be stored. With the **ROW** command, it is possible to retrieve this array from the non-volatile memory (EEPROM).

CAUTION! This command is for internal use only (TECAN software). Overwriting of such variables can cause malfunction of the instrument and software.

n: [1..128] Type of integer.

EXAMPLE: #M1RGD67

Reads the integer value at storage location number 67

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RED *Read EPROM Data:*

RED n

This command reads data directly from the EEPROM. The overall size of the EEPROM is 1024 words.

CAUTION! This command is for service purposes only (board exchange). Overwriting of such variables can cause malfunction of the instrument and software.

n: 0 = overall EEPROM size in words.
[1..1024] Words.

EXAMPLE: #M1RED123

Reads the word value at storage location number 123

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (13) no access to serial EEPROM.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDF *Report Diagnostic Functions:*

RDF Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Number of power ups.
1 = Report hour meter.
2 = Number of error interrupts on Host RS232 since last power up.
3 = Number of error interrupts on Host RS232 overall.
4 = Number of repeated messages on Host RS232 since last power up.
5 = Number of repeated messages on Host RS232 overall.

EXAMPLE: #M1RDF1

Reports the sum of *switched on* time in hours.

RESPONSE: see selector.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDO *Read Digital Output:*

RDO OutNo

This function can be used only with the *GENESIS I/O Option Board*, where the condition of the digital power outputs 1 to 3 can be reported. In case of a Freedom instrument, output number 3 can't be used.

OutNo: [1..3]

EXAMPLE: #M1RDO3

Read the condition of digital output number 3.

RESPONSE: On/Off: [0 = Off, 1 = On]

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RLO *Read Door Lock Output:*

RLO OutNo

The condition of the door lock outputs 1 to 2 can be read by this command, provided that the door lock hardware is installed on the instrument.

OutNo: [1..2]

EXAMPLE: #M1RLO2

Read door lock output number 2.

RESPONSE: On/Off: [0 = Off, 1 = On]

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RDI *Read Digital Input:*

RDI InNo

This function can be used only with the *GENESIS I/O Option Board*, where the condition of the digital inputs 1 to 4 can be reported. A response of 1 corresponds to a logical high input. In case of a Freedom instrument, input number 3 can't be used.

InNo: [1..4]

EXAMPLE: #M1RDI2

Read digital input number 2.

RESPONSE: On/Off: [0 = Off, 1 = On]

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RLI *Read Door Lock Input:*

RLI InNo

The condition of the door lock inputs 1 to 2 can be read by this command, provided that the door lock hardware is installed on the instrument. A response of 1 corresponds to a released door (logical high input).

InNo: [1..2]

EXAMPLE: #M1RLI2

Read door lock input number 2.

RESPONSE: On/Off: [1 = Off, 0 = On]

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RVM *Report The Service Channel Volt Meter:*

RVM Channel

With this function it's possible to measure any voltages on the CU board with the *Service Channel* connector. The first channel (0) allows the user to measure any voltages in the range between 0 and 5 Volt with a resolution of 10mV. The second (1) channel has a range between 0 and 24 Volt with a resolution of 100mV.

Channel: [0..1]

EXAMPLE: #M1RVM0

Measuring the 5-Volt channel.

RESPONSE: 10mV increments for channel 0. 100mV increments for channel 1.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RRS Report The I/O Option Rs485 Address Of Selected Channel:

RRS Channel

This function can be used only with the *GENESIS I/O Option Board*. It reports the RS485 device address of the selected channel. The device addresses will be scanned while power up the instrument or while using the scan command **ARS**. There are in maximum two different devices accessible, which are accessible by the device id #I. For detailed information about the RS485 communication read the *GENESIS I/O Option* manual.

Channel: [1..2]

EXAMPLE: #M1RRS2

Reports the address of channel number two.

RESPONSE: decimal address information.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

2.2. Set Commands:

SMA Set Overall Machine Limitation X-Axis Only:

SMA X

The **SMA** command sets the physical limitation range (in volatile RAM) for the X-axis of the instrument. It is used as a safety for the LIHA and ROMA **SRA** commands to ensure that the X-axis ranges cannot be set to invalid machine range. After definition, the maximal range can be stored in non-volatile memory with the **SOW** command.

X: distance in 0.1 mm [0..1000000] (default = 1150)

EXAMPLE: #M1SMA10000

Set machine limitation in X-axis to 1000 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOW Write System Parameters To EPROM:

SOW

This command writes all parameters set by the following commands to the EEPROM (non-volatile memory).

- **#M SMA** command: Overall machine range, X-axis only.
- **#M SGD** command: Set global data.
- **#A SRA** command: Absolute range LIHA.
- **#A SOX, SOY, SOZ** command: Init offset X, Y, Z-axis LIHA.
- **#A SFX, SFY, SFZ** command: Speed and acceleration X, Y, Z-axis LIHA.
- **#A SDA** command: Liquid detection acceleration of Z-axis.
- **#A SAX, SAY, SAS** command: Scale adjust factor X, Y-axis LIHA.
- **#A SYS** command: Y-space distance and space type.
- **#A SYB** command: Backlash distance.
- **#A SST/CST** command: Splash free diti eject logical positions.
- **#A SMT** command: X-axis motor type.
- **#A SSM** command: X-axis smooth move mode.
- **#R SRA** command: Absolute range ROMA.
- **#R SOX, SOY, SOZ, SOR, SOG** command: Init offset X, Y, Z, R, G-axis ROMA.
- **#R SFX, SFY, SFZ, SFR, SFG** command: Speed and acceleration X, Y, Z, R, G-axis ROMA.
- **#R SAX, SAY, SAZ, SAR** command: Scale adjust factor X, Y, Z, R-axis ROMA.

- **#R SGG** command: Gripper parameter.
- **#R SOD** command: Rotator width and Fixon.
- **#R SMX** command: X-axis motor gear type.
- **#R SMG** command: Gripper-axis motor encoder type.

EXAMPLE: #M1SOW

Stores all Machine, LIHA and ROMA parameters.

RESPONSE: none.

GENERATED ERRORS: (13) no access to serial EEPROM.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SGD *Set Global Data:*

SGD n, int

This command writes global data into volatile memory. A maximum of 128 variables (type of integer) can be stored. With the **SOW** command, it is possible to store this array into non-volatile memory (EEPROM).

CAUTION! This command is for internal use only (TECAN software). Overwriting of such variables can cause malfunction of the instrument and software.

n: [1..128] Variables of type integer.

int: [-32768..32767]

EXAMPLE: #M1SGD67,12345

Writes the integer value 12345 to storage location number 67

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SED *Set EPROM Data:*

SED n, word

This command writes data directly into the EEPROM. The overall size of the EEPROM is 1024 words.

CAUTION! This command is for service purposes only (board exchange). Overwriting of such variables can cause malfunction of the instrument and software.

n: [1..1024] Words.

word: [0..65535]

EXAMPLE: #M1SED123,32000

Writes the word value 32000 to storage location number 123

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (13) no access to serial EEPROM.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SHB *Set Host Communication Baud Rate:*

SHB BaudRateSel

With this command it's possible to change the host communication baud rate. The instrument is using the default rate of 9600 after power up. This is useful to ensure the exact rate is used while sending the very first commands to the machine. After sending this command, the software has to wait for about 200ms. This time is used to set the communication hardware of the CU to the new rate.

BaudRateSel:

- 0 = 1200
- 1 = 2400
- 2 = 4800
- 3 = 9600

4 = 19200

5 = 38400

EXAMPLE: #M1SHB4

Set the host communication baud rate to 19200.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SCR *Switch Collision Avoidance Between LIHA and ROMA On/Off:*

SCR On/Off

This command can be used to turn off the collision avoidance between the LIHA and ROMA arm.

By default the collision supervisor is turned on.

On/Off: 0 = switched off, 1 = switched on (default = 1)

EXAMPLE: #A1SCR0

Switch off collision avoidance.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOF *Firmware Download:*

SOF Firmware

This command initiates the firmware downloading process. The **SOF** command should not be used as string command itself. Only in connection with the utility program "DOWNLOAD.EXE", this command makes sense. Diagnose data will be saved before downloading a new firmware.

Firmware: [INTEL.HEX file format]

EXAMPLE with DOWNLOAD.EXE Program:

c:\download COM=1 firmware=geni1620.hex dev=#M1

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SOM *Firmware Download Mode:*

SOM Mode

This command defines the mode, which is used for downloading a firmware to an option. The old mode is increasing the baud rate to 38400 while downloading. After completion of the downloading process, the baud rate decreases to the former defined baud rate. The new mode is leaving the baud rate at the actual chosen value. There is no change in baud rate, while downloading process.

Mode: 0 = old mode, 1 = new mode (default = 0)

EXAMPLE: #M1SOM1

Switch the download mode to the new mode.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDT *Set Diluter Action Timeout:*

SDT Timeout

This command allows the setting of an action timeout for the diluter channels. In case of a failed pump (no response in a certain time), a timeout error will be sent to the calling software. This

avoids dead channels. The controlling software can decide then, to switch of the failed channel and to work around with the remaining pumps.

Timeout: [0 = endless], [1..1600 seconds] (default = 90)

EXAMPLE: #M1SDT60

Sets the action timeout to 60 seconds.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SNV *Set New Device #V Node:*

SNV Node

This command is used to define the address node of a new detected device with the Id “V”. Since these devices do not have an address switch, the software must configure the node. A new device announces his presence by sending a special boot node. This can be reported by the command **RNV**. The user can now define where the new device should be located. This function is basically used during installation and configuration of a new instrument. If once defined, the new node is automatically stored in non-volatile memory and must never be changed.

CAUTION: Only one device “V” can be configured at the time. If more than one device is connected to the system, one after the other must be handled.

Node: address node [1..8]

EXAMPLE: #M1SNV2

Set the address node to location two. The device is now accessible by the command Id #V2.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (20) no new node detected, (21) node already defined.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDO *Set Digital Output On/Off:*

SDO OutNo, On/Off

This function can be used only with the *GENESIS I/O Option Board*, where the digital power outputs 1 to 3 can be set individually. In case of a Freedom instrument, output number 3 can’t be used.

OutNo: [1..3]

On/Off: [0 = Off, 1 = On]

EXAMPLE: #M1SDO3, 1

Set digital output number 3 on.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

2.3. Positioning, Move and Action Commands:

PIS *Position Init System:*

PIS

This command initializes the whole system in a crash free and fast way. The initialization procedure handles the LIHA, ROMA and PosId. The initialization procedure is different if one of those modules isn't installed. The system init takes care of the actual setup of the instrument. Errors of an involved device can be reported by the **REE** command. CAUTION: This command detects if the ROMA arm is complete. Complete means, that all drives (motors) are installed. If one or more motors are not connected (special application), the **PIS** routine won't initialize the ROMA. It's up to the user program to initialize the ROMA its best way.

EXAMPLE: #M1PIS

Initializes LIHA, ROMA and PosId at the same time.

GENERATED ERRORS: (1) initialization failed, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ACX *Calibrate Scale Adjust Of Roma X-Axis:*

ACX

This function is used to calibrate the scale adjust of the ROMA X-axis. Assumption for successful calibrating is a scaled LIHA. The whole scaling procedure will be handled by this function. After completion of this function, the new scale adjust can be saved in non-volatile memory by the **SOW** command.

EXAMPLE: #M1ACX

Scales the X-axis of ROMA.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (5) device not implemented, (7) device not init, (13) arm collision avoided with PosId, (17) arm collision avoided between LIHA and ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARS *Scan The I/O Option Rs485 Bus:*

ARS

This function can only be used with the GENESIS I/O Option Board. It scans the RS485 bus for installed devices. The RS485 modules are accessible by the device Id #I. There are in maximum two different devices accessible. For detailed information about the RS485 communication, read the GENESIS I/O option manual.

EXAMPLE: #M1ARS

Scanning the RS485 bus.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ALO *Activate Door Lock Output On/Off:*

ALO OutNo, On/Off

This command activates the door lock mechanism. It is possible to switch the two outputs independently by using the normal output number 1 or 2. The other possibility is to switch both outputs together by selecting output number 3. They will be handled then as a linked pair of door lock outputs. If a door can't be locked, an error message will be returned and the selected lock will be released again. The time in which the lock mechanism must be in a valid status is 1 second.

OutNo: [1..3] (1 = Lock1, 2 = Lock2, 3 = Both Locks)

On/Off: [0 = Off, 1 = On]

EXAMPLE: #M1ALO3, 1

Switch on door lock number one and two.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (18) door lock 1 failed, (19) door lock 2 failed.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

2.4. Group Commands:

GFC *Group Feed Command:*

GFC

If several commands should be started synchronously, they can be loaded first by this command without any execution. With **GSC** all feed action can be started at the same time. This function supports all installed devices, except the device #M itself.

EXAMPLE: #M1GFC (start feeding process)
 #A1MAZ500,500,500,500 (feed command to device #A1)
 #D1A1000R (feed command to device #D1)
 #D2A1000R (" " " " #D2)
 #D3A1000R (" " " " #D3)
 #D4A1000R (" " " " #D4)
 #M1GSC (start all action at the same time)

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

GSC *Group Start Command:*

GSC

All commands set by **GFC** command can be started with **GSC** command at the same time. Arm, Diluters, PosId or Options can be started.

EXAMPLE: see **GFC** command.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

2.5. Error Codes Machine #M

Code	Common Errors for all Devices
1	Initialization error
2	Invalid command
3	Invalid operand
4	Invalid command Sequence
5	Device not implemented
6	Timeout error
7	Device not initialized
8	Command overflow of CU

15	Command overflow of sub device
----	--------------------------------

Code	Device #M Error Codes
13	No access to serial EEPROM
16	Power fail circuit error
17	Arm collision avoided between LIHA and ROMA (not Freedom)
18	Door lock 1 failed (not Freedom)
19	Door lock 2 failed (not Freedom)
20	No new device #V node detected
21	Device #V node already defined

3. Command Set of LIHA Arm #A

3.1. Report Commands:

RNT Report Number Of Tips On Arm:

RNT Selector

The **RNT** command reports the number of tips on the arm in binary (TipSelect) or in decimal format.

Selector: 0 = binary format [0..255]
 1 = decimal format [0..8]

EXAMPLE: #A1RNT0

Reports the number of tips (Z-drives) on arm 1 in binary format.

RESPONSE: see selector

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RSD Report Presence Of Splash Free Diti Eject Option:

RSD

The **RSD** command reports if the splash free diti eject option is installed on the LIHA arm.

EXAMPLE: #A1RSD

Reports if splash free diti eject option is installed.

RESPONSE: 0 = no splash free diti eject option is installed. 1 = splash free diti eject option is installed.

GENERATED ERRORS: (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RST Report Splash Free Diti Eject Logical Positions:

RST

This command reports the logical positions either set by the **SST** command or automatically calibrated by the **CST** command. There are two positions. One is used for the upper eject position and the other is used for the lower eject position. Additionally, there is a third parameter, which describes the discard distance to throw away the disposable tips.

EXAMPLE: #A1RST

RESPONSE: The answer could be 1075,700,45. The first value is the upper eject position, the second value is the lower eject position and the third value is the discard distance.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDE Report Splash Free Diti Eject Status:

RDE

This command returns the actual status of the splash free diti eject solenoid.

EXAMPLE: #A1RDE

Reports the diti eject status.

RESPONSE: 0 = eject released (power off), 1 = eject active (power on)

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RYS Report Minimum Y Space Distance And Fixed Space Type:

RYS

This command reports the minimal space distance between the tips and the fixed space type, set by the **SYS** command.

EXAMPLE: #A1RYS

Reports the minimal space distance and the fixed space type.

RESPONSE: 90..380,0..1

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RYB Report Y Backlash Distance:

RYB

This command reports the Y backlash distance defined with the **SYB** command.

EXAMPLE: #A1RYB

Reports the backlash distance.

RESPONSE: 0..50.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RPX Report Current Parameter For X-Axis:

RPX Selector

This command reports the current parameter of the X-axis. Only one axis parameter can be reported at a time.

Selector:

- 0 = Report current position in 1/10 mm. (default)
- 1 = Report acceleration in 1/10 mm/s².
- 2 = Report end speed in 1/10 mm/s.
- 3 = Report init speed in 1/10 mm/s.
- 4 = Report init offset in 1/10 mm.
- 5 = Report actual machine range in 1/10 mm.
- 6 = Report init error steps in encoder increments.
- 7 = Report displacement offset in 1/10 mm.
- 8 = Report actual scale adjust factor.
- 9 = Report slow speed in 1/10 mm/s.
- 10 = Report axis scaling factor.
- 11 = Report target position in 1/10 mm.

EXAMPLE: #A1RPX2

Reports the end speed of the X-drive.

RESPONSE: one X-axis parameter.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RPY Report Current Parameter For Y-Axis:

RPY Selector

This command reports the current parameter of the Y and Y-space axis. Only one axis parameter can be reported at a time.

Selector:

- 0 = Report current position in 1/10 mm. (default)
- 1 = Report acceleration in 1/10 mm/s².
- 2 = Report end speed in 1/10 mm/s.
- 3 = Report init speed in 1/10 mm/s.

- 4 = Report init offset in 1/10 mm.
- 5 = Report actual machine range in 1/10 mm.
- 6 = Report init error steps in encoder increments.
- 7 = Report travel position in 1/10 mm.
- 8 = Report actual scale adjust factor.
- 9 = Report slow speed in 1/10 mm/s.
- 10 = Report axis scaling factor.
- 11 = Report target position in 1/10 mm.

EXAMPLE: #A1RPY3

Reports the init speed of both Y-drives.

RESPONSE: two Y-axis parameters.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☒ GENESIS Freedom

RPZ Report Current Parameter For Z-Axis:

RPZ Selector

This command reports the current parameter of the Z-axis. Only one axis parameter can be reported at a time.

- Selector:**
- 0 = Report current position in 1/10 mm. (default)
 - 1 = Report acceleration in 1/10 mm/s².
 - 2 = Report end speed in 1/10 mm/s.
 - 3 = Report init speed in 1/10 mm/s.
 - 4 = Report init offset in 1/10 mm.
 - 5 = Report actual machine range in 1/10 mm.
 - 6 = Report init error steps in encoder increments.
 - 7 = Report travel position in 1/10 mm.
 - 8 = Report actual scale adjust factor.
 - 9 = Report slow speed in 1/10 mm/s.
 - 10 = Report axis scaling factor.
 - 11 = Report target position in 1/10 mm.

EXAMPLE: #A1RPZ0

Reports the current position of all Z-drives.

RESPONSE: 1..8 Z-axis parameters.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☒ GENESIS Freedom

RVZ Report Z-Axis Values And Parameters:

RVZ Selector

This command reports the following values and parameters for the Z-axis.

- Selector:**
- 0 = 0.
 - 1 = Report capture position.
 - 2 = Report capture events.
 - 3 = Report search speed, set by *SSL* cmd.
 - 4 = Report slow speed, set by *SSS* cmd.

EXAMPLE: #A1RVZ3

Reports the liquid search speed of all Z-axis.

RESPONSE: 1..8 Z-axis parameters.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☒ GENESIS Freedom

RGZ *Report Global Z-Axis Values And Parameters:*

RGZ Selector

This command reports the following values and parameters for the Z-axis.

Selector: 0 = Report pierce speed, PWMLimit, CurLimit set by **SPS** command.
 1 = Report pick speed, PWMLimit, CurLimit set by **SSP** command.
 2 = Report discard speed, PWMLimit, CurLimit set by **SSD** command.

EXAMPLE: #A1RGZ2

Reports the discard speed, PWMLimit and current limit.

RESPONSE: Speed, PWM, Current

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RTL *Report Individual Z-Start For Liquid Search Commands:*

RTL

This command reports the individual Z-start height for all Z-axis. These parameters are used by the **MDT**, **MET** command if no Z-start is set.

EXAMPLE: #A1RTL

Reports all Z-Start heights.

RESPONSE: Z-start1,...,Z-start8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RML *Report Individual Z-Max For Liquid Search Commands:*

RML

This command reports the individual Z-max height for all Z-axis. These parameters are used by the **MDT**, **MET** command if no Z-max is set.

EXAMPLE: #A1RML

Reports all Z-max heights.

RESPONSE: Z-max1,...,Z-max8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RBL *Report Individual Submerge For Liquid Search Commands:*

RBL

This command reports the individual submerge distance for all Z-axis. These parameters are used by the **MDT**, **MET** command if no submerge is set.

EXAMPLE: #A1RBL

Reports all submerge distances.

RESPONSE: Submerge1,...,Submerge8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDL *Report Individual Safe Detection Retract Distance For Liquid Search Commands:*

RDL

This command reports the individual safe detection retract distance for all Z-axis. These parameters are used by the **MDT**, **MET** command if no global distance is selected.

EXAMPLE: #A1RDL

Reports all the safe detection retract distances.

RESPONSE: SaveDetRetractDist1,..., SaveDetRetractDist8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDR Report Individual Retract Distance For Clot Detection:

RDR

This command reports the individual retract distance for all Z-axis. These parameters are used by the **MCT** command if no global retract distance is set.

EXAMPLE: #A1RDR

Reports all retract distances.

RESPONSE: RetractDist1,...,RetractDist8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RSR Report Individual Retract Speed For Clot Detection:

RSR

This command reports the individual retract speed for all Z-axis. These parameters are used by the **MCT** command if no global retract speed is set.

EXAMPLE: #A1RSR

Reports all retract speeds.

RESPONSE: RetractSpeed1,...,RetractSpeed8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RLR Report Individual Retract Limit For Clot Detection:

RLR

This command reports the individual retract limit for all Z-axis. These parameters are used by the **MCT** command if no global retract limit is set.

EXAMPLE: #A1RLR

Reports all retract limits.

RESPONSE: Limit1,...,Limit8

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDM Report Liquid Detection Mode:

RDM

This command reports all the different possible parameters and procedures of the liquid detection setup. Parameters are described in the **SDM** command.

EXAMPLE: #A1RDM

Reports all liquid detection settings.

RESPONSE: Detection Proc, Sensitivity, Phase, DipIn, DipOut.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDA Report Liquid Detection Acceleration:

RDA

This command reports the acceleration in Z-axis for liquid detection. This parameter is only active while searching for liquid with the **MDT** command. After completion of liquid detection, the normal acceleration, set by the **SFZ** command, is in use.

EXAMPLE: #A1RDA

Reports the actual setting of the liquid detection acceleration.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RTS *Report Tip Status Diti:*

RTS

This command reports the number of mounted disposable tips on the arm in binary format. If normal tips are mounted, the answer is always 255.

EXAMPLE: #A1RTS

Reports mounted disposable tips. For example 223 means that disposable tip number 6 is not fetched.

RESPONSE: [0..255] Binary format

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RCL *Report Collision Avoidance Status Between LIHA And PosId:*

RCL

This command reports the status of the collision avoidance between LIHA and PosId. The collision avoidance can be disabled / enabled by the set command SCL.

EXAMPLE: #A1RCL

Reports the status of the collision avoidance.

RESPONSE: 0 = Off, 1 = On.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RRX *Report Absolute / Relative Position To The Other Arm:*

RRX Selector

This command reports the maximal absolute position or the maximal relative distance to the other arm without generating a collision avoidance error between LIHA and ROMA. This function is only active if LIHA and ROMA are installed on the system.

Selector: 0 = absolute position to the other arm.

1 = relative distance to the other arm.

EXAMPLE: #A1RRX1

The answer could be 2050, which is the maximal relative distance of the LIHA X-axis.

RESPONSE: maximal position in 1/10 mm.

GENERATED ERRORS: (3) invalid operand, (7) device not initialized.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RSM *Report X-Axis Smooth Move Mode:*

RSM

This command sets the X-axis smooth move mode. By default the smooth move mode is active. In this case the acceleration and speed parameters will be recalculated depending on the distance to move. When selecting mode 1, the normal acceleration and speed parameters set by the **SFX** command are in use.

EXAMPLE: #A1RSM

Reports the status of smooth move selection.

RESPONSE: 0 = smooth move mode, 1 = normal speed parameter.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

REE *Report Extended Error Code or Axis Configuration String:*

REE Selector

This command gets the axis specific error codes. Possible are all the errors generated by the ROMA device. To visualize the error codes as ASCII characters, an offset of 40 hexadecimal is added to the error value. Alternatively the maximal axis configuration can be reported as a string. The axis configuration corresponds to the extended error codes.

Selector: 0 = Report extended error codes.
 1 = Report axis configuration string.

EXAMPLE: #A1REE

RESPONSE: X, Y, S, Z1..Z8 error code i.e. @@@@ @@@@ @@@@.

Means all drives are OK.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDX *Report Diagnostic Functions For X-Axis:*

RDX Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
 1 = Report distance counter in meter.
 2 = Report the no load counter.
 5 = Report re-settable move counter.

EXAMPLE: #A1RDX0

Reports the overall number of movements.

RESPONSE: X-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDY *Report Diagnostic Functions For Y-Axis:*

RDY Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
 1 = Report distance counter in meter.
 2 = Report the no load counter.
 5 = Report re-settable move counter.

EXAMPLE: #A1RDY1

Reports the overall distance in meters.

RESPONSE: Y and Y-space data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

RDZ *Report Diagnostic Functions For Z-Axis:*

RDZ Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
 1 = Report distance counter in meters.
 2 = Report the no load counter.

- 3 = Reports the number of fetched disposable tips.
- 4 = Reports the number of piercing.
- 5 = Report re-settable move counter.

EXAMPLE: #A1RDZ2

Reports the number of crashes of all Z-axis.

RESPONSE: All Z-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

3.2. Set Commands:

SRX Set X-Axis Range:

SRX Xrange

This command sets the X-axis range. It is an alternative command to the **SRA** described below. The **SRX** ranging command must be used in a Freedom multi-arm instrument. It takes no care to the overall machine range as it **SRA** dos. The X-range can be stored in non-volatile memory with **SOW** command.

Xrange: distance in 0.1 mm [0..1000000] (default = 1000)

EXAMPLE: #A1SRX 12345

Set the X-axis range to 1234,5 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SRY Set Y-Axis Range:

SRY Yrange

This command sets the Y-axis range. It is an alternative command to the **SRA** described below. The **SRY** ranging command must be used in a Freedom multi-arm instrument. The Y-range can be stored in non-volatile memory with the **SOW** command.

Yrange: distance in 0.1 mm [0..1000000] (default = 1000)

EXAMPLE: #A1SRY2500

Set Y-axis range to 250 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SRZ Set All Z-Axis Ranges:

SRZ Zrange1*..Zrange8*

This command set all the Z-axis ranges. It is an alternative command to the **SRA** described below. The **SRZ** ranging command must be used in a Freedom multi-arm instrument. All the Z-ranges can be stored in non-volatile memory with the **SOW** command. After redefinition of the Z-ranges, also the Z-travel heights (set by **SHZ**) are reset to the new range values and the changed axis must be reinitialized.

Zrange[i]*: distance in 0.1 mm [0..1000000] (default = 1000)

EXAMPLE: #A1SRZ1000,,1000,,1000,,1000

Set the Z-ranges of axis number 1, 3, 5 and 7 to 100 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SRA *Set Range For Absolute Field:*

SRA X*, Y*, Z1*..Z8*

The **SRA** command sets the absolute field range (in volatile RAM), for all axis of the arm. The X-axis range cannot exceed the maximal value defined by the **[M]SMA** command. All other axis can be defined without any limitation. All values can be stored in non-volatile memory with the **SOW** command. After redefinition of the Z-ranges, also the Z-travel heights (set by **SHZ**) are reset to the new range values. Only set values will be overwritten.

X*: distance in 0.1 mm [0..Machine Range set by **[M]SMA** – X-Offset] (default = 1000)

Y*: distance in 0.1 mm [0..1000000] (default = 1000)

Z[i]*: distance in 0.1 mm [0..1000000] (default = 1000)

EXAMPLE: #A1SRA5000,1500,2000,2000,2000,2000,1600,1600,1600,1600

Set max X-Range to 500 mm, Y-Range to 150 mm and Z-Range to 200 mm and 160 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SYS *Set Minimum Y Space Distance And Fixed Space Type:*

SYS Space, Type*

This command allows the redefinition of the LIHA Y-space axis minimum distance. This may be useful in user specific applications where a different minimal space than 9mm is required between the tips or while using a fixed space LIHA. The fixed space type can be selected between the four or eight tip TECAN LIHA and the four tip ABD versions.

The space parameters can be saved in non-volatile memory by **SOW** command.

Space: [90..380] (default = 90)

Type: [0..1] (default = 0)
 0 = TECAN fixed space (4 or 8 tip)
 1 = ABD fixed space (4 tip)

EXAMPLE: #A1SYS150,0

Sets the minimal space between tips to 15mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SYB *Set Y Backlash Distance:*

SYB Backlash

This command defines the Y backlash distance. This distance will be used in case of moving the Y-axis from the back of the instrument to the front. This parameter can be stored in non-volatile memory with the **SOW** command.

Backlash: [0..50] (default 20)

EXAMPLE: #A1SYB0

Deactivates the Y backlash.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SHZ *Set Individual Z-Travel Height:*

SHZ Z-travel1*..Z-travel8*

The **SHZ** command sets (in volatile RAM) the individual Z-travel heights for the absolute field.

The **SHZ** values are valid until the **SHZ** command is either reentered or until the machine is turned

off. The only time those values are in effect, is when the machine is traveling in the absolute field (**PAA** command). Only set values will be overwritten.

Z-travel[i]*: distance in 0.1 mm [0..Z-Range set by **SRA** cmd] (default = 1000)

EXAMPLE: #A1SHZ600,600,600,600,1000,1000,1000,1000

Set the travel height for the first four tips to 60 mm above worktable and for the second four tips to the height of 100 mm above worktable.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSL Set Search Speed For Liquid Search Commands:

SSL Speed1*..Speed8*

This command sets the search speeds (in volatile RAM) that the Z-axis will use by the liquid search commands (**MDT**, **MET**) while moving from Z-start to Z-max and back to Z-travel (**MDT**).

Speed[i]*: speed in 0.1 mm/s [1..1500] (default = 400)

EXAMPLE: #A1SSL200,200,200,200,300,300,300,300

Set liquid search speed for the first four tips to 20 mm/s and for the second four tips to 30 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSX Set Slow Speed For X-Axis:

SSX Speed

This function sets the slow speed for the X-axis. This setting is in action while using **MRX** or **MAX** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command. When Smooth Move is set, the minimum slow speed will be 5 mm/s.

Speed: speed in 0.1 mm/s. [1..4000] (default = 1000)

EXAMPLE: #A1SSX200

Set the slow speed of X-axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSY Set Slow Speed For Y-Axis:

SSY Speed

This function sets the slow speed for both Y-axis. This setting is in action while using **MRY** or **MAY** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 mm/s. [20..4000] (default = 350)

EXAMPLE: #A1SSY200

Set the slow speed of Y and Y-space axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSS Set Individual Slow Speed For Z1..Z8:

SSS Speed1*..Speed8*

This function sets an individual slow speed for all Z-axis. These settings are in action while using **MRZ** or **MAZ** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed [i]*: speed in 0.1 mm/s. [1..4000] (default = 400)

EXAMPLE: #A1SSS100,200,150,100,120,130,140,150

Set an individual speed for every Z-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SPS Set Pierce Speed For Piercing Commands:

SPS Speed*, PWMLimit*, CurLimit*

The **SPS** command sets the piercing parameter for all Z-axis (in volatile RAM) that they will use while moving from Z-start to Z-max. For detailed information about PWM limit and current limit, read the *DC Servo Controller Command Summary* document.

Speed*: Speed in 0.1 mm/s [1..1500] (default = 200)

PWMLimit*: PWM Limit [0..249] (default = 100)

CurLimit*: Current Limit [0..3] (default = 0)

EXAMPLE: #A1SPS100

Set pierce speed to 10 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSP Set Pick Speed For Diti Commands:

SSP Speed*, PWMLimit*, CurLimit*

The **SSP** command sets the pick parameter for all Z-axis (in volatile RAM) that they will use while moving from Z-start to Z-max. For detailed information about PWM limit and current limit, read the *DC Servo Controller Command Summary* document.

Speed*: speed in 0.1 mm/s [1..1500] (default = 800)

PWMLimit*: PWM Limit [0..249] (default = 60)

CurLimit*: Current Limit [0..3] (default = 0)

EXAMPLE: #A1SSP100

Sets pick speed to 10 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSD Set Discard Speed For Diti Commands:

SSD Speed*, PWMLimit*, CurLimit*

The **SSD** command sets the discard parameter for all Z-axis (in volatile RAM) that they will use while moving from Z-start to Z-max. For detailed information about PWM limit and current limit, read the *DC Servo Controller Command Summary* document.

Speed*: speed in 0.1 mm/s [1..1500] (default = 250)

PWMLimit*: PWM Limit [0..249] (default = 160)

CurLimit*: Current Limit [0..3] (default = 0)

EXAMPLE: #A1SSD100

Set discard speed to 10 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SST *Set Splash Free Diti Eject Logical Positions:*

SST Log1*, Log2*, DiscardDist*

This command sets the logical positions for the splash free diti eject manually. Normally the **CST** command is used to calibrate the diti eject mechanism. But under some circumstances it is useful to readjust the logical positions by hand. These parameters can be stored in non-volatile memory by the **SOW** command.

Log1*: Upper eject position in 0.1 mm [0..Z-Range] (default = 1075)

Log2*: Lower eject position in 0.1 mm [0..Z-Range] (default = 700)

DiscardDist*: Discard distance in 0.1 mm [0..100] (default = 45)

EXAMPLE: #A1SST,705

Corrects the logical position two by 0.5 mm upwards.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDE *Switch Splash Free Diti Eject On Or Off:*

SDE OnOff

This command can be used to turn on or off the splash free diti eject solenoid.

OnOff: 0 = eject released (power off), 1 = eject active (power on)

EXAMPLE: #A1SDE1

Switch diti eject solenoid on.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

STL *Set Individual Z-Start For Liquid Search Commands:*

STL Z-start1*..Z-start8*

This command sets the individual Z-start height for all Z-axis. Those parameters are used by the **MDT**, **MET** command if there is no global Z-start selected.

Z-start[i]*: = [-32768..max Z-Range set by **SRA** cmd or 32767] (default = 1000)

EXAMPLE: #A1STL1000,1000,1000,1000,1300,1300,1300,1300

Set the Z-start height for the first four tips to 100 mm and the height for the second four tips to 130 mm above worktable.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SML *Set Individual Z-Max For Liquid Search Commands:*

SML Z-max1*..Z-max8*

This command sets the individual Z-max height for all Z-axis. Those parameters are used by the **MDT**, **MET** command if there is no global Z-max selected.

Z-max[i]*: [-32768..max Z-Range set by **SRA** cmd or 32767] (default = 1000)

EXAMPLE: #A1SML500,500,500,500,600,600,600,600

Set the Z-max height for the first four tips to 50 mm and the height for the second four tips to 60 mm above worktable.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SBL *Set Individual Submerge For Liquid Search Commands:*

SBL Submerge1*..Submerge8*

This command sets the individual submerge distance for all Z-axis. Those parameters are used by the **MDT**, **MET** command if no global submerge is selected.

Submerge[i]*: [-32768..max Z-Range set by **SRA** cmd or 32767] (default = 0)

EXAMPLE: #A1SBL10,10,10,10,30,30,30,30

Set the submerge distance for the first four tips to 1 mm and for the second four tips to 3 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDL *Set Individual Safe Detection Retract Distance For Liquid Search Commands:*

SDL SafeDetRetractDist1*.. SafeDetRetractDist8*

This command sets the individual safe detection retract distance for all Z-axis. Those parameters are used by the **MDT**, **MET** command if no global distance is selected.

SafeDetRetractDist[i]*: [-32768..max Z-Range set by **SRA** cmd or 32767] (default = 50)

EXAMPLE: #A1SDL10,10,10,10,30,30,30,30

Sets the safe detection retract distance for the first four tips to 1 mm and the those for the second four tips to 3 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDR *Set Individual Retract Distance For Clot Detection Commands:*

SDR RetractDist1*..RetractDist8*

This command sets the individual retract distance for all Z-axis. This parameter is used by the **MCT** command if no global retract distance is selected.

RetractDist[i]*: [0..max Z-Range set by **SRA** cmd or 32767] (default = 50)

EXAMPLE: #A1SDR150,150,150,150,120,120,120,120

Set the retract distance for the first four tips to 15 mm and to 12 mm for the second four tips.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SSR *Set Individual Retract Speed For Clot Detection Commands:*

SSR RetractSpeed1*..RetractSpeed8*

This command sets the individual retract speed for all Z-axis. This parameter is used by the **MCT** command if no global retract speed is selected.

RetractSpeed[i]*: speed in 0.1 mm/s [1..1500] (default = 200)

EXAMPLE: #A1SSR150,150,150,150,120,120,120,120

Set the retract speed for the first four tips to 15 mm/s and to 12 mm/s for the second four tips.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SLR *Set Individual Limit For Clot Detection Commands:*

SLR Limit1*..Limit8*

This command sets the individual limit within the clot must be detected without generating an error for all Z-axis. This parameter is used by the **MCT** command if no global limit is selected.

Limit [i]*: [0..RetractDist] (default = 40)

EXAMPLE: #A1SLR50,50,50,50,80,80,80,80

Set the limit distance for the first four tips to 5 mm and to 8 mm for the second four tips.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SDM Set Liquid Detection Mode:

SDM DetProc*, Sense*, Phase*, DipIn*, DipOut*

This command sets the different liquid detection procedures and detection modes for the liquid detection commands **MDT**, **MET**. There are eight different detection procedures available. For reagent troughs, use detection mode 7 only.

0. The **Common Proc** detects liquid with all selected tips simultaneously.
1. The **Common Safe Proc** detects liquid with all selected tips simultaneously. After a successful first detection, the position where liquid was detected is stored and the tips will be retracted with the distance defined by the **SDL** command. Then a second detection will be started. The second detection must be within a window (+/- 50% **SDL** dist.) to accept the detection. If the second capture position is out of window range a further detection will be started at this point. After four failed detection's the procedure responds with an error message.
2. The **Semi Proc** detects first with all odd selected tips, then with all even selected tips. The detection itself is like the **Common Proc**.
3. The **Semi Safe Proc** detects first with all odd selected tips, then with all even selected tips. The detection itself is like the **Common Safe Proc**.
4. The **Full Proc** detects liquid tip after tip with a **Common Proc**.
5. The **Full Safe Proc** detects liquid tip after tip with a **Common Safe Proc**.
6. The **Delay Proc** detects liquid tip after tip with a delay of 80ms with a **Common Proc**.
7. The **Trough Proc** detects liquid tip after tip with a **Common Safe Proc**. If a tip detects liquid, it will be moved out of liquid 10 mm immediately. When all tips have done the same detection, they will be moved into liquid again with default submerge of 1 mm. The individual submerge distance is added after default submerge.

DetProc*: [0..7] (default = 1)
 0 = *Common Proc*
 1 = *Common Safe Proc*
 2 = *Semi Proc*
 3 = *Semi Safe Proc*
 4 = *Full Proc*
 5 = *Full Safe Proc*
 6 = *Delay Proc*
 7 = *Trough Proc*

Sense*: (Sensitivity) [0..2] (default = *standard*)
 0 = *standard*
 1 = *high*
 2 = *very high*

Phase*: [0..1] (default = *same*)
 0 = *same*
 1 = *against* (not recommendable) (not possible if Freedom)

DipIn*/DipOut*: [0..1] (default = *enable*)
 0 = *enable*
 1 = *disable*

EXAMPLE: #A1SDM4,,1,,1

Set *Full Sequence Proc* with *standard* sensitivity, phase *against*, DipIn *enabled* and DipOut *disabled*.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SFX Set X-Ramp Parameters:

SFX EndSpeed*, Accel*

This command sets the X-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory. CAUTION: There are two different sets of parameters handled now at this place. The first set is used in a standard GENESIS RSP X-axis. The second set supports the new GENESIS Freedom X-axis concept.

Standard GENESIS RSP:

EndSpeed*: speed in 0.1 mm/s. [50..11250] (default = 10000)

Accel*: accel. in 0.1 mm/s². [380..11250] (default = 1600)

GENESIS Freedom:

EndSpeed*: speed in 0.1 mm/s. [50..10000] (default = 10000)

Accel*: accel. in 0.1 mm/s². [190..10000] (default = 1200)

EXAMPLE: #A1SFX5000,1000

Set end speed to 500 mm/s and the acceleration to 100 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SFY Set Y-Ramp Parameters:

SFY EndSpeed*, Accel*

This command sets the Y and Y-space axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 mm/s. [50..12500] (default = 3500)

Accel*: accel. in 0.1 mm/s². [430..12500] (default = 2400)

EXAMPLE: #A1SFY1000,500

Set end speed to 100 mm/s and the acceleration to 50 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SFZ Set Z-Ramp Parameters:

SFZ EndSpeed*, Accel*

This command sets all the Z-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 mm/s. [50..7500] (default = 4000)

Accel*: accel in 0.1 mm/s². [250..7500] (default = 2000)

EXAMPLE: #A1SFZ2500,3000

Set end speed to 250 mm/s and the acceleration to 300 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SDA *Set Liquid Detection Acceleration:*

SDA Accel

This command sets the acceleration in Z-axis for liquid detection. This parameter is only active while searching for liquid with the **MDT** command. After completion of liquid detection, the normal acceleration, set by the **SFZ** command, is in use. This value can be stored in non-volatile memory by the **SOW** command.

Accel: accel in 0.1 mm/s². [250..7500] (default = 2000)

EXAMPLE: #A1SDA250

Decreases the acceleration to absolute minimum while liquid detection.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SOX *Set Initialization Offset For X-Axis:*

SOX InitOffset*, Displacement*

This command sets the initialization offset and the displacement offset in a multi-arm instrument to the entered parameter. Both parameter entered are in action immediately after this command is given. These parameters can be stored in non-volatile memory by the **SOW** command. CAUTION: The displace parameter can be used only for the Freedom instrument. After power up of a classic GENESIS RSP, the displacement is always zero.

InitOffset*: distance in 0.1 mm [0..X-Range set by **SRA** + InitOffset or 32767]
(default = 150)

Displacement*: distance in 0.1 mm [-250.. 32767] (default = 0)

EXAMPLE: #A1SOX100,1100

Set the X-init offset to 10 mm from initialization position and the X-displacement to 110 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SOY *Set Initialization Offset For Y-Axis:*

SOY InitOffset

This command sets the initialization offset to the entered parameter for the Y-axis. The Y-space axis is automatically set 1 mm higher then the Y-offset. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset: distance in 0.1 mm [10..Y-Range set by **SRA** + InitOffset (actual) or 32767]
(default = 900)

EXAMPLE: #A1SOY910

Set the Y-offset to 91 mm and space offset to 92 mm from initialization position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SOZ *Set Initialization Offset For Z-Axis:*

SOZ InitOffset1*..InitOffset8*

This command sets the initialization offset to the entered parameter for the given axis. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset[i]*: distance in 0.1 mm [10..1000] (default = 100)

EXAMPLE: #A1SOZ100,100,100,100

Set the Z-init offset for the first four tips to 10 mm from initialization position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SAX *Set Scale Adjust Factor For X-Axis:*

SAX ScaleAdjust

This command redefines the scale adjust factor of the X-axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5,0%] (default = 10000)

EXAMPLE: #A1SAX9975

Set the scale adjust factor to 0,9975.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SAY *Set Scale Adjust Factor For Y-Axis:*

SAY ScaleAdjust

This command redefines the scale adjust factor of the Y and Y-space axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5,0%] (default = 10000)

EXAMPLE: #A1SAY10055

Set the scale adjust factor to 1,0055.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SAS *Set Scale Adjust Factor For Y- Space Axis Only:*

SAS ScaleAdjust

This command redefines the scale adjust factor of the Y-space axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5,0%] (default = 10000)

EXAMPLE: #A1SAS9975

Set the scale adjust factor to 0,9975.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SCL *Switch Collision Avoidance Between LIHA And PosId On/Off:*

SCL On/Off

With this command it's possible to disable the collision avoidance between LIHA and PosId. This can be useful for positioning evaluation. The collision avoidance can be either reactivated by this command or it will be reactivated after an initialization with the following commands: **#MIPIS**, **#A1PIA**, **#A1PIX**, **#A1PIY**.

CAUTION: The collision avoidance between LIHA and PosId in a Freedom instrument is turned off anyway. This commands function is disabled.

On/Off: 0 = switched off, 1 = switched on (default = 1) (without PosId = 0)

EXAMPLE: #A1SCL0

Switch off collision avoidance.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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SSM *Set X-Axis Smooth Move Mode:*

SSM Mode

This command sets the X-axis smooth move mode. By default the smooth move mode is active. In this case the acceleration and speed parameters will be recalculated depending on the distance to move. When selecting mode 1, the normal acceleration and speed parameters set by the **SFX** command are in use. The mode parameter can be stored in the non-volatile memory with the **SOW** command.

Mode: [0..1] 0 = smooth move active, 1 = normal speed parameter (default = 0)

EXAMPLE: #A1SSM0

Activate smooth move mode.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SLX *Set New X-Axis Scaling Factor And Motion Direction:*

SLX XScale

CAUTION! This command should never be used in the normal operation with a GENESIS instrument. Wrong definition causes malfunction and could destroy the instrument!

With this command, it's possible to redefine the X-axis scale factor. In some special applications it's maybe useful to redefine this value. Inverting the sign of the scale factor can change the motor rotation direction. This value can't be stored in non-volatile memory.

XScale: [-32768..32767] (default = -1251 if SMT1; -2500 if SMT2; -3127 if SMT0)

EXAMPLE: #A1SLX1234

Set new scale factor for X-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SLY *Set New Y-Axis Scaling Factor And Motion Direction:*

SLY Yscale*,YSscale

CAUTION! This command should never be used in the normal operation with a GENESIS instrument. Wrong definition causes malfunction and could destroy the instrument!

With this command, it's possible to redefine the Y and Ys-axis scale factor. In some special applications it's maybe useful to redefine this value. Inverting the sign of the scale factor can change the motor rotation direction. This value can't be stored in non-volatile memory.

YScale [i]: [-32768..32767] (default = -1400)

EXAMPLE: #A1SLY3333,-3333

Set new scale factor for Y and Ys-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SLZ *Set New Z-Axis Scaling Factor And Motion Direction:*

SLZ ZScale1*..ZScale8*

CAUTION! This command should never be used in the normal operation with a GENESIS instrument. Wrong definition causes malfunction and could destroy the instrument!

With this command, it's possible to redefine the Z-axis scale factor. In some special applications it's maybe useful to redefine this value. Inverting the sign of the scale factor can change the motor rotation direction. This value can't be stored in non-volatile memory.

ZScale [i]: [-32768..32767] (default = +/-801)

EXAMPLE: #A1SLZ-801,801,-801,801,-801,801,-801,801

Define the scale factor of all axis to default.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

SMC Set All LIHA Axis Move Counter To Zero:

SMC Key

This command sets the entire LIHA move counter, reportable with the **RPX/Y/Z5** command to zero. The value of the counter that can be reported by the **RPX/Y/Z0** command remains at the same value as before.

EXAMPLE: #A1SMCxxxxx

Sets all LIHA move counter to zero.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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SMT Set X-Axis Motor Type:

SMT MotorType

This command sets the motor type. There are three different types supported. The default motor is the standard 1000 increment X-axis motor. There is an other type supported, which has an encoder resolution of 400 increments. The newest type has also a resolution of 1000 increments, but is mounted directly on the arm. This motor type is only used in a multi-arm instrument. This setting will be done at TECAN and must never be changed unless a hardware change will be done. The motor type must be stored in non-volatile memory by the **SOW** command. CAUTION: Wrong motor type definition causes malfunction of the instrument.

MotorType:

- 0 = 400 increment encoder X-motor, belt driven.
- 1 = 1000 increment encoder X-motor, belt driven. (default)
- 2 = 1000 increment encoder X-motor, direct driven.

EXAMPLE: #A1SMT2

Set LIHA X-axis to the new direct driven motor type in a Freedom multi-arm instrument.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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3.3. Positioning, Move and Action Commands:

PIA Position Initialization X/Y/Z - Axis:

PIA Selector

This is the command, to initialize the arm X/Y/Z-axis. No movement command for the arm will be accepted before the **PIA** command is executed. When the **PIA** command is entered, the X/Y/Z-axis moves to their initialization positions with a default init speed. With the selector it is possible to disable the X-axis. This is useful after a pre initialization with **PIB** command. When the init position of each axis has been detected, they move to an initial offset position. There are four different init procedures possible.

1. No PosId installed, first init: First all Z-axis will be initialized at the current X and Y position. Then the Y and Y- space will be initialized. After that, the X-axis will be initialized and finally the Z-axis will be initialized once again.
2. No PosId installed, further init: First all Z-axis move upwards to initialization position. Then the Y and Y- space axis will be initialized. After that, the X-axis will be initialized and finally the Z-axis will be initialized.
3. PosId installed, first init: First all Z-axis will be initialized at the current X and Y position. Then the Y and Y- space axis move a little in the opposite direction to be sure that the tips be out of the PosId area. Then the X-axis will be initialized and after that, the Y and Y-space axis will be initialized. Finally the Z-axis will be initialized once again.
4. PosId installed, further init: First all Z-axis move upwards to initialization position. Then the Y and Y-space axis move to a near init position to avoid a crash with the PosId. Then the X-axis will be initialized and after that, the Y-axis will be initialized. Finally the Z-axis will be initialized.

Selector: 0 = normal initialization.
1 = X-axis disabled.

EXAMPLE: #A1PIA

Initialization of all axis on the arm.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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PIB *Position Pre Initialization:*

The **PIB** command is used to perform a pre initialization of the arm. This must be to prevent a collision with an obstacle in the rear part of the instrument while initialization. After performing the **PIB**, normally a **PIA** without X-axis will be performed. The goal of this command is to bring the Y-axis to the front of the instrument. After doing a **PIB**, all axis have a not initialized status.

EXAMPLE: #A1PIB

Pre initialization of the arm.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PIF *Fake Initialization X/Y/Z - Axis:*

PIF

The **PIF** command tells the firmware that all axis have been initialized, however, no mechanical initialization is executed. The current position coordinate of each axis is still valid, except if it is not initialized. In case of a not initialized axis, the position will be set to zero or maximal range.

CAUTION: Incorrect usage of this command may damage the instrument.

EXAMPLE: #A1PIF

Fake initialization of the arm.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PIX *Position Initialization X - Axis:*

PIX InitSpeed

This function reinitializes only the X-axis. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 400)

EXAMPLE: #A1PIX250

Initialization of the arm X-axis with an init speed of 25 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PIY *Position Initialization Y - Axis:*

PIY InitSpeed

This function reinitializes the Y and Y-space axis on the arm. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 350)

EXAMPLE: #A1PIY100

Initialization of the arm Y and Y-space axis with an init speed of 10 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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PIZ *Position Initialization Z - Axis:*

PIZ TipSelect, InitSpeed

This function reinitializes all installed Z-drives on the arm. If single tip initialization is required, the binary value of *TipSelect* selects the corresponding Z-drive. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameters uses the default speed and all tips to initialize. The init position of the Z drives is the range position set by the **SRA** command. That means that Z-zero position must be somewhere near the worktable.

TipSelect: binary coded tip select [1..255]

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 270)

EXAMPLE: #A1PIZ170

Initialization of the arms Z-drive number 2, 4, 6 & 8 with default speed.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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PAA *Position Absolute For All Axis:*

PAA X, Y, Ys, Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8

The **PAA** command moves the X/Y/Z-axis to the entered coordinates in the absolute field. After using this command, the individual Z-travel height, set with the **SHZ** command, is in effect. If no Z-travel is set by **SHZ** command the Z-drives move to init position before traveling. The number of Z-parameters depends on the number of installed tips. In case of a fixed space LIHA, the Ys parameter will be ignored.

X: distance in 0.1 mm [(-InitOffset + 10 + X-Displace)..X-Range set by **SRA** cmd]

Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd] of tip 1.

Ys: space distance in 0.1 mm [0, 90..380]. (0 = 90)

Z[i]: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset -10)] of tip i [1..8]

EXAMPLE: #A1PAA1000,200,100,500,500,500,500,500,500,500

Moves all axis to the specified coordinates. The tips move up to Z-travel position before moving in X and Y directions.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId, (17) arm collision avoided with ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PAX *Position Absolute For X-Axis:*

PAX X

Moves the X-axis to an absolute position, leaving the other axis position unchanged.

X: distance in 0.1 mm [(-InitOffset + 10 + X-Displace)..X-Range set by **SRA** cmd] (default = 0)

EXAMPLE: #A1PAX1000

Absolute move in X-direction to 100 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId, (17) arm collision avoided with ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PAY *Position Absolute For Y-Axis:*

PAY Y*, Ys*

Moves the Y and Y-space axis to an absolute position, leaving the other axis position unchanged. The Y-space axis parameter is the distance from tip to tip. In case of a fixed space LIHA, the Ys parameter will be ignored.

Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd] (default = 0)

Ys: space in 0.1 mm [0, 90..380] (0 = 90) depending on Y.

EXAMPLE: #A1PAY500,200

Absolute move in Y-direction to 50 mm and a tip-to-tip space of 20 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PSY *Y-Spacing Of Tips:*

PSY Ys

Space the tips in Y-direction. Tip number one remains at the same position. The Y-space axis parameter is the distance from tip to tip. In case of a fixed space LIHA, this command has no function.

Ys: space in 0.1 mm [0, 90..380] (0 = 90) depending on Y.

EXAMPLE: #A1PSY360

Move to tip-to-tip space of 36 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PAZ *Position Absolute For Z-Axis:*

PAZ Z1*, Z2*, Z3*, Z4*, Z5*, Z6*, Z7*, Z8*

Move all installed tips individually to absolute position, leaving the X and Y-axis position unchanged. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable. The number of Z-parameters depends on the number of installed tips.

Z[i]: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

EXAMPLE: #A1PAZ100,200,300,400,500,600,700,800

Individual absolute moves in Z-direction

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PRX *Position Relative For X-Axis:*

PRX +/- X

Moves X-axis relative to its actual position. All other positions remain unchanged.

+/-X: distance in 0.1 mm [(-InitOffset + 10 + X-Displace)..X-Range set by **SRA** cmd]

EXAMPLE: #A1PRX500

Move the X-axis 50 mm from the current position to the right.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId, (17) arm collision avoided with ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PRY *Position Relative For Y-Axis:*

PRY +/- Y

Moves Y-axis relative to its actual position. All other positions and the Y-spacing remain unchanged.

+/-Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

EXAMPLE: #A1PRY200

Move the Y-axis 20 mm from the current position to the front.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PRZ *Position Relative For Z-Axis:*

PRZ +/- Z1*, .. +/- Z7*, +/- Z8*

Move all installed tips individually in the Z-axis to positions relative to their present positions, leaving the other axis unchanged. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable. The number of Z-parameters depends on the number of installed tips.

+/-Z[i]: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

EXAMPLE: #A1PRZ100,-50,100,-100,50,100,200,-50

Move the Z-axis down or up from the current position. (Negative values move axis down)

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PCX *Position Relative In Increment Resolution For X-Axis:*

PCX +/-Xincs

Moves the X-axis relative to its actual position in increment resolution. This feature is useful when the normal resolution of 1/10mm is too high.

CAUTION: This command does not check any ranges and does not support any collision avoidance. Improper usage of this command can destroy the instrument.

+/-Xincs: distance in increments [-10000..10000]

EXAMPLE: #A1PCX3

Move the X-axis 3 increments from the current position to the right.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

PCY *Position Relative In Increment Resolution For Y-Axis:*

PCY +/-Yincs

Moves the Y and Y-space axis relative to its actual position in increment resolution. This feature is useful when the normal resolution of 1/10mm is too high.

CAUTION: This command does not check any ranges and does not support any collision avoidance. Improper usage of this command can destroy the instrument.

+/-Yincs: distance in increments [-10000..10000]

EXAMPLE: #A1PCY5

Move the Y and Y-space axis 5 increments from the current position to the front.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MAX *Move Absolute Slow Speed For X-Axis:*

MAX X, SlowSpeed

Moves the X-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default speed stored in memory is used.

X: distance in 0.1 mm [(-InitOffset + 10 + X-Displace)..X-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 1000)

EXAMPLE: #A1MAX1000,500

Absolute move in X-direction to 100 mm from init position with a slow speed of 50 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId, (17) arm collision avoided with ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MAY *Move Absolute Slow Speed For Y-Axis:*

MAY Y, Ys, SlowSpeed

Moves the Y and Y-space axis with a slow speed to an absolute position, leaving the other axis positions unchanged. The Y-space axis parameter is the distance between the tips. In case of a fixed space LIHA, the Ys parameter will be ignored. If no speed or speed is equal zero, then the default speed stored in memory is used. When speed is < 5 mm/s the move acts different than moving with faster speeds.

Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd] of tip 1.

Ys: space in 0.1 mm [0, 90..380]. (0 = 90)

SlowSpeed: speed in 0.1 mm/s [0, 20..4000] (0 = default = 350)

EXAMPLE: #A1MAY1000,200,250

Absolute move in Y-direction to 100 mm from init position and 20 mm tip-to-tip space with a speed of 25 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MAZ *Move Absolute Slow Speed For Z-Axis:*

MAZ Z1*,.. Z8*, SlowSpeed

Move all installed tips with slow speed individually to absolute position, leaving the other axis positions unchanged. If no speed is selected, the default speed stored in memory is used. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable. The number of Z-parameters depends on the number of installed tips.

Z[i]: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset – 10)]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 400)

EXAMPLE: #A1MAZ100,200,300,400,500,600,700,800,500

Move all Z-axis individually with a speed of 50 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MRX *Move Relative Slow Speed For X-Axis:*

MRX +/- X, SlowSpeed

Moves the X-axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed is selected, the default speed stored in memory is used. When speed is < 5 mm/s the move acts different than moving with faster speeds.

+/-X: distance in 0.1 mm [(-InitOffset + 10 + X-Displace)..X-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 1000)

EXAMPLE: #A1MRX1000,500

Relative move in X-direction, 100 mm from current position to the right with a slow speed of 50 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId, (17) arm collision avoided with ROMA.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MRY *Move Relative Slow Speed For Y-Axis:*

MRY +/- Y, SlowSpeed

Moves the Y and Y-space axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed or speed is equal zero, then the default speed stored in memory is used.

+/-Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [0, 20..4000] (0 = default = 350)

EXAMPLE: #A1MRY-500,50

Move Y-axis 50 mm from the current position to the back with a speed of 5 mm/s. The tip space remains unchanged.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (13) arm collision avoided with PosId.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MRZ Move Relative Slow Speed For Z-Axis:

MRZ +/- Z1*,... +/- Z8*, SlowSpeed

Move all installed tips individually in the Z-axis to positions relative to their present position, leaving the other axis unchanged. If no speed is selected, the default speed stored in memory is used. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable. The number of Z-parameters depends on the number of installed tips.

+/-Z[i]: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 400)

EXAMPLE: #A1MRZ100,-200,300,-400,500,-600,700,-800,100

Move Z-axis up or down from the current position with a speed of 10 mm/s. Negative values move axis down.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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MHZ Move To Z-Travel Height:

MHZ TipSelect, +/-Dist

Move the selected tips to the Z-travel height defined by the **SHZ** command, plus or minus the distance indicated by +/-Dist. The distance parameter is set global for all installed tips.

TipSelect: binary coded tip select [1..255]

+/-Dist: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

EXAMPLE: #A1MHZ170,-50

Move tip 2, 4, 6 & 8 to Z-travel height - 5 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MDT Move Tip, Detect Liquid, Submerge:

MDT TipSelect, Submerge, Z-start, Z-max, Z-add1..Z-add8

The **MDT** command moves the selected tips to *Z-start* and then searches downward until they detect liquid or reach *Z-max*. If no liquid is detected, the tips will move back to their Z-travel position and an error code will be generated. If liquid is detected, the tips will be lowered by the specified *Submerge* distance and verify that another *Add* distance can be lowered before reaching *Z-max*. If this is not possible, an error code is generated. If the parameter *TipSelect* is not defined, all possible tips are used to detect liquid. If the parameters *Submerge*, *Z-start* or *Z-max* are not defined, the **MDT** command is using the individual position values. Those values can be set for each axis separately by the following commands: **SBL** (set submerge distance), **STL** (set Z-start position), **SML** (set Z-max position) and **SDL** (set safe detection retract distance). The **MDT** command can handle also different detection procedures and modes, which can be set by the **SDM** (set detection mode) command. The number of Z-add parameters depends on the number of installed tips.

TipSelect: binary coded tip select [1..255]

Submerge: distance in 0.1 mm, Z-start – Submerge must be within [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

Z-start: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

Z-max: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

Z-Add[i]: distance in 0.1 mm. Required distance to travel downwards before reaching *Z-Max*.

EXAMPLE: #A1MDT170,20,1000,600

Move tip 2, 4, 6 & 8 down to *Z-start* height (100 mm), and then start liquid detection until *Z-max* (60 mm) is reached. If liquid is detected, submerge with 0.2 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (9) no liquid detected, (10) drive no load, (11) not enough liquid **MDT**, (20) no liquid exit detected, (23) not yet moved, (24) pulse Ild.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MET *Move Tip, Detect Liquid, Submerge:*

MET TipSelect, Submerge, Z-start, Z-max, Z-add1..Z-add8

The **MET** is the same as **MDT** command, except the tips will remain at *Z-max* upon error.

TipSelect: binary coded tip select [1..255]

Submerge: distance in 0.1 mm, *Z-start* – Submerge must be within [0..*Z-Range* set by **SRA** cmd + (InitOffset –10)]

Z-start: distance in 0.1 mm [0..*Z-Range* set by **SRA** cmd + (InitOffset –10)]

Z-max: distance in 0.1 mm [0..*Z-Range* set by **SRA** cmd + (InitOffset –10)]

Z-Add[i]: distance in 0.1 mm. Required distance to travel downwards before reaching *Z-Max*.

EXAMPLE: #A1MET170,20,1000,600

Move tip 2, 4, 6 & 8 down to *Z-start* height (100 mm), and then start liquid detection until *Z-max* (60 mm) is reached. If liquid is detected, submerge with 0,2 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (9) no liquid detected, (10) drive no load, (12) not enough liquid **MET**, (20) no liquid exit detected, (23) not yet moved, (24) pulse Ild.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

MCT *Check For Clot On Selected Tips:*

MCT TipSelect, RetractDist, RetractSpeed, Limit

Retract the selected tips out of liquid with the specified distance and speed. Then check if the exit signal (dip out) is within a defined limit. If the exit signal is not within the limit, a *Clot Limit* error will be generated. If no exit signal can be detected, a *Clot no Exit* error is generated. If the parameter *TipSelect* is not defined, all possible tips are used for Clot detection. If the parameters *RetractDist*, *RetractSpeed* or *Limit* is not defined, the **MCT** command are using the individual retract values. Those values can be set for each axis separately by the following commands: **SDR** (set retract distance), **SSR** (set retract speed) and **SLR** (set limit). The **MCT** command can also handle different detection procedures and modes, which can be set by the **SDM** (set detection mode) command.

TipSelect: binary coded tip select [1..255]

RetractDist: distance in 0.1 mm [0..*Z-Range* set by **SRA** cmd + (InitOffset –10)] (default = 50)
RetractDist must be > *Limit*.

RetractSpeed: speed in 0.1 mm/s [1..1500] (default = 200)

Limit: distance in 0.1 mm [0..*RetractDist*-1] (default = 40)

EXAMPLE: #A1MCT,150,100,100

Retract all tips with 15 mm with speed 10 mm/s and check if exit signal occurs within 10 mm from start position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load, (18) clot limit, (19) clot no exit, (24) pulse Ild.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

APT Pierce With Tip:

APT TipSelect, Z-start, Z-max

The **APT** command moves the selected tips to *Z-start* and then pierces downwards until the tips reach *Z-max*. The parameters *Z-start* and *Z-max* must be given, otherwise no move will be performed.

TipSelect: binary coded tip select [1..255]

Z-start: distance in 0.1 mm [0..Z-Range set by *SRA* cmd + (InitOffset –10)]

Z-max: distance in 0.1 mm [0..Z-Range set by *SRA* cmd + (InitOffset –10)]

EXAMPLE: #A1APT170,500,600

Move tip 2, 4, 6 & 8 down to start piercing position, and then pierce down to Z-max position

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

AGT Get A Disposable Tip:

AGT TipSelect, Z-start, SearchDist, ,Retract

This function picks up the number of disposable tips set by *TipSelect* from the current position. If no tip is selected, all channels are searching for a disposable tip. *Z-start* is the position where searching begins and the *SearchDist* defines the range within a tip must be found. The forth parameter can be ignored. It is used as a placeholder for compatibility to the EVO instrument. At least, the retract movement can be electively selected. Per default the tips will be retracted to max Z-Range. Alternatively by disabling the retract switch, the tip will be left at Z-Start after the tip fetch procedure.

TipSelect: binary coded tip select [1..255]

Z-start: distance in 0.1 mm [0..Z-Range set by *SRA* cmd + (InitOffset –10)]

SearchDist: distance in 0.1 mm, Z-start – SearchDist must be within [0..Z-Range set by *SRA* cmd + (InitOffset –10)]

Retract: 0 = retract move to Z-Range, 1 = retract disabled - leave Tips at Z-Start after tip fetch.

EXAMPLE: #A1AGT170,500,100

Get a tip at the current position with tip 2, 4, 6 & 8. Start searching begins at 50 mm above worktable and the tip fetch range must be within 10 mm downwards.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load, (25) tip not fetched, (26) tip not mounted, (27) tip mounted.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

ADT Discard Tip:

ADT TipSelect

Discards the number of disposable tips set by *TipSelect*. If no tip is selected, all tips will be discarded. The tips will be thrown off by moving up to initialization position of the Z-axis.

TipSelect: binary coded tip select [1..255]

EXAMPLE: #A1ADT170

Discard tip at the current position with tip 2, 4, 6 & 8.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented, (7) device not init, (27) tip mounted.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

AST *Splash Free Discard Tip:*

AST TipSelect, LogPos

Discards the number of disposable tips set by *TipSelect*. If no tip is selected, all tips will be discarded. Unselected tips remain at the actual position. *LogPos* defines the logical position where the tips must be thrown off. The logical positions can be calibrated automatically by the *CST* command or set manually by the *SST* command. The presence of the splash free diti eject mechanism can be reported by the *RSD* command.

TipSelect: binary coded tip select [1..255]

LogPos: 0 = higher discard position, 1 = lower discard position.

EXAMPLE: #A1AST15,0

Discards tips one to four at the higher discard position.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented, (7) device not init, (10) drive no load, (27) tip mounted.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

BMX *Stop X Drive Movement Immediately:*

BMX Selector

This function stops the movement of the commands *PAX*, *PRX*, *MAX*, *MRX* immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector: 0 = normal deceleration.

1 = emergency break.

2 = power down axis.

EXAMPLE: #A1BMX

Break the movement of X-axis with normal deceleration.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

BMX *Stop Y Drive Movement Immediately:*

BMX Selector

This function stops the movement of the commands *PAY*, *PRY*, *MAY*, *MRY* immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector: 0 = normal deceleration.

1 = emergency break.

2 = power down axis.

EXAMPLE: #A1BMX2

Power down of Y and Y-space axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

BMZ *Stop Z Drive Movement Immediately:*

BMZ TipSelect, Selector

This function stops the movement of the commands *PAZ*, *PRZ*, *MAZ*, *MRZ*, *MHZ* immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered

down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

TipSelect: binary coded tip select [1..255]

Selector: 0 = normal deceleration.
1 = emergency break.
2 = power down axis.

EXAMPLE: #A1BMZ255,1

Emergency break of all tips.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

CST *Calibrate Automatically The Splash Free Diti Eject Logical Positions:*

CST

This command searches automatically the splash free diti eject logical positions. First the lower eject position will be evaluated, then the higher one.

EXAMPLE: #A1CST

Calibrates the lower and higher logical discard positions.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

ARX *Auto Range X-Axis:*

ARX Dummy, Selector, Offset*

This command moves to the right and then to the left stopper of the X-axis and sets the X-range. After completion of the ranging movement either the standard offset or the offset given by the third parameter will be performed. The scale adjust value can be set to 10000, when using the selector one. The determined range value can be stored into the non-volatile memory with the **SOW** command.

CAUTION: Wrong usage of this command can damage the instrument.

Dummy: not relevant for this command.

Selector: 0 = use original scale adjust.
1 = reset scale adjust to 10000.

Offset*: distance in 0.1 mm [0..X-Offset set by **SOX**]

EXAMPLE: #A1ARX,1

Auto ranges the X-axis with a scale adjust factor of 10000 and standard offset.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

ARY *Auto Range Y-Axis:*

ARY Dummy, Selector

This command moves to the front and the back stopper of the Y-axis and sets the Y-range. The scale adjust value can be set to 10000, when using the selector one. The determined value can be stored into the non-volatile memory with the **SOW** command.

CAUTION: Wrong usage of this command can damage the instrument.

Dummy: not relevant for this command.

Selector: 0 = use original scale adjust.
1 = reset scale adjust to 10000.

EXAMPLE: #A1ARY

Auto ranges the Y-axis with the actual set scale adjust.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

ARZ *Auto Range Z-Axis:*

ARZ TipNo

This command moves with the selected reference tip from top downward onto the table and back to the initialization position. Only one tip can be selected to evaluate the range at a time. For correct ranging a TECAN reference tip must be mounted. The determined value can be stored into the non-volatile memory with the **SOW** command.

CAUTION: Wrong usage of this command can damage the instrument.

TipNo: tip selection [1..8].

EXAMPLE: #A1ARZ7,1

Auto ranges the Z-axis number seven.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

NOC *Automatic Reference Pin Coarse Detection:*

NOC TipNo

This function is used for coarse finding the reference pin with the hole in the middle. After once detected the pin, the hole inside can be found with the NOK command precisely. For further information about the function of this command, please contact TECAN.

CAUTION: Wrong usage of this command can damage the instrument.

TipNo: tip selection [1..8].

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
------------------------------------------------------	-----------------------------------------------------

NOK *Automatic Reference Hole Detection:*

NOK TipNo

This function can be used to find a reference hole automatically. For further information about the function of this command, please contact TECAN.

CAUTION: Wrong usage of this command can damage the instrument.

TipNo: tip selection [1..8].

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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3.4. Error Codes LIHA Arm #A

Code	Common Errors for all Devices
1	Initialization error
2	Invalid command
3	Invalid operand
4	Invalid command sequence
5	Device not implemented
6	Timeout error
7	Device not initialized
8	Command overflow of CU
15	Command overflow of sub device

Code	Device #A Error Codes
9	No liquid detected (MDT, MET)
10	Drive no load
11	Not enough liquid (MDT)
12	Not enough liquid (MET)
13	Arm collision avoided with PosId (not Freedom)
16	Power fail circuit error
17	Arm collision avoided with ROMA (not Freedom)
18	Clot limit passed (MCT)
19	No clot exit detected (MCT)
20	No liquid exit detected (MDT, MET)
23	Not yet moved (MDT, MET)
24	Ilid pulse error (MDT, MET, MCT)
25	Tip not fetched (AGT, ADT)
26	Tip not mounted (AGT, ADT)
27	Tip mounted (AGT, ADT)

4. Command Set of ROMA Arm #R

4.1. Report Commands:

RHW Report Roma Hardware Version:

RHW

This command reports the actual installed ROMA hardware version.

EXAMPLE: #R1RHW

Reports the actual hardware version.

RESPONSE: 1 = ROMA1, 2 = ROMA2

GENERATED ERRORS: (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RAA Report Coordinate Position From Table:

RAA TableIndex

This command reports the defined table entries set by the command **SAA**. Only axis which are defined can be reported. Undefined axis does not report any parameter. The last parameter reported is the speed setting.

TableIndex: table position [1..100]

EXAMPLE: #R1RAA2

Reports the table entry number two.

RESPONSE: X,Y,Z,R,G positions, slow/fast speed.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RAE Report Actual Table Index Of AAA Movement:

RAE

This command reports the actual position of the AAA movement. Especially in error case it's useful to report the position where the ROMA stops execution.

EXAMPLE: #R1RAE

Reports the actual table index of **AAA** movement.

RESPONSE: 1..100 while execution or 0 if successful termination of **AAA** command.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RPX Report Current Parameter For X-Axis:

RPX Selector

This command reports the current parameter of the X-axis. Only one axis parameter can be reported at a time.

Selector:

- 0 = Report current position in 1/10 mm. (default)
- 1 = Report acceleration in 1/10 mm/s².
- 2 = Report end speed in 1/10 mm/s.
- 3 = Report init speed in 1/10 mm/s.
- 4 = Report init offset in 1/10 mm.
- 5 = Report actual machine range in 1/10 mm.
- 6 = Report init error steps in encoder increments.
- 7 = Report travel position in 1/10 mm.
- 8 = Report scale adjust factor.
- 9 = Report slow speed in 1/10 mm/s.

- 10 = Report axis scaling factor.
- 11 = Report target position in 1/10 mm.

EXAMPLE: #R1RPX2

Reports the end speed of X-drive.

RESPONSE: one X-axis parameter.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

RPY Report Current Parameter For Y-Axis:

RPY Selector

This command reports the current parameter of the Y-axis. Only one axis parameter can be reported at a time.

- Selector:**
- 0 = Report current position in 1/10 mm. (default)
 - 1 = Report acceleration in 1/10 mm/s².
 - 2 = Report end speed in 1/10 mm/s.
 - 3 = Report init speed in 1/10 mm/s.
 - 4 = Report init offset in 1/10 mm.
 - 5 = Report actual machine range in 1/10 mm.
 - 6 = Report init error steps in encoder increments.
 - 7 = Report travel position in 1/10 mm.
 - 8 = Report scale adjust factor.
 - 9 = Report slow speed in 1/10 mm/s.
 - 10 = Report axis scaling factor.
 - 11 = Report target position in 1/10 mm.

EXAMPLE: #R1RPY2

Reports the end speed of Y-drive.

RESPONSE: one Y-axis parameter.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

RPZ Report Current Parameter For Z-Axis:

RPZ Selector

This command reports the current parameter of the Z-axis. Only one axis parameter can be reported at a time.

- Selector:**
- 0 = Report current position in 1/10 mm. (default)
 - 1 = Report acceleration in 1/10 mm/s².
 - 2 = Report end speed in 1/10 mm/s.
 - 3 = Report init speed in 1/10 mm/s.
 - 4 = Report init offset in 1/10 mm.
 - 5 = Report actual machine range in 1/10 mm.
 - 6 = Report init error steps in encoder increments.
 - 7 = Report travel position in 1/10 mm.
 - 8 = Report scale adjust factor.
 - 9 = Report slow speed in 1/10 mm/s.
 - 10 = Report axis scaling factor.
 - 11 = Report target position in 1/10 mm.

EXAMPLE: #R1RPZ2

Reports the end speed of Z-drive.

RESPONSE: one Z-axis parameter.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RPR Report Current Parameter For R-Axis:

RPR Selector

This command reports the current parameter of the Rotator-axis. Only one axis parameter can be reported at a time.

Selector:

- 0 = Report current position in 1/10 dg.
- 1 = Report acceleration in 1/10 dg/s².
- 2 = Report end speed in 1/10 dg/s.
- 3 = Report init speed in 1/10 dg/s.
- 4 = Report init offset in 1/10 dg.
- 5 = Report actual machine range in 1/10 dg.
- 6 = Report init error steps in encoder increments.
- 7 = Report travel position in 1/10 dg.
- 8 = Report scale adjust factor.
- 9 = Report slow speed in 1/10 dg/s.
- 10 = Report axis scaling factor.
- 11 = Report target position in 1/10 dg/s.

EXAMPLE: #R1RPR2

Reports the end speed of Rotator-drive.

RESPONSE: one R-axis parameter.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RPG Report Current Parameter For G-Axis:

RPG Selector

This command reports the current parameter of the Gripper-axis. Only one axis parameter can be reported at a time.

Selector:

- 0 = Report current position in 1/10 mm.
- 1 = Report acceleration in 1/10 mm/s².
- 2 = Report end speed in 1/10 mm/s.
- 3 = Report init speed in 1/10 mm/s.
- 4 = Report init offset in 1/10 mm.
- 5 = Report actual machine range in 1/10 mm.
- 6 = Report init error steps in encoder increments.
- 7 = Report travel position in 1/10 mm. (RealDist)
- 8 = Report scale adjust factor.
- 9 = Report slow speed in 1/10 mm/s.
- 10 = Report axis scaling factor.
- 11 = Report target position in 1/10 mm.

EXAMPLE: #R1RPG2

Reports the end speed of G-drive.

RESPONSE: one G-axis parameter.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RGG Report Gripper Parameter:

RGG

This command reports the gripper speed, PWM limit and maximal allowed current set by the **SGG** command.

EXAMPLE: #R1RGG

RESPONSE: Speed, PWMLimit, CurrLimit.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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ROD *Report Gripper Outtrigger Distance:*

ROD

This command reports the gripper outtrigger distance. The distance reported by this command is used by the instrument to avoid crashes between the LIHA and the ROMA. In addition, the outtrigger Fixon parameter will be reported.

EXAMPLE: #R1ROD

Report the gripper outtrigger distance.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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RIZ *Report Z-Axis Force:*

RIZ

This command reports the Z-axis force set by the **SIZ** command. This setting is only active while moving down with Z-axis of the ROMA.

EXAMPLE: #R1RIZ

Reports the actual force set by **SIZ** command.

RESPONSE: 0 = lower force (default), 1 = high force.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RBK *Report Z-Axis Break Status:*

RBK

This command returns the actual status of the Z-axis break.

EXAMPLE: #R1RBK

Reports the break status.

RESPONSE: 0 = break active (power off), 1 = break released (power on)

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RRX *Report Absolute / Relative Position To The Other Arm:*

RRX Selector

This command reports the maximal absolute position or the maximal relative distance to the other arm without generating a collision avoidance error between LIHA and ROMA. This function is only active if LIHA and ROMA are installed on the system.

Selector: 0 = absolute position to the other arm.

1 = relative distance to the other arm.

EXAMPLE: #R1RRX

The answer is the maximal moving distance of the ROMA X-axis.

RESPONSE: maximal position in 1/10 mm.

GENERATED ERRORS: (3) invalid operand, (7) device not initialized.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

REE *Report Extended Error Code or Axis Configuration String:*

REE Selector

This command gets the axis specific error codes. Possible are all the errors generated by the ROMA device. To visualize the error codes as ASCII characters, an offset of 40 hexadecimal is added to the error value. Alternatively the maximal axis configuration can be reported as a string. The axis configuration corresponds to the extended error codes.

Selector: 0 = Report extended error codes.
1 = Report axis configuration string.

EXAMPLE: #R1REE

RESPONSE: X, Y, Z, R, G error code i.e. @ @ @ @ @.

Means all drives are OK.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RDX *Report Diagnostic Functions For X-Axis:*

RDX Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
1 = Report distance counter in meter.
2 = Report the no load counter.
5 = Report re-settable move counter.

EXAMPLE: #R1RDX0

Reports the overall number of movements.

RESPONSE: X-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RDY *Report Diagnostic Functions For Y-Axis:*

RDY Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
1 = Report distance counter in meter.
2 = Report the no load counter.
5 = Report re-settable move counter.

EXAMPLE: #R1RDY1

Reports the overall distance in meter.

RESPONSE: Y-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

RDZ *Report Diagnostic Functions For Z-Axis:*

RDZ Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
1 = Report distance counter in meter.

2 = Report the no load counter.

5 = Report re-settable move counter.

EXAMPLE: #R1RDZ2

Reports the number of crashes on this axis.

RESPONSE: Z-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

☒ GENESIS Standard ☐ GENESIS Freedom

RDR Report Diagnostic Functions For R-Axis:

RDR Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
1 = Report distance counter in 1000 dg.
2 = Report the no load counter.
5 = Report re-settable move counter.

EXAMPLE: #R1RDR1

Reports the overall angle driven by this axis in 1000 dg increments.

RESPONSE: R-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

☒ GENESIS Standard ☐ GENESIS Freedom

RDG Report Diagnostic Functions For G-Axis:

RDG Selector

All the diagnostic values will be saved at power off of the instrument or if a power fail situation occurs. The stored data can be read by this command.

Selector: 0 = Report move counter.
1 = Report distance counter in meter.
2 = Report the no load counter.
3 = Report the number of gripped plates.
5 = Report re-settable move counter.

EXAMPLE: #R1RDG3

Reports the overall number of gripped plates

RESPONSE: G-axis data.

GENERATED ERRORS: (3) invalid operand, (16) power fail circuit error.

☒ GENESIS Standard ☐ GENESIS Freedom

4.2. Set Commands:

SRX Set X-Axis Range:

SRX Range

This command sets the absolute X-axis range. It can be stored in non-volatile memory with the **SOW** command.

Range: distance in 0.1 mm [0..1'000'000] (default = 1000)

EXAMPLE: #R1SRX12345

Set the X-axis range to 1234.5mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SRY Set Y-Axis Range:

SRY Range

This command sets the absolute Y-axis range. It can be stored in non-volatile memory with the **SOW** command.

Range: distance in 0.1 mm [0..1'000'000] (default = 1000)

EXAMPLE: #R1SRY2222

Set the Y-axis range to 222.2mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SRZ Set Z-Axis Range:

SRZ Range

This command sets the absolute Z-axis range. The **SRZ** range can be stored in non-volatile memory with the **AWE** command. After changing this parameter, this axis must be reinitialized again.

Range: distance in 0.1 mm [0..1'000'000] (default = 1000)

EXAMPLE: #R1SRZ3500

Set the Z-axis range to 350mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SRR Set R-Axis Range:

SRR Range

This command sets the absolute R-axis range. It can be stored in non-volatile memory with the **SOW** command.

Range: distance in 0.1 dg [0..1'000'000] (default = 1000)

EXAMPLE: #R1SRR2700

Set the X-axis range to 270 dg.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SRG Set G-Axis Range:

SRG Range

This command sets the absolute G-axis range. It can be stored in non-volatile memory with the **SOW** command.

Range: distance in 0.1 mm [0..1'000'000] (default = 1560)

EXAMPLE: #R1SRG1234

Set the G-axis range to 123.4mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SRA Set Range For Absolute Field:

SRA X*, Y*, Z*, R*, G*

The **SRA** command sets the absolute field range (in volatile RAM) for all axis of the ROMA arm. The X-Range cannot exceed the maximal value defined by the **[M]SMA** command. All other axis

can be defined without any limitation. These absolute values can be stored in non-volatile memory with the **[M]SOW** command.

X*: distance in 0.1 mm [0..max Machine Range set by **[M]SMA** cmd - X-Offset]
(default X-axis = 1000)

Y*: distance in 0.1 mm [0..1000000] (default = 1000)

Z*: distance in 0.1 mm [0..1000000] (default = 1000)

R*: distance in 0.1 dg [0..1000000] (default = 1000)

G*: distance in 0.1 mm [0..1000000] (default = 1560)

EXAMPLE: #R1SRA5000,3000,1500

Set max X-Range to 500 mm, Y-Range to 300 mm and Z-Range to 150 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SAA Set Coordinate Position Into Table:

SAA TableIndex, X*, Y*, Z*, R*, G*, Speed*

This command defines coordinate positions where the ROMA should drive. There is a maximum of hundred table entries (coordinate points) possible. Every axis can be selected individually. If an axis is not defined (parameter not set), the axis will not move. If the table definition is finished, it can be reported by the command **RAA** or it can be started by the command **AAA**. The last parameter defines the move type. It can be set to slow or fast movement.

TableIndex: coordinate points [1..100]

X*: distance in 0.1 mm

Y*: distance in 0.1 mm

Z*: distance in 0.1 mm

R*: distance in 0.1 dg

G*: distance in 0.1 mm

Speed* speed setting, 0 = slow speed, 1 = end speed (default = 0)

EXAMPLE: #R1SAA1,5000,3000,1500,,400,1

#R1SAA2,4000,,900,0,0

This example defines two table coordinates. The first entry defines all axis to move with fast speed setting (EndSpeed defined by e.g. SFX command), except the rotator axis. The second entry moves with the X, Rotator and Gripper axis using slow speed.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

☒ GENESIS Standard ☐ GENESIS Freedom

SGG Set Gripper Parameters:

SGG Speed*, PWMLimit*, CurLimit*

The **SGG** command sets the gripper speed, PWM limit and the maximal allowed current (in volatile memory) that are used while gripping a plate. For detailed information about PWM limit and current limit, read the *DC Servo Controller Command Summary* document. With the **SOW** command, the values can be stored in the non-volatile memory.

Speed*: speed in 0.1 mm/s [1..1500] (default = 200)

PWMLimit*: PWM limit [0..249] (default = 75)

CurLimit*: current limit [0..3] (default = 0)

EXAMPLE: #R1SGG200

Set the grip speed to 20 mm/s.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SOD *Set Gripper Outtrigger Distance:*

SOD Dist*, Fixon

This command can be used to define the gripper outrigger distance (length of gripper plus ½ MTP). The distance set by this command is used by the instrument to avoid crashes between the LIHA and the ROMA. This is useful when using gripper pins that are different in size than the standard gripper pins used for micro plates. In addition, there is a *Fixon* parameter, which allows continuously enabling the outrigger distance. This feature is useful for a ROMA without a rotator axis, but a fixed mechanic, which is larger than the ROMA itself. The outrigger distance is active between an 10dg and 170dg angle. With the **SOW** command, the values can be stored in the non-volatile memory.

Dist*: dist in 0.1 mm [1100..3000] (default = 1850)

Fixon: 0 = normal ROMA, 1 = outrigger distance always enabled. (default = 0)

EXAMPLE: #R1SOD2000,0

Set the gripper outrigger distance to 200 mm and to normal ROMA mode.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SFX *Set X-Ramp Parameters:*

SFX EndSpeed*, Accel*

This command sets the X-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory. CAUTION: There are two different sets of parameters handled now at this place. An X-axis gear of 1:1 uses the first set of parameter. The second set supports a new gear type 1:2.

1:1 setting:

EndSpeed*: speed in 0.1 mm/s. [50..11250] (default = 8000)

Accel*: acceleration in 0.1 mm/s². [380..11250] (default = 400)

1:2 default setting:

EndSpeed*: speed in 0.1 mm/s. [50..5000] (default = 5000)

Accel*: acceleration in 0.1 mm/s². [190..5000] (default = 800)

EXAMPLE: #R1SFX4000,1000

Set end speed to 400 mm/s and the acceleration to 100 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SFY *Set Y-Ramp Parameters:*

SFY EndSpeed*, Accel*

This command sets the Y-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 mm/s. [50..9500] (default = 3500)

Accel*: acceleration in 0.1 mm/s². [320..9500] (default = 1000)

EXAMPLE: #R1SFY1000,500

Set end speed to 100 mm/s and the acceleration to 50 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SFZ Set Z-Ramp Parameters:

SFZ EndSpeed*, Accel*

This command sets the Z-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 mm/s. [50..2800] (default = 1000)

Accel*: acceleration in 0.1 mm/s². [100..2800] (default = 250)

EXAMPLE: #R1SFZ2000,3000

Set end speed to 200 mm/s and the acceleration to 300 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SFR Set R-Ramp Parameters:

SFR EndSpeed*, Accel*

This command sets the R-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the speed can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 dg/s. [50..19000] (default = 2000)

Accel*: acceleration in 0.1 dg/s². [100..19000] (default = 400)

EXAMPLE: #R1SFR2500,4000

Set end speed to 250 dg/s and the acceleration to 400 dg/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SFG Set G-Ramp Parameters:

SFG EndSpeed*, Accel*

This command sets the G-axis DC-Servo ramp settings in volatile RAM. With the **SOW** command, the values can be stored in the non-volatile memory.

EndSpeed*: speed in 0.1 mm/s. [50..3700] (default = 400)

Accel*: acceleration in 0.1 mm/s². [130..3700] (default = 200)

EXAMPLE: #R1SFG2500,3000

Set end speed to 250 mm/s and the acceleration to 300 mm/s².

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SAX Set Scale Adjust Factor For X-Axis:

SAX ScaleAdjust

This command defines the scale adjust factor of the X-axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5.0%] (default = 10000)

EXAMPLE: #R1SAX9975

Set the scale adjust factor to 0,9975.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SAY *Set Scale Adjust Factor For Y-Axis:*

SAY ScaleAdjust

This command defines the scale adjust factor of the Y-axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5.0%] (default = 10000)

EXAMPLE: #R1SAY10055

Set the scale adjust factor to 1,0055.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SAZ *Set Scale Adjust Factor For Z-Axis:*

SAZ ScaleAdjust

This command defines the scale adjust factor of the Z-axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 7.5%] (default = 10000)

EXAMPLE: #R1SAZ10055

Set the scale adjust factor to 1,0055.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SAR *Set Scale Adjust Factor For R-Axis:*

SAR ScaleAdjust

This command defines the scale adjust factor of the rotator-axis within a defined range. Default scale adjust is 10000. This value can be stored in non-volatile memory with the **SOW** command.

ScaleAdjust: [10000 +/- 5.0%] (default = 10000)

EXAMPLE: #R1SAR10055

Set the scale adjust factor to 1,0055.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SSX *Set Slow Speed For X-Axis:*

SSX Speed

This function sets the slow speed for the X-axis. This setting is in action while using **AAA**, **MRX** or **MAX** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 mm/s. [1..4000] (default = 1500)

EXAMPLE: #R1SSX200

Set the slow speed of X-axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SSY *Set Slow Speed For Y-Axis:*

SSY Speed

This function sets the slow speed for the Y-axis. This setting is in action while using **AAA**, **MRY** or **MAY** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 mm/s. [1..4000] (default = 800)

EXAMPLE: #R1SSY200

Set the slow speed of Y-axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SSZ Set Slow Speed For Z-Axis:

SSZ Speed

This function sets the slow speed for the Z-axis. This setting is in action while using **AAA**, **MRZ** or **MAZ** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 mm/s. [1..2800] (default = 500)

EXAMPLE: #R1SSZ200

Set the slow speed of Z-axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SSR Set Slow Speed For R-Axis:

SSR Speed

This function sets the slow speed for the R-axis. This setting is in action while using **AAA**, **MRR** or **MAR** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 dg/s. [1..4000] (default = 600)

EXAMPLE: #R1SSR200

Set the slow speed of R-axis to 20 dg/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SSG Set Slow Speed For G-Axis:

SSG Speed

This function sets the slow speed for the G-axis. This setting is in action while using **AAA**, **MRG** or **MAG** commands without the *SlowSpeed* parameter. It is possible to change the speed 'on the fly' with this command.

Speed: speed in 0.1 mm/s. [1..4000] (default = 100)

EXAMPLE: #R1SSG200

Set the slow speed of G-axis to 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SOX Set Initialization Offset For X-Axis:

SOX InitOffset*

This command sets the initialization offset to the entered parameter for the given axis. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset*: distance in 0.1 mm [10..(X-Range set by **SRA** + InitOffset) / 2 or 32767]
(default = 100)

EXAMPLE: #R1SOX100

Set the X-init offset to 10 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOY *Set Initialization Offset For Y-Axis:*

SOY InitOffset*

This command sets the initialization offset to the entered parameter for the given axis. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset*: distance in 0.1 mm [10..Y-Range set by **SRA** + InitOffset (actual) or 32767]
(default = 30)

EXAMPLE: #R1SOY200

Set the Y-init offset to 20 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOZ *Set Initialization Offset For Z-Axis:*

SOZ InitOffset*

This command sets the initialization offset to the entered parameter for the given axis. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset*: distance in 0.1 mm [10..1000] (default = 100)

EXAMPLE: #R1SOZ100

Set the Z-init offset to 10 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOR *Set Initialization Offset For R-Axis:*

SOR InitOffset*

This command sets the initialization offset to the entered parameter for the given axis. The offset parameter entered is in action immediately after this command is given. This parameter can be stored in non-volatile memory by the **SOW** command.

InitOffset*: distance in 0.1 dg [10..R-Range set by **SRA** + InitOffset (actual) or 32767]
(default = 50)

EXAMPLE: #R1SOR100

Set the R-init offset to 10 degrees from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SOG *Set Initialization Offset For Gripper-Axis:*

SOG InitOffset*, RealDist*

This command sets the initialization offset and the real distance between the gripper pins (inner distance) to the entered parameters. Both parameters entered are in action immediately after this command is given. These parameters can be stored in non-volatile memory by the **SOW** command.

InitOffset*: distance in 0.1 mm [10..G-Range set by **SRA** + InitOffset – RealDist (actual) or 32767] (default = 20)

RealDist*: distance in 0.1 mm [0..32767] (default = 560)

EXAMPLE: #R1SOG100,800

Set the G-init offset to 10 mm from init position and the real distance between pins to 80 mm.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SIZ *Set Z-Axis Force:*

SIZ Force

This command is used to define the Z-axis force while moving down. By default, the force is reduced while moving down. Moving up is done always with maximal force. It is possible to switch the force to maximal power also while moving down with this command. This setting is stored in volatile memory.

Force: 0 = lower force (default), 1 = high force.

EXAMPLE: #R1SIZ1

Set Z-force to high while moving down.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SBK *Set Z-Axis Break On Or Off:*

SBK OnOff

This command can be used to turn on or off the Z-axis break, which is implemented in the new ROMA2. In normal operation, the break will be controlled by the moving commands. There is no need to control the break manually, except for service purposes.

OnOff: 0 = break active (power off), 1 = break released (power on)

EXAMPLE: #R1SBK1

Releases the Z-axis break.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented.

☒ GENESIS Standard ☐ GENESIS Freedom

SLX *Set New X-Axis Scaling Factor And Motion Direction:*

SLX XScale

CAUTION! This command should never be used in the normal operation with a GENESIS instrument. Wrong definition causes malfunction and could destroy the instrument!

With this command, it's possible to redefine the X-axis scale factor. In some special applications it's maybe useful to redefine this value. Inverting the sign of the scale factor can change the motor rotation direction. This value can't be stored in non-volatile memory.

XScale [i]: [-32768..32767] (default = 626)

EXAMPLE: #R1SLX1234

Set new scale factor for X-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

☒ GENESIS Standard ☐ GENESIS Freedom

SMC Set All Roma Axis Move Counter To Zero:

SMC Key

This command sets the entire ROMA move counter, reportable with the ***RPX/Y/Z/R/G5*** command to zero. The value of the counter that can be reported by the ***RPX/Y/Z/R/G0*** command remains at the same value as before.

EXAMPLE: #R1SMCxxxxx

Sets all ROMA move counter to zero.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SMX Set X-Axis Motor Gear Type:

SMX Gear

SET X-AXIS MOTOR GEAR TYPE:

This command sets the motor gear type. There are two different types supported. Default setting is the 1:2 gear ratio. A 1:1 gear ratio is used in older instruments. This setting will be done at TECAN and must never be changed unless a hardware change will be done. The motor gear type must be stored in non-volatile memory by the ***SOW*** command and the X-ramp parameters are automatically reset to default. CAUTION: Wrong gear definition causes malfunction of the instrument.

Gear: 0 = 1:1 gear, 1 = 1:2 gear (default).

EXAMPLE: #R1SMX1

Set ROMA X-axis to a 1:2 gear ratio.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

SMG Set Gripper-Axis Motor Encoder Type:

SMG Encoder

This command sets the motor encoder type. There are two different types supported. Default setting is the one with 15 increments per revolution. A 30-increment encoder is used in older instruments. This setting will be done at TECAN and must never be changed unless a hardware change will be done. The motor encoder type must be stored in non-volatile memory by the ***SOW*** command. CAUTION: Wrong encoder definition causes malfunction of the instrument.

Encoder: 0 = 30 increments, 1 = 15 increments (default).

EXAMPLE: #R1SMG1

Set ROMA gripper-axis to a 15-increment encoder.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

4.3. Positioning, Move and Action Commands:

PIB Position Pre Initialization:

The ***PIB*** command is used to perform a pre initialization of the arm. This must be to prevent a collision with an obstacle in the rear part of the instrument while initialization. After performing the ***PIB***, normally a ***PIA*** without X-axis will be performed. The goal of this command is to bring the Y-axis to the front of the instrument. After doing a ***PIB***, all axis have a not initialized status.

EXAMPLE: #R1PIB

Pre initialization of the arm.

RESPONSE: none.

GENERATED ERRORS: (1) initialization failed, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input checked="" type="checkbox"/> GENESIS Freedom
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PIF Fake Initialization X/Y/Z/R/G - Axis:

PIF

The ***PIF*** command tells the firmware that all axis have been initialized, however, no mechanical initialization is executed. The current position coordinate of each axis is still valid, except if it is not initialized. In case of a not initialized axis, the position will be set to zero or maximal range.

CAUTION: Incorrect usage of this command may damage the instrument.

EXAMPLE: #R1PIF

Fake initialization of the ROMA.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PIA Position Initialization X/Y/Z/R/G - Axis:

PIA Selector

This is the command, to initialize the ROMA X/Y/Z/Rotator and Gripper-axis. No movement command for the ROMA will be accepted before the ***PIA*** command is executed. When the ***PIA*** command is entered, all axis try to move to their initialization positions with a default init speed. When the init position of each axis has been detected, they move to an initial offset position. It is possible that the ROMA can't find a free position to initialize all axis, in this case the ROMA must be moved to a free location manually.

Selector: 0 = normal initialization.
 1 = X-axis disabled.

EXAMPLE: #R1PIA

Initialization of all axis on the ROMA.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PIX Position Initialization X - Axis:

PIX InitSpeed

This function initializes only the X-axis on the ROMA. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 400)

EXAMPLE: #R1PIX250

Initialization of the ROMA X-axis with an init speed of 25 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PIY *Position Initialization Y - Axis:*

PIY InitSpeed

This function initializes only the Y-axis on the ROMA. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 350)

EXAMPLE: #R1PIY100

Initialization of the ROMA Y-axis with an init speed of 10 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PIZ *Position Initialization Z - Axis:*

PIZ InitSpeed

This function initializes only the Z-axis on the ROMA. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize. The init position of the Z-drives is the range position set by the **SRA** command. That means, that Z-zero position must be somewhere near the worktable.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 200)

EXAMPLE: #R1PIZ170

Initialization of the ROMA Z-axis with an init speed of 17 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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PIR *Position Initialization R - Axis:*

PIR InitSpeed

This function initializes only the rotator axis of the ROMA. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 dg/s [5..1500] (default = 500)

EXAMPLE: #R1PIR170

Initialization of the ROMA rotator axis with an init speed of 17 dg/s.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PIG *Position Initialization G - Axis:*

PIG InitSpeed

This function initializes only the gripper axis of the ROMA. An override motor speed for axis initialization may be placed at the end of the command. A command without any parameter uses the default speed to initialize.

InitSpeed: speed in 0.1 mm/s [5..1500] (default = 300)

EXAMPLE: #R1PIG170

Initialization of the ROMA gripper axis with an init speed of 17 mm/s.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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AAA *Action Move To Coordinate Position:*

AAA

This command starts the coordinate movement, built by the coordinate table. The point where the ROMA should drive to, can be defined with the command **SAA**. There is a maximum of hundred table entries allowed. Axis, which aren't defined, do not perform any action. The movements are done with the selected speed settings. After successful movement to all position in the table, the coordinate table is empty again.

EXAMPLE: #R1AAA

Starts coordinate movement.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PAX *Position Absolute For X-Axis:*

PAX X

Moves the X-axis to an absolute position, leaving the other axis positions unchanged.

X: distance in 0.1 mm [(-InitOffset + 10)..X-Range set by **SRA** cmd]

EXAMPLE: #R1PAX1000

Absolute move in X-direction to 100 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PAY *Position Absolute For Y-Axis:*

PAY Y

Moves the Y-axis to an absolute position, leaving the other axis positions unchanged.

Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

EXAMPLE: #R1PAY500

Absolute move in Y-direction to 50 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PAZ *Position Absolute For Z-Axis:*

PAZ Z

Moves the Z-axis to an absolute position, leaving the other axis positions unchanged. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable.

Z: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset - 10)]

EXAMPLE: #R1PAZ100

Absolute move in Z-direction to 10 mm above worktable (max. Z-Range).

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PAR *Position Absolute For R-Axis:*

PAR R

Moves the Rotator-axis to an absolute position, leaving the other axis position unchanged.

R: distance in 0.1 dg [(-InitOffset + 10)..R-Range set by **SRA** cmd]

EXAMPLE: #R1PAR500

Absolute move with Rotator-axis to 50 dg from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

☒ GENESIS Standard ☐ GENESIS Freedom

PAG *Position Absolute For G-Axis:*

PAG G

Moves the Gripper-axis to an absolute position, leaving the other axis positions unchanged. The real distance of the gripper pins can be defined by the **SOG** command.

G: distance in 0.1 mm [(-InitOffset + 10 + RealDist)..G-Range set by **SRA** cmd]

EXAMPLE: #R1PAG1060

Absolute move with Gripper-axis to 106 mm from init position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

☒ GENESIS Standard ☐ GENESIS Freedom

PRX *Position Relative For X-Axis:*

PRX +/- X

Moves the X-axis relative to its actual position. All other positions remain unchanged.

+/-X: distance in 0.1 mm [(-InitOffset + 10)..X-Range set by **SRA** cmd]

EXAMPLE: #R1PRX500

Move the X-axis 50 mm from the current position to the right.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

☒ GENESIS Standard ☐ GENESIS Freedom

PRY *Position Relative For Y-Axis:*

PRY +/- Y

Moves the Y-axis relative to its actual position. All other positions remain unchanged.

+/-Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

EXAMPLE: #R1PRY200

Move the Y-axis 20 mm from the current position to the front.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

☒ GENESIS Standard ☐ GENESIS Freedom

PRZ *Position Relative For Z-Axis:*

PRZ +/- Z

Moves the Z-axis relative to its actual position, leaving the other axis unchanged. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable.

+/-Z: distance in 0.1 mm [0..Z-Range set by **SRA** cmd + (InitOffset - 10)]

EXAMPLE: #R1PRZ-100

Move the Z-axis down 10 mm from the current position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

☒ GENESIS Standard ☐ GENESIS Freedom

PRR *Position Relative For R-Axis:*

PRR +/- R

Moves the Rotator-axis relative to its actual position. All other positions remain unchanged.

+/-R: distance in 0.1 dg [(-InitOffset + 10)..R-Range set by **SRA** cmd]

EXAMPLE: #R1PRR200

Move the Rotator-axis clockwise 20 dg from the current position. (Seen from above)

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

PRG *Position Relative For G-Axis:*

PRG +/- G

Moves the Gripper-axis relative to its actual position. All other positions remain unchanged.

+/-G: distance in 0.1 mm [(-InitOffset + 10)..G-Range - RealDist set by **SRA** cmd]

EXAMPLE: #R1PRG200

Move the Gripper-axis to open 20 mm from the current position.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MAX *Move Absolute Slow Speed For X-Axis:*

MAX X, SlowSpeed

Moves the X-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default slow speed stored in memory is used.

X: distance in 0.1 mm [(-InitOffset + 10)..X-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 1500)

EXAMPLE: #R1MAX1000,500

Absolute move in X-direction to 100 mm from init position with a slow speed of 50 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MAY *Move Absolute Slow Speed For Y-Axis:*

MAY Y, SlowSpeed

Moves the Y-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default slow speed stored in memory is used.

Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 800)

EXAMPLE: #R1MAY1000,250

Absolute move in Y-direction to 100 mm from init position with a slow speed of 25 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MAZ *Move Absolute Slow Speed For Z-Axis:*

MAZ Z, SlowSpeed

Moves the Z-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default slow speed stored in memory is used. The init

position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable.

Z: distance in 0.1mm [0..Z-Range set by **SRA** cmd + (InitOffset –10)]

SlowSpeed: speed in 0.1mm/s [1..4000] (default = 500)

EXAMPLE: #R1MAZ100,300

Move in Z-direction to absolute position 10 mm with a slow speed of 30 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

☒ GENESIS Standard ☐ GENESIS Freedom

MAR Move Absolute Slow Speed For R-Axis:

MAR R, SlowSpeed

Moves the Rotator-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default slow speed stored in memory is used.

R: distance in 0.1 dg [(-InitOffset + 10)..R-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 dg/s [1..4000] (default = 600)

EXAMPLE: #R1MAR1000,250

Absolute move with Rotator-axis to 100 dg from init position with a slow speed of 25 dg/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

☒ GENESIS Standard ☐ GENESIS Freedom

MAG Move Absolute Slow Speed For G-Axis:

MAG G, SlowSpeed

Moves the Gripper-axis with a slow speed to an absolute position, leaving the other axis positions unchanged. If no speed is selected, the default slow speed stored in memory is used.

G: distance in 0.1 mm [(-InitOffset + 10 + RealDist)..G-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 100)

EXAMPLE: #R1MAG1000,250

Absolute move with Gripper-axis to 100 mm from init position with a slow speed of 25 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

☒ GENESIS Standard ☐ GENESIS Freedom

MRX Move Relative Slow Speed For X-Axis:

MRX +/- X, SlowSpeed

Moves the X-axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed is selected, the default slow speed stored in memory is used.

+/-X: distance in 0.1 mm [(-InitOffset + 10)..X-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 1500)

EXAMPLE: #R1MRX1000,500

Relative move in X-direction, 100 mm from current position to the right with a slow speed of 50 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

☒ GENESIS Standard ☐ GENESIS Freedom

MRY Move Relative Slow Speed For Y-Axis:

MRY +/- Y, SlowSpeed

Moves the Y-axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed is selected, the default slow speed stored in memory is used.

+/-Y: distance in 0.1 mm [(-InitOffset + 10)..Y-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 800)

EXAMPLE: #R1MRY-500,50

Move Y-axis 50 mm from the current position to the back with a speed of 5 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MRZ Move Relative Slow Speed For Z-Axis:

MRZ +/- Z, SlowSpeed

Moves the Z-axis with slow speed relative to their present positions, leaving the other axis unchanged. If no speed is selected, the default slow speed stored in memory is used. The init position is equal to the range set by the **SRA** command. The zero position is somewhere near the worktable.

+/-Z: distance in 0.1 mm [-Z-Range set by **SRA** cmd + (InitOffset -10)]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 500)

EXAMPLE: #R1MRZ100,200

Move Z-axis up 10 mm from the current position with a speed of 20 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MRR Move Relative Slow Speed For R-Axis:

MRR +/- R, SlowSpeed

Moves the Rotator-axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed is selected, the default slow speed stored in memory is used.

+/-R: distance in 0.1 dg [(-InitOffset + 10 + RealDistance)..R-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 dg/s [1..4000] (default = 600)

EXAMPLE: #R1MRR-500,50

Move Rotator-axis counter clockwise 50 dg from the current position back with a speed of 5 dg/s. (seen from above)

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

MRG Move Relative Slow Speed For G-Axis:

MRG +/- G, SlowSpeed

Moves the Gripper-axis with slow speed relative to its actual position, leaving the other axis unchanged. If no speed is selected, the default slow speed stored in memory is used.

+/-G: distance in 0.1 mm [(-InitOffset + 10)..G-Range set by **SRA** cmd]

SlowSpeed: speed in 0.1 mm/s [1..4000] (default = 100)

EXAMPLE: #R1MRG-500,50

Move Gripper-axis to close 50 mm from the current position with a speed of 5 mm/s.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARP *Move To Logical Angle Position:*

ARP AnglePos

This command moves the rotator to a logical angle position. All four-quarter angle positions are accessible with this method.

AnglePos: 90 dg angle [0..3]

EXAMPLE: #R1ARP2

Moves the rotator to 180 dg position.

GENERATED ERRORS: (3) invalid operand, (7) device not init, (10) drive no load, (17) arm collision avoided with LIHA.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

AGR *Grip Plate:*

AGR Pos

This command grips a plate with the Gripper-axis at the current X/Y/Z/R-position. The plate must be fetched within the current position (start) and the absolute position (target) defined by the parameter *Pos*. If no plate can be fetched within the search distance a plate not fetched error will be generated. The speed, force and maximal allowed current to grip can be defined with the **SGG** command.

Pos: distance in 0.1 mm [(-InitOffset + 10 + RealDist)..G-Range set by **SRA** cmd]

EXAMPLE: #R1AGR800

Start gripping at current position and try to fetch a plate before reaching absolute position 80 mm.

GENERATED ERRORS: (3) invalid operand, (5) device not implemented, (7) device not init, (9) plate not fetched.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARX *Auto Range X-Axis:*

ARX Selector, Offset*

This command is measuring the maximal reachable range of the X-axis. The scale adjust can be either switched to default or the actual setting can be used. Also an alternative initialization offset can be given. If the offset parameter is not used, the standard offset set by the **SOX** command will be used. The determined scale adjust value can be stored into the non-volatile memory with the **SOW** command.

Selector: 0 = use original scale adjust.

1 = reset scale adjust to 10000.

Offset*: distance in 0.1 mm [0..X-Offset set by **SOX**]

EXAMPLE: #R1ARX1

Auto ranges the X-axis with a scale adjust factor of 10000 and standard offset.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARY *Auto Range Y-Axis:*

ARY Selector, Offset*

This command is measuring the maximal reachable range of the Y-axis. The scale adjust can be either switched to default or the actual setting can be used. Also an alternative initialization offset can be given. If the offset parameter is not used, the standard offset set by the **SOY** command will be used. The determined scale adjust value can be stored into the non-volatile memory with the **SOW** command.

Selector: 0 = use original scale adjust.
1 = reset scale adjust to 10000.

Offset*: distance in 0.1 mm [0..Y-Offset set by *SOY*]

EXAMPLE: #R1ARY

Auto ranges the Y-axis with the actual set scale adjust.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARZ *Auto Range Z-Axis:*

ARZ Selector, Offset*

This command is measuring the maximal reachable range of the Z-axis. The scale adjust can be either switched to default or the actual setting can be used. Also an alternative initialization offset can be given. If the offset parameter is not used, the standard offset set by the *SOZ* command will be used. The determined scale adjust value can be stored into the non-volatile memory with the *SOW* command.

Selector: 0 = use original scale adjust.
1 = reset scale adjust to 10000.

Offset*: distance in 0.1 mm [0..Z-Offset set by *SOZ*]

EXAMPLE: #R1ARZ

Auto ranges the Z-axis with the actual set scale adjust.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARR *Auto Range R-Axis:*

ARR Selector, Offset*

This command is measuring the maximal reachable range of the R-axis. The scale adjust can be either switched to default or the actual setting can be used. Also an alternative initialization offset can be given. If the offset parameter is not used, the standard offset set by the *SOR* command will be used. The determined scale adjust value can be stored into the non-volatile memory with the *SOW* command.

Selector: 0 = use original scale adjust.
1 = reset scale adjust to 10000.

Offset*: distance in 0.1 mm [0..R-Offset set by *SOR*]

EXAMPLE: #R1ARR

Auto ranges the R-axis with the actual set scale adjust.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

ARG *Auto Range G-Axis:*

ARG Dummy, Offset*

This command is measuring the maximal reachable range of the R-axis. Also an alternative initialization offset can be given. If the offset parameter is not used, the standard offset set by the *SOG* command will be used.

Offset*: distance in 0.1 mm [0..G-Offset set by *SOG*]

EXAMPLE: #R1ARG

Auto ranges the G-axis.

RESPONSE: none.

GENERATED ERRORS: (1) init failed, (3) invalid operand, (5) device not implemented.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

BMX Stop X-Drive Movement Immediately:

BMX Selector

This function stops the movement of the commands **PAX**, **PRX**, **MAX**, **MRX** immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector:

- 0 = normal deceleration.
- 1 = emergency break.
- 2 = power down axis.

EXAMPLE: #R1BMX0

Break the movement of X-axis with normal deceleration.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

BMX Stop X-Drive Movement Immediately:

BMX Selector

This function stops the movement of the commands **PAY**, **PRY**, **MAY**, **MRY** immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector:

- 0 = normal deceleration.
- 1 = emergency break.
- 2 = power down axis.

EXAMPLE: #R1BMY1

Emergency breaks the movement of Y-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

BMZ Stop Z-Drive Movement Immediately:

BMZ Selector

This function stops the movement of the commands **PAZ**, **PRZ**, **MAZ**, **MRZ** immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector:

- 0 = normal deceleration.
- 1 = emergency break.
- 2 = power down axis.

EXAMPLE: #R1BMZ2

Power down the Z-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

BMR Stop R-Drive Movement Immediately:

BMR Selector

This function stops the movement of the commands **PAR**, **PRR**, **MAR**, **MRR** immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector: 0 = normal deceleration.
 1 = emergency break.
 2 = power down axis.

EXAMPLE: #R1BMR0

Break the movement of R-axis with normal deceleration.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
------------------------------------------------------	------------------------------------------

BMG Stop G-Drive Movement Immediately:

BMG Selector

This function stops the movement of the commands **PAG**, **PRG**, **MAG**, **MRG** immediately either with normal deceleration or with an emergency break. Additionally the axis can be powered down for position evaluation. After breaking a movement, a new positioning command can be send. The drive doesn't lose the position.

Selector: 0 = normal deceleration.
 1 = emergency break.
 2 = power down axis.

EXAMPLE: #R1BMG2

Power down the G-axis.

RESPONSE: none.

GENERATED ERRORS: (3) invalid operand.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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BMA Stop All Drive Movement Immediately:

BMA

This function stops all movements of all running axis immediately. Especially movements activated by the **AAA** command can be stopped. After breaking all axis movements, also the table entries are removed. The actual table position where the movements have been stopped can be reported by the **RAE** command.

EXAMPLE: #R1BMA

Immediately break all axis movements and remove table entries.

RESPONSE: none.

GENERATED ERRORS: none.

<input checked="" type="checkbox"/> GENESIS Standard	<input type="checkbox"/> GENESIS Freedom
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4.4. Error Codes ROMA Arm #R

Code	Common Errors for all Devices
1	Initialization error
2	Invalid command
3	Invalid operand
4	Invalid command sequence
5	Device not implemented
6	Timeout error
7	Device not initialized
8	Command overflow of CU
15	Command overflow of sub device

Code	Device #R Error Codes
9	Plate not fetched (AGR)
10	Drive no load
16	Power fail circuit error
17	Arm collision avoided with LIHA