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1.0 System Overview

1.1 General Description

The CONEX-PSD consists in a two-axis position and power-sensing device connected to a controller. It provides a very compact and low-cost solution for measuring position and power of a laser spot.

Communication with the CONEX-PSD is achieved via an USB port (requires Windows™ operating system). A Windows™ based software enables basic motion. Advanced application programming is simplified by an ASCII command interface and a set of two letter mnemonic commands.

1.2 CONEX-PSD

1.2.1 Contents of Delivery

- CONEX-PSD or CONEX-PSD10Ge
  Controller box with associated sensor (cable length: 0.55 m).
- CONEX-USB
  USB cable, 1.8 m length.
- CONEX-MOTION
  CD-ROM.
1.2.2 Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Description</td>
<td>2-axis position sensing device with power level indication</td>
</tr>
<tr>
<td>Position Capability</td>
<td>9 x 9 mm or 10 x 10 mm sensor with 12-bit resolution measurement</td>
</tr>
<tr>
<td>Power Display</td>
<td>0 to 100% of max power with 12 bits resolution measurement</td>
</tr>
<tr>
<td>Status display</td>
<td>Bi-color LED</td>
</tr>
<tr>
<td>Programming</td>
<td>20+ intuitive, 2-letter ASCII commands including position and power readings, offset and gain setting.</td>
</tr>
<tr>
<td>Computer interface</td>
<td>USB (requires Windows™ operating system)</td>
</tr>
<tr>
<td>Communication rate</td>
<td>50 Hz Max. (USB)</td>
</tr>
<tr>
<td>Internal safety feature</td>
<td>Watchdog timer</td>
</tr>
<tr>
<td>Consumption</td>
<td>+5 V (USB): &lt; 0.5 A</td>
</tr>
</tbody>
</table>

1.2.3 Controller Dimensions

![Controller Dimensions Diagram]

1.2.4 Silicon Sensor Dimensions

![Silicon Sensor Dimensions Diagram]
1.2.5 Germanium Sensor Dimensions

1.3 System Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>5 °C to 40 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>20% to 85% relative humidity, non-condensing</td>
</tr>
<tr>
<td>Location</td>
<td>Indoor use only</td>
</tr>
</tbody>
</table>

1.4 Connector Identification

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB</td>
<td>Mini-USB connector</td>
</tr>
<tr>
<td>LED</td>
<td>Status LED</td>
</tr>
<tr>
<td>Sensor</td>
<td>Sensor cable entry</td>
</tr>
<tr>
<td>Cable retainer</td>
<td>2 x M3 threaded hole to attach cable retainer</td>
</tr>
</tbody>
</table>

1.5 USB Communication Settings

Communication parameters are preset in the CONEX-PSD controller and do not require any configuration:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bits per second</td>
<td>921,600</td>
</tr>
<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow control</td>
<td>None</td>
</tr>
<tr>
<td>Terminator</td>
<td>CR LF</td>
</tr>
</tbody>
</table>

NOTE

USB communication allows Inputs reading and outputs setting up to 50 times/s.
2.0 Programming

2.1 State Diagram
For a consistent operation, the CONEX-PSD uses 2 different operation states: Ready and configuration. In each state, only specific commands are accepted by the CONEX-PSD. Therefore, it is important to understand the state diagram below and which commands and actions cause transition between the different states. Also see section 2.5 for command/state information:

LED display
CONFIGURATION: SLOW BLINK RED.
READY: SOLID GREEN.

When connecting the CONEX-PSD to power, the controller initializes (see section 0). When the initialization is successful, the controller gets to the READY state. From the READY state, the controller can go to the CONFIGURATION state with the PW1 command. In CONFIGURATION stage, the CONEX-PSD allows changing configuration parameters like analog input offset and gain. The PW0 command saves all changes to the controller’s memory and returns the controller back to the READY state.

2.2 Initialization
During initialization (< 1 sec) LED display is turned off.
For more information about system errors during initialization, refer to the TS command in section 2.5.
2.3 Command Syntax

The CONEX-PSD is a command driven controller. The general format of a command is a two-letter ASCII character preceded and followed by parameters specific to the command:

**Command format**

```
  nn  AA  xx
```

- **nn** — Optional or required controller address.
- **AA** — Command name.
- **xx** — Optional or required value or “?” to query current value.

Both, upper and lower case characters are accepted. Depending on the command, it can have an optional or required prefix (nn) for the controller address and/or a suffix (xx) value or a “?”.

**Blank spaces**

Blanks are allowed and ignored in any position, including inside a numerical value. The following two commands are equivalent, but the first example might be confusing and uses more memory:

```
2P A1.43 6  
2PA1.436
```

**Decimal separator**

A dot (”.”) is used as decimal separator for all numerical values.

**Command terminator**

Commands are executed as the command terminator CRLF (carriage-return line-feed, ASCII 13 and ASCII 10) is received. The controller will analyze the received string. If the command is valid and its parameters are in the specified range, it will be executed. Otherwise it will memorize an error.

After the execution of the command, all remaining characters in the input string, if any, will be ignored. In particular, it is not possible to concatenate several commands on a single string from the PC to the CONEX-PSD.

Each command will handle properly the memorization of related errors that can be accessed with the TE command. Please refer to the command set in section 2.5 for details.

2.4 Command Execution Time

The CONEX-PSD controller interprets commands continuously as received. The typical execution time for a "get position" (nGP?) is about 20 ms. Here, command execution time means the time from sending the command until receive of the answer.
2.5 Command Set

This section describes the supported two-letter ASCII commands used to configure and operate the CONEX-PSD. The general command format is:

Command format

```
nn  AA  xx
```

- **nn**: Optional or required controller address.
- **AA**: Command name.
- **xx**: Optional or required value or “?” to query current value.

Most commands can be used to set a value (in that case the command name is followed by the value “xx”) or to query the current value (in that case the command name is followed by a “?”). When querying a value, the controller responds with the command it received followed by the queried value. For example, a `1IX0.1` sets the X offset of the controller #1 to 0.01. A `1IX?` reads the response `1IX0.1`.

Not every command can be executed in all states of the CONEX-PSD and some commands have different meaning in different states. It is therefore important to understand the state diagram of the controller, see section 2.1.

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>●</td>
<td>Get X, Y positions and laser power</td>
</tr>
<tr>
<td>ID</td>
<td>□</td>
<td>Set/Get stage identifier</td>
</tr>
<tr>
<td>IS</td>
<td>–</td>
<td>Set/Get offset on ADC input Summ</td>
</tr>
<tr>
<td>IX</td>
<td>–</td>
<td>Set/Get offset on ADC input X</td>
</tr>
<tr>
<td>IY</td>
<td>–</td>
<td>Set/Get offset on ADC input Y</td>
</tr>
<tr>
<td>LF</td>
<td>–</td>
<td>Set/Get low pass filter frequency</td>
</tr>
<tr>
<td>PS</td>
<td>–</td>
<td>Set/Get gain on ADC input Summ</td>
</tr>
<tr>
<td>PX</td>
<td>–</td>
<td>Set/Get gain on ADC input X</td>
</tr>
<tr>
<td>PY</td>
<td>–</td>
<td>Set/Get gain on ADC input Y</td>
</tr>
<tr>
<td>PW</td>
<td>●</td>
<td>Enter/Leave CONFIGURATION state</td>
</tr>
<tr>
<td>RA</td>
<td>●</td>
<td>Get raw analog input values</td>
</tr>
<tr>
<td>RC</td>
<td>●</td>
<td>Get corrected analog input values</td>
</tr>
<tr>
<td>RS</td>
<td>●</td>
<td>Reset controller</td>
</tr>
<tr>
<td>RS##</td>
<td>□</td>
<td>Reset controller’s address to 1</td>
</tr>
<tr>
<td>SA</td>
<td>–</td>
<td>Set/Get controller’s address</td>
</tr>
<tr>
<td>TB</td>
<td>●</td>
<td>Get command error string</td>
</tr>
<tr>
<td>TE</td>
<td>●</td>
<td>Get last command error</td>
</tr>
<tr>
<td>TS</td>
<td>●</td>
<td>Get positioner error and controller state</td>
</tr>
<tr>
<td>VE</td>
<td>●</td>
<td>Get controller revision information</td>
</tr>
</tbody>
</table>

- ○: Changes configuration parameters. Those changes will be stored in the controller’s memory with the PW1 command and remain available after switching off the controller.
- □: Changes working parameters only. Those changes will get lost when switching off the controller.
- ●: Accepted command.
- –: Write command not accepted (will return an error).

Command: Command passed without preceding controller number applies to all controllers.
GP — Get X, Y positions and laser power level

Usage

<table>
<thead>
<tr>
<th></th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>xxGP</td>
<td>xxGP?</td>
</tr>
</tbody>
</table>

Parameters

**Description**

- **xx** [int] — Controller address.
- **Range** xx — 1 to 31
- **Units** xx — None
- **Defaults** xx
  - Missing: Error B.
  - Out of range: Error B.
  - Floating point: Error A.

**Description**

This command returns the X, Y positions and the laser power level. The coordinates are equal to the X or Y corrected signals (as given by the RC command) divided by the also corrected SUM signal (see “CONEX-PSD-x Part5:Sensor Manual”) and then multiplied by half of the dimension of the sensor.

**Errors**

- **A** — Unknown message code or floating point controller address.
- **B** — Controller address not correct.

**Rel. Commands**

- RA — get raw analog inputs.

**Example**

1GP | Get X, Y positions and laser power level.

1GP3.125,-2.962,52 | Controller returns X=3.125, Y=-2.962, LP=52%.
ID — Set/Get sensor identifier

**Usage**

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>○</td>
</tr>
</tbody>
</table>

**Syntax**

`xxIDnn` or `xxID?`

**Parameters**

**Description**

`xx` [int] — Controller address.

`nn` [float] — Sensor model number.

**Range**

`xx` — 1 to 31

`nn` — 1 to 31 ASCII characters.

**Units**

`xx` — None

`nn` — None

**Defaults**

`xx` Missing: Error B.

Out of range: Error B.

Floating point: Error A.

`nn` Missing: Error C.

Out of range: Error C.

**Description**

The ID command sets the sensor identifier string.

**Returns**

If the sign “?” takes place of `nn`, this command returns the current programmed value.

**Errors**

A — Unknown message code or floating point controller address.

B — Controller address not correct.

C — Parameter missing or out of range.

K — Execution not allowed in READY state.

**Example**

`1ID? | Get sensor identifier for controller #1.`

*CONEX-PSD | Controller returns CONEX-PSD.*
IS — Set/Get offset on ADC input SUM

Usage

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>○</td>
</tr>
</tbody>
</table>

Syntax

xxISnn or xxIS?

Parameters

**Description**

xx [int] — Controller address.

**Range**

xx — 1 to 31

nn [float] — >-2.5 and <2.5

**Units**

xx — None

nn — Volts

**Defaults**

xx Missing: Error B.

Out of range: Error B.

Floating point: Error A.

nn Missing: Error C.

Out of range: Error C.

**Description**

In CONFIGURATION state, this command will set the offset for the ADC input SUM.

**Returns**

If the sign “?” takes place of nn, this command returns the current programmed value.

**Errors**

A — Unknown message code or floating point controller address.

B — Controller address not correct.

C — Parameter missing or out of range.

D — Execution not allowed.

**Example**

1IS0.010 |

Sets the ADC input offset to 10mV for SUM channel of controller #1.
IX — Set/Get offset on ADC input X

Usage

Ready Config.

Syntax

xxIXnn or xxIX?

Parameters

Description

xx [int] — Controller address.

Range

xx — 1 to 31

nn [float] — >-2.5 and <2.5

Units

xx — None

nn — Volts

Defaults

xx Missing: Error B.

Out of range: Error B.

Floating point: Error A.

nn Missing: Error C.

Out of range: Error C.

Description

In CONFIGURATION state, this command will set the offset for the ADC input X.

Returns

If the sign “?” takes place of nn, this command returns the current programmed value.

Errors

A — Unknown message code or floating point controller address.

B — Controller address not correct.

C — Parameter missing or out of range.

D — Execution not allowed.

Example

1IX0.01 | Sets the ADC input offset to 10mV for X channel of controller #1.
IY — Set/Get offset on ADC input Y

Usage

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>○</td>
</tr>
</tbody>
</table>

Syntax

xxIYnn or xxIY?

Parameters

Description

xx [int] — Controller address.

Range

xx — 1 to 31

nn [float] — >-2.5 and <2.5

Units

xx — None

nn — Volts

Defaults

xx Missing: Error B.

Out of range: Error B.

Floating point: Error A.

nn Missing: Error C.

Out of range: Error C.

Description

In CONFIGURATION state, this command will set the offset for the ADC input Y.

Returns

If the sign “?” takes place of nn, this command returns the current programmed value.

Errors

A — Unknown message code or floating point controller address.

B — Controller address not correct.

D — Execution not allowed.

Example

1IY0.01 | Sets the ADC input offset to 10mV for Y channel of controller #1.
LF — Set/Get low pass filter

Usage Ready Config.
    – ○

Syntax `xxLFnn` or `xxLF?`

Parameters

Description `xx [int]` — Controller address.

Range `xx` — 1 to 31
`nn [float]` — > 0 and < 1000.0

Units `xx` — None
`nn` — Hertz

Defaults `xx` Missing: Error B.
Out of range: Error B.
Floating point: Error A.
`nn` Missing: Error C.
Out of range: Error C.

Description In CONFIGURATION state, this command will set the frequency of the first order low pass filter applied on the ADC inputs.

Returns If the sign “?” takes place of `nn`, this command returns the current programmed value.

Errors A — Unknown message code or floating point controller address.
B — Controller address not correct.
D — Execution not allowed.

Example 1LF50 | Sets the low pass filter frequency to 50 Hz of controller #1.
## PS — Set/Get gain on ADC input SUM

**Syntax**  
xxPSnn or xxPS?

**Parameters**

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>Controller address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>xx</td>
<td>1 to 31</td>
</tr>
<tr>
<td>nn [float]</td>
<td>&gt;0.1 and &lt;10</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>xx</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>nn</td>
<td>None</td>
</tr>
</tbody>
</table>

**Defaults**

<table>
<thead>
<tr>
<th>xx</th>
<th>Missing: Error B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out of range:</td>
<td>Error B.</td>
</tr>
<tr>
<td>Floating point:</td>
<td>Error A.</td>
</tr>
<tr>
<td>nn</td>
<td>Missing: Error C.</td>
</tr>
<tr>
<td>Out of range:</td>
<td>Error C.</td>
</tr>
</tbody>
</table>

**Description**

In CONFIGURATION state, this command will set the gain applied on ADC input SUM. The default value is 1.

**Returns**

If the sign “?” takes place of nn, this command returns the current programmed value.

**Errors**

- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- D — Execution not allowed.

**Example**

1PS0.995  
Sets the ADC input gain to 0.995 for SUM channel of controller #1.
PX — Set/Get gain on ADC input X

Usage
Ready
  ○
Config.

Syntax
xxPXnn or xxPX?

Parameters

Description
xx [int] — Controller address.

Range
xx — 1 to 31
nn [float] — >0.1 and <10

Units
xx — None
nn — None

Defaults
xx Missing: Error B.
Out of range: Error B.
Floating point: Error A.

nn Missing: Error C.
Out of range: Error C.

Description
In CONFIGURATION state, this command will set the gain applied on ADC input X.
The default value is 1.

Returns
If the sign “?” takes place of nn, this command returns the current programmed value.

Errors
A — Unknown message code or floating point controller address.
B — Controller address not correct.
D — Execution not allowed.

Example
1PX0.995 | Sets the ADC input gain to 0.995 for X channel of controller #1.
PY — Set/Get gain on ADC input Y

Usage Ready Config.

Syntax xxPYnn or xxPY?

Parameters

Description xx [int] — Controller address.

Range xx — 1 to 31

nn [float] — >0.1 and <10

Units xx — None

nn — None

Defaults xx Missing: Error B.

Out of range: Error B.

Floating point: Error A.

nn Missing: Error C.

Out of range: Error C.

Description In CONFIGURATION state, this command will set the gain applied on ADC input Y. The default value is 1.

Returns If the sign “?” takes place of nn, this command returns the current programmed value.

Errors A — Unknown message code or floating point controller address.

B — Controller address not correct.

D — Execution not allowed.

Example 1PY0.995 | Sets the ADC input gain to 0.995 for Y channel of controller #1.
PW — Enter/Leave CONFIGURATION state

Usage

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

Syntax

xxPWnn

Parameters

Description

- xx [int] — Controller address.
- nn [float] — State.

Range

- xx — 1 to 31
- nn — 1: Go from READY state to CONFIGURATION state.
- 0: Go from CONFIGURATION state to READY state.

Units

- xx — None.
- nn — None.

Defaults

- xx Missing: Error B.
- nn Missing: Error C.
- Floating point: Error A.
- Out of range: Error C.

Description

PW1 changes the controller’s state from READY to CONFIGURATION. In Configuration state all parameter settings are saved in the controller’s memory and remain available after switching off the controller. In addition, some settings are only possible in CONFIGURATION state (e.g. offsets or gains.).

PW0 checks all stage parameters, and if they are acceptable, saves them in the flash memory of the controller. After that, it changes the controller’s state from CONFIGURATION to READY.

The execution of a PW0 command may take up to 10 seconds. During that time the controller will not respond to any other command.

Errors

- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- C — Parameter missing or out of range.
- D — Execution not allowed.

Example

1PW1 | Changes controller #1 to CONFIGURATION state.
### RA — Get analog input values

#### Usage

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Syntax

xxRA or xxRA?

#### Parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>—</th>
<th>Controller address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>xx</td>
<td>—</td>
<td>1 to 31</td>
</tr>
<tr>
<td>Units</td>
<td>xx</td>
<td>—</td>
<td>None.</td>
</tr>
</tbody>
</table>

#### Defaults

- Missing: Error B.
- Out of range: Error B.
- Floating point: Error A.

#### Description

The RA command returns the value of the analog inputs. The converter is a ±11 bits analog to digital converter with ±0.15 volts of maximum offset and 5% full-scale linearity. The resolution is 0.078125 volts. The CONEX-PSD controller has analog input low pass filters with a cut-off frequency of 175Hz.

#### Errors

- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- D — Execution not allowed.

#### Example

1RA | Get controller #1 analog inputs.

1RA0.9,1.2,2.3 | Controller returns: X=0.9, Y=1.2 and SUM=2.3.
### RC — Get corrected analog input values

**Usage**
- Ready
- Config.

**Syntax**
- xxRC or xxRC?

**Parameters**

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>Controller address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>xx</td>
<td>1 to 31</td>
</tr>
<tr>
<td>Units</td>
<td>xx</td>
<td>None.</td>
</tr>
</tbody>
</table>

**Defaults**
- Missing: Error B.
- Out of range: Error B.
- Floating point: Error A.

**Description**
The RC command returns the value of the corrected analog inputs. The converter is a ±11 bits analog to digital converter with ±0.15 volts of maximum offset and 5% full-scale linearity. The resolution is 0.078125 volts. For X input, the RC command will return the RA reading minus X offset (set by the commands IX, IY, IS) and then multiplied by X gain (set by the commands PX, PY, PS). This allows an easy scaling to a specific setup.

**Errors**
- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- D — Execution not allowed.

**Example**
- `1RC` | Get controller #1 corrected analog inputs.

1RC0.9,1.2,2.3 | Controller returns: X=0.9, Y=1.2 and SUM=2.3.
## RS — Reset controller

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬤</td>
<td>⬤</td>
</tr>
</tbody>
</table>

### Syntax

`xxRS`

### Parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>Controller address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>xx</td>
<td>1 to 31</td>
</tr>
<tr>
<td>Units</td>
<td>xx</td>
<td>None.</td>
</tr>
<tr>
<td>Defaults</td>
<td>xx</td>
<td>Missing: Error B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Out of range: Error B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Floating point: Error A.</td>
</tr>
</tbody>
</table>

### Description

The RS command issues hardware reset of the controller, equivalent to a power-up. LED display is turned off, controller re-initializes itself and after a short period of time returns to the READY state with LED display solid green. During initialization CONEX-PSD is not communicating.

### Errors

- **A** — Unknown message code or floating point controller address.
- **B** — Controller address not correct.
- **D** — Execution not allowed.

### Example

`1RS | Reset controller #1.`
## RS## — Reset controller’s address

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Syntax**

xxRS## or RS##

**Parameters**

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>—</th>
<th>Axis number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>xx</td>
<td>—</td>
<td>0 to 31</td>
</tr>
<tr>
<td></td>
<td>##</td>
<td>—</td>
<td>Always ##</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>xx</td>
<td>—</td>
<td>None.</td>
</tr>
<tr>
<td><strong>Defaults</strong></td>
<td>xx</td>
<td></td>
<td>Missing: Change to 0.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Out of range: Error B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Floating point: Error A.</td>
</tr>
</tbody>
</table>

**Description**

The RS## command resets the controller’s address to 1. This address needs to be different for each CONEX controller when connected to a RS-485 communication network.

**Returns**

**Errors**

- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- D — Execution not allowed.

**Example**

| 2RS## | Reset controller’s #2 address to 1. |
SA — Set/Get controller’s RS-485 address

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Syntax `xxSAnn` or `xxSA?`

**Parameters**

<table>
<thead>
<tr>
<th>Description</th>
<th>xx [int]</th>
<th>nn [int]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Axis number.</td>
<td>Controller’s axis number.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range</th>
<th>xx</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>nn</td>
<td>2 to 31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>xx</th>
<th>None.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>nn</td>
<td>None.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Defaults</th>
<th>xx</th>
<th>Missing: Error B.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>nn</td>
<td>Missing: Error C.</td>
</tr>
<tr>
<td></td>
<td>nn</td>
<td>Out of range: Error C.</td>
</tr>
</tbody>
</table>

**Description**
The SA command sets the controller’s RS-485 address.

**Returns**
If the sign "?" takes place of `nn`, this command returns the current programmed value.

**Errors**
- `A` — Unknown message code or floating point controller address.
- `B` — Controller address not correct.
- `C` — Parameter missing or out of range.
- `D` — Execution not allowed.

**Example**
1SA3 | Set controller’s RS-485 address to 3.

---

**NOTE**
Special function. Contact Newport to get additional support on this command.
TB — Get command error string

<table>
<thead>
<tr>
<th>Usage</th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>xxTBnn</td>
<td></td>
</tr>
<tr>
<td>Parameters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description**
xx [int] — Controller address.

**Range**
xx — 1 to 31

**Units**
xx — None.

**Defaults**
xx Missing: Error B.
Out of range: Error B.
Floating point: Error A.

nn Missing: Returns explanation of current error.
Out of range: Error C.

**Description**
The TB command returns a string that explains the meaning of the error code nn (see TE command for complete list).

**Errors**
A — Unknown message code or floating point controller address.
B — Controller address not correct.
C — Parameter missing or out of range.
D — Execution not allowed.

**Rel. Commands**
TE — Get error code.

**Example**
1TB@ | Get explanation to error code @.

1TB@ No error | Controller returns: @ meaning No error.
TE — Get last command error

Usage

<table>
<thead>
<tr>
<th></th>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
</table>

Syntax

```
xTE
```

Parameters

- **xx** [int] — Controller address.
- **Range** xx — 1 to 31
- **Units** xx — None.
- **Defaults**
  - Missing: Error B.
  - Out of range: Error B.
  - Floating point: Error A.

Description

The TE command returns the currently memorized error. When a command is not executable, it memorizes an error. This error can be read with the TE command. After the execution of a TE command, the error buffer gets erased and another TE command will return @, means no error. When a new command error is generated before the previous command error is read, the new command error will overwrite the current memorized error.

For a safe program flow it is recommended to always query the command error after each command execution.

Errors

- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- D — Execution not allowed.

Rel. Commands

- TB — Get error string.

Example

```
1TE | Get last error memorized on controller #1.
    | Controller returns: 1TE@, means no error.
```

List of errors and corresponding strings (see TB command):

- @ — No error.
- A — Unknown message code or floating point controller address.
- B — Controller address not correct.
- C — Parameter missing or out of range.
- D — Command not allowed.
- I — Command not allowed in CONFIGURATION state.
- K — Command not allowed in READY state.
- S — Communication Time Out.
- V — Error during command execution.
TS — Get positioner error and controller state

Usage

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

Syntax

```
xxTS
```

Parameters

**Description**

**xx** [int] — Controller address.

**Range**

xx — 1 to 31

**Units**

xx — None.

**Defaults**

xx

- Missing: Error B.
- Out of range: Error B.
- Floating point: Error A.

**Description**

The TS command returns the positioner error and the current controller state.

**Returns**

The TS command returns six characters (1TSabcdef).

*The first 4 characters (abcd) are set to “0000”.*

The last two characters (ef) represent the controller state.

**Controller states (ef):**

- 14: CONFIGURATION.
- 32: READY.

---

**NOTES**

The error buffer gets updated periodically, approx. every 1 ms.

The TS command reads the error buffer and clears the error buffer at the same time (same as for commands TE, TB). So when launching the TS command, it is important to process the TS feedback accordingly.

**Errors**

A — Unknown message code or floating point controller address.

B — Controller address not correct.

**Rel. Commands**

TE — Get last error.

**Example**

```
1TS | Get error and state of controller #1.
1TS000032 | Controller returns: READY.
```
VE — Get controller revision information

Usage

<table>
<thead>
<tr>
<th>Ready</th>
<th>Config.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Syntax

xxVE

Parameters

Description

xx [int] — Controller address.

nn [string] — Action.

Range

xx — 1 to 31

Units

xx — None.

Defaults

xx Missing: Error B.

Out of range: Error B.

Floating point: Error A.

Description

This command returns the controller’s revision information.

Errors

A — Unknown message code or floating point controller address.

B — Controller address not correct.

Rel. Commands

GP — Get current position.

Example

1VE

Get controller #1 revision information.

1VE CONEX-PSD revision 1.0.0. Controller returns the firmware revision
3.0 Controller Interfaces

3.1 Mini-USB (Male) Connector Pinout

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-5 VDC IN DO NOT CONNECT IF COMM CONNECTOR IS USED</td>
</tr>
<tr>
<td>2</td>
<td>DATA-</td>
</tr>
<tr>
<td>3</td>
<td>DATA+</td>
</tr>
<tr>
<td>4</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
</tbody>
</table>
Service Form

Name: _________________________________________________  Return authorization #: _________________________________________________
Company:_______________________________________________  
Address: ________________________________________________  Date: __________________________________________________
Country: ________________________________________________  Phone Number: __________________________________________
P.O. Number: ____________________________________________  Fax Number: ____________________________________________
Item(s) Being Returned: ____________________________________  Model#: ________________________________________________
Model#: ________________________________________________  Serial #: ________________________________________________

Description: ________________________________________________________________________________________________________
Reasons of return of goods (please list any specific problems): ________________________________________________________________
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