# Overview

This document is an addendum to the Cornerstone Remote Control document that highlights the syntax of LECO’s remote control API for Cornerstone. This document contains additional commands that are exclusive to GDS instruments.

# CDP Method

This command returns detail data for the specified CDP method. The CDP method can be specified either by key or by name.

## Parameters

One of the following must be supplied to identify the CDP method. If both are provided, the Key parameter will be used to identify the method.

**Key**: The unique key that identifies the CDP method. Leading zeroes may be omitted.

**Name**: The unique name that identifies the CDP method.

## Syntax

<CdpMethod Key="D3"/>

<CdpMethod Name="CDP"/>

## Reply

<CdpMethod ErrorCode=”0” ErrorMessage=”Success”>

<Key>00000000000000D3</Key>

<Name Label="Name">CDP</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">03/19/2014 15:28:29</LastUsed>

<LastModified Label="Last Modified">06/03/2013 11:36:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

<BulkMethod Label="Bulk Method">Bulk</BulkMethod>

<QuantifierParameters>

<CalibrationFactor Label="Calibration Factor">1</CalibrationFactor>

<QuantificationElements Label="Elements To Quantify">C Al Cr Fe Ni Cu Zn Sn</QuantificationElements>

</QuantifierParameters>

<SourceSettings>

<CalibrationFactor Label="Calibration Factor">1</CalibrationFactor>

</SourceSettings>

<CdpCalculations>

<CdpCalculation>

<Name Label="Name">Ct Wt Zn</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">01/01/0001 00:00:00</LastUsed>

<LastModified Label="Last Modified">01/01/0001 00:00:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

<TraceDomain Label="Trace Domain">Composition vs. Depth</TraceDomain>

<OutputUnits Label="Units">Coating Weight</OutputUnits>

<CalculationExpression Label="Calculation">CoatingWeight(Zn[..])</CalculationExpression>

<StartExpression Label="Start">Start</StartExpression>

<EndExpression Label="End">End</EndExpression>

</CdpCalculation>

…

</CdpCalculations>

<Plots>

<GdsPlot>

<Name Label="Name">Basic Intensities</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">01/01/0001 00:00:00</LastUsed>

<LastModified Label="Last Modified">01/01/0001 00:00:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

<TraceDomain Label="Trace Domain">Intensity vs. Time</TraceDomain>

<CompositionUnits Label="Composition">Percent</CompositionUnits>

<DepthUnits Label="Depth">Micrometers</DepthUnits>

<IsLogXAxis Label="X Axis Log Scale">False</IsLogXAxis>

<IsLogYAxis Label="Y Axis Log Scale">False</IsLogYAxis>

<IsAutoScalingTraces Label="Auto Scale">True</IsAutoScalingTraces>

<MinimumX Label="X Axis Minimum">NaN</MinimumX>

<MaximumX Label="X Axis Maximum">NaN</MaximumX>

<MinimumLeftY Label="Left Y Axis Minimum">NaN</MinimumLeftY>

<MaximumLeftY Label="Left Y Axis Maximum">NaN</MaximumLeftY>

<MinimumRightY Label="Right Y Axis Minimum">NaN</MinimumRightY>

<MaximumRightY Label="Right Y Axis Maximum">NaN</MaximumRightY>

<Traces>

<GdsPlotTrace>

<Name Label="Name">C</Name>

<Analyte Label="Analyte">C</Analyte>

<IsIncluded Label="Included">True</IsIncluded>

<IsMarkerVisible Label="Markers">False</IsMarkerVisible>

<IsLeftAxis Label="Axis">False</IsLeftAxis>

<Color Label="Color">#FF7B4F24</Color>

<Style Label="Style">Solid</Style>

</GdsPlotTrace>

…

</Traces>

<Calculations>

<GdsPlotCalculation>

<Name Label="Name">Avg Fe Intensity</Name>

<Key Label="Key">0000000000002AFF</Key>

<IsIncluded Label="Included">False</IsIncluded>

<IsMarkerVisible Label="Markers">False</IsMarkerVisible>

<Color Label="Color">#FFFF6700</Color>

<Style Label="Style">SolidLine</Style>

</GdsPlotCalculation>

…

</Calculations>

</GdsPlot>

…

</Plots>

</CdpMethod>

## Possible Error Codes

6 – Exception

11 - RequestedItemNotFound

# CDP Methods

This command returns all CDP methods.

## Syntax

<CdpMethods/>

## Reply

<CdpMethods ErrorCode=”0” ErrorMessage=”Success”>

<CdpMethod>

<Key>00000000000000D3</Key>

<Name Label="Name">SWV</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">03/19/2014 15:28:29</LastUsed>

<LastModified Label="Last Modified">06/03/2013 11:36:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

</CdpMethod>

…

</CdpMethods>

## Possible Error Codes

6 – Exception

# CdpMethodKey

This command returns the key for the CDP method whose name matches the name provided.

## Parameters

**Name**: The unique name that identifies the CDP method.

## Syntax

<CdpMethodKey Name=”…”/>

## Reply

<CdpMethodKey Name="…" ErrorCode=”0” ErrorMessage=”Success”>

<Key>0000000000000010</Key>

</CdpMethodKey>

## Possible Error Codes

6 – Exception

11 - RequestedItemNotFound

# Limit

This command returns detail data for the specified limit. The limit can be specified either by key or by name.

## Parameters

One of the following must be supplied to identify the limit. If both are provided, the Key parameter will be used to identify the limit.

**Key**: The unique key that identifies the limit. Leading zeroes may be omitted.

**Name**: The unique name that identifies the limit.

## Syntax

<Limit Key="D3"/>

<Limit Name="SWV"/>

## Reply

<Limit ErrorCode=”0” ErrorMessage=”Success”>

<Key>00000000000000D3</Key>

<Name Label="Name">SWV</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">03/19/2014 15:28:29</LastUsed>

<LastModified Label="Last Modified">06/03/2013 11:36:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

<Elements>

<Element>

<Analyte>Fe</Analyte>

<LowerControlLimit>90</LowerControlLimit>

<UpperControlLimit>100</UpperControlLimit>

</Element>

…

</Elements>

</Limit>

## Possible Error Codes

6 – Exception

11 - RequestedItemNotFound

# Limits

This command returns all limits.

## Syntax

<Limits/>

## Reply

<Limits ErrorCode=”0” ErrorMessage=”Success”>

<Limit>

<Key>00000000000000D3</Key>

<Name Label="Name">SWV</Name>

<Description Label="Description"></Description>

<LastUsed Label="Last Used">03/19/2014 15:28:29</LastUsed>

<LastModified Label="Last Modified">06/03/2013 11:36:00</LastModified>

<Excluded Label="Excluded">False</Excluded>

</Limit>

…

</Limits>

## Possible Error Codes

6 – Exception

# LimitKey

This command returns the key for the limit whose name matches the name provided.

## Parameters

**Name**: The unique name that identifies the limit.

## Syntax

<LimitKey Name=”…”/>

## Reply

<LimitKey Name="…" ErrorCode=”0” ErrorMessage=”Success”>

<Key>0000000000000010</Key>

</LimitKey>

## Possible Error Codes

6 – Exception

11 - RequestedItemNotFound

# StandardsForElements

This command retrieves the standards for the specified elements.

## Parameters

**MethodKey**: The unique key that identifies the specific method of interest. This parameter can be replaced with the name of method in a parameter called MethodName.

**Usage:** Indicates which types of standards to return. Valid values are CALIBRATION, CHECK, DRIFT, TYPE and TRANSFER.

## Syntax

<StandardsForElements MethodKey=”…” Usage=”…”>

<Elements>

<Element>Fe</Element>

…

</Elements>

</StandardsForElements>

<StandardsForElements MethodName=”…”>

<Elements>

<Element>Fe</Element>

…

</Elements>

</StandardsForElements>

## Reply

<StandardsForElements ErrorCode=”0” ErrorMessage=”Success”>

<Standards>

<Standard Key="0000000000000462" Name="1761" Manufacturer="NIST" />

<Standard Key="0000000000000463" Name="1762" Manufacturer="NIST" />

<Standard Key="0000000000000464" Name="1763" Manufacturer="NIST" />

<Standard Key="0000000000000465" Name="1764" Manufacturer="NIST" />

<Standard Key="0000000000000466" Name="1765" Manufacturer="NIST" />

<Standard Key="0000000000000467" Name="1766" Manufacturer="NIST" />

<Standard Key="0000000000000468" Name="1767" Manufacturer="NIST" />

<Standard Key="0000000000004799" Name="RN 19-65" Manufacturer="SUS" />

<Standard Key="000000000000575E" Name="3Q13L1" Manufacturer="ASTM" />

<Standard Key="0000000000005850" Name="BS17A" Manufacturer="BRAMMER" />

<Standard Key="0000000000005EE1" Name="CFe2-5" Manufacturer="SUS" />

</Standards>

</StandardsForElements>

## Possible Error Codes

6 – Exception

11 - RequestedItemNotFound

# StandardManufacturers

This command retrieves the list of all standard manufacturers.

## Syntax

<StandardManufacturers/>

## Reply

<StandardManufacturers ErrorCode=”0” ErrorMessage=”Success”>

<Manufacturer Name="ALCAN" />

<Manufacturer Name="ALCOA" />

<Manufacturer Name="ALPHA" />

…

</StandardManufacturers>

## Possible Error Codes

6 – Exception

# StandardsForManufacturers

This command returns the list of standards for the specified manufacturer.

## Parameters

**Manufacturer:** Name of manufacturer as returned in the StandardManufacturers command.

## Syntax

<StandardsForManufacturers Manufacturer=”…”/>

## Reply

<StandardsForManufacturers ErrorCode=”0” ErrorMessage=”Success”>

<Standard>

<Key>0000000000000462</Key>

<Name Label="Name">1761</Name>

<Description Label="Description"></Description>

<Manufacturer Label="Manufacturer">NIST</Manufacturer>

<LastUsed Label="Last Used">08/10/2018 17:59:31</LastUsed>

<LastModified Label="Last Modified">08/02/2017 15:27:08</LastModified>

<Excluded Label="Excluded">False</Excluded>

<SputterRateMode Label="Sputter Rate Mode">Determined</SputterRateMode>

<SputterRate Label="Sputter Rate Mode">0.273</SputterRate>

</Standard>

…

</StandardsForManufacturer>

## Possible Error Codes

6 – Exception

11 – RequestedItemNotFound

# StringValue

This lists the specific replies for loading and unloading a sample through remote control, which is through the string value of “Sample Load State”.

## Syntax

<StringValue Key="Sample Load State”/>

## Reply

<StringValue Key=”Sample Load State” Value=”…”/>

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| Unclamping | Start of unload step 1. Retracting the reamer from the sample. |
| Unclamped | Unload step 1 sequence complete. Finished retracting the reamer. |
| Releasing | Start of unload step 2. Cleaning burst to free sample from lamp. |
| Released | Unload step 2 complete. Cleaning burst finished. |
| Cleaning Anode | Start of unload step 3. Reaming and cleaning anode. |
| No Sample | Unload step 3 complete. Anode cleaning complete, no sample on lamp, door unlocked. |
| Evacuating | Start of load step 1. Drawing to vacuum on lamp to remove gases. |
| Evacuated | Load step 1 complete. Achieved lamp pressure < 1 torr. |
| Error: pressure evacuation timeout | Unable to achieve < 1 torr, when evacuating, in desired time. |
| Clamped – Low Pressure | Start of load step 2. Clamping sample to lamp with reamer assembly at low pressure. |
| Clamped – High Pressure | Clamping sample to lamp with reamer assembly at high pressure. |
| Depressurizing to 0.1 torr | Evacuating lamp to < 0.1 torr. |
| Preparing | Pressurizing lamp to lamp seed pressure for method. |
| Loaded | Load step 2 complete. Sample loaded and ready for analysis. |
| Error: door close timeout | Door was not closed fully within 60 seconds of sample being clamped at low pressure. |
| Error: depressurizing to 0.1 torr timeout | Lamp pressure did not get below 0.1 torr in 60 seconds, when trying to depressurize. |
| Error: prepare sample | Either operator aborted or timeout while pressurizing or depressurizing, during lamp preparation cycles. |
| Operator Abort: xxx | Operator intervened in load or unload of sample by manually stopping with abort button. |

# AddConditioningSamples

This command will add conditioning samples to the list of samples to analyze and return the key values for each sample set added.

## Parameters

**RepCount**: The number of replicates to add to each conditioning set. This parameter is optional. If not specified, the number of replicates added to each set will be 1.

**Operator:** The value to place into the operator field for the conditioning replicates. This parameter is optional. If not specified, the operator field will be empty.

## Syntax

<AddConditioningSamples/>

<AddConditioningSamples RepCount=”2”/>

<AddConditioningSamples Operator=”User”/>

## Reply

<AddConditioningSamples ErrorCode=”0” ErrorMessage=”Success”>

<Keys>

<Key>…</Key>

…

</Keys>

</AddConditioningSamples>

## Possible Error Codes

6 – Exception

# AddSamples

For GDS, this command has additional options in addition to the base.

## Parameters: Add Replicates to a New Set

**SampleType**: The sample type of the set. Valid values are "Sample", “CDP”, “Check”, and "Drift".

**CdpMethodKey**: The unique key that identifies the specific CDP method to assign to the set of sample type CDP. Leading zeros may be omitted.

**CdpMethodName**: The unique name that identifies the specific CDP method to assign to the set of sample type CDP.

Note: When adding a CDP set, you should only specify the CDP Method. There is no need to specify the method, as that will be set along with the CDP Method.

## Parameters: Replicates

**Mass**: Not applicable.

**Location**: Not applicable.

## Syntax: Add Replicates to a New Set

<AddSamples>

<PromptOperatorForEntry>True</PromptOperatorForEntry>

<Set>

<Field Id=”SampleType”></Field>

<Field Id=”Name”></Field>

<Field Id=”Description”></Field>

<Field Id=”CdpMethodKey”>0</Field>

<Field Id=”StandardKey”>0</Field>

<Field Id=”UDF: 1111”>User defined field value here</Field>

<Field Id=”SetId”>Set 1</Field>

</Set>

<Replicates>

<Replicate>

<Field Id=”Comments”></Field>

<Field Id=”UDF: 1234”>User defined field value here</Field>

<Field Id=”RepId”>Rep 1</Field>

</Replicate>

<Replicate>

<Field Id=”Comments”></Field>

<Field Id=”UDF: 1234”>User defined field value here</Field>

<Field Id=”RepId”>Rep 2</Field>

</Replicate>

</Replicates>

</AddSamples>

# Condition

This command performs a conditioning operation for the specified sample set.

## Parameters

**SetKey**: The unique key that identifies the specific sample set of interest.

## Syntax

<Condition SetKey=”…”/>

## Reply

<Condition ErrorCode=”0” ErrorMessage=”Success”/>

## Possible Error Codes

6 – Exception

11 – RequestedItemNotFound

12 - GeneralError

# Drift

This command performs a drift operation for the specified method on the specified sets.

## Parameters

**MethodKey**: The unique key that identifies the specific method of interest. This parameter can be replaced with the name of method in a parameter called MethodName.

## Syntax

<Drift MethodKey=”…”>

<Sets>

<Set Key=”…” />

…

</Sets>

</Drift>

<Drift MethodName=”…”>

<Sets>

<Set Key=”…” />

…

</Sets>

</Drift>

## Reply

<Drift ErrorCode=”0” ErrorMessage=”Success”/>

## Possible Error Codes

6 – Exception

11 – RequestedItemNotFound

12 - GeneralError

# AutoAnalyze

This command changes the auto analyze on sample load state of the instrument.

## Parameters

**State**: Auto analyze on sample load state to set on instrument. Valid values are "ENABLED" and "DISABLED".

## Syntax

<AutoAnalyze State=”ENABLED”/>

## Reply

<AutoAnalyze ErrorCode=”0” ErrorMessage=”Success”/>

## Possible Error Codes

6 – Exception

8 - CommandCurrentlyUnavailable

9 – UnknownParameterValue

10 – MissingAttribute

13 - UserDoesNotHavePermissionToExecuteCommand