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GREGOR: Derotator: New DCP Commands

Document No.: GRE-KIS-MAN-0011

Version: <2>

Date: 2020-06-30

Signatures & Approval

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| Change Log | | | | |
|------------|------------|--------|--|------------------------------|
| Vers. | Date | Author | Description of Changes | Sect./Para. |
| 1.0 | 2019-08-01 | O.G. | New Document | |
| 2 | 2020-06-30 | O.G | Correction after software update in offsets enhancements | 1, 4.2, marked in blue |

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1 General information

New DCP commands have been added to the Derotator User Interface for the purpose of remote control from a DCP client. Remember here, the Derotator client name is “DER”.

The interface software can also manage DCP commands from multiple clients, at the same time. In case of commands that generate a movement action of the motorization (DCP “In progress...”), taking time to fulfill a function, the sender client is memorized and will get the answer at the end of execution. Meanwhile, other clients can perform “Set Nop”, “GET” commands or even a “Stop” command; in the last case, both clients will receive the end of execution message, going back to the DCP “No active command” state.

This new version (of DCP commands) is compatible with the previous version, called “Beta2”.

It also automatically incorporates the “Set Time (relative)” option and the user does not need to check the box before the “Track” action anymore.

The front panel has been redesigned with new controls and indicators.

All commands and parameters are not case sensitive, but the DCP client name “DER” is always in uppercase. Ex: “DER get earthoffset” or “DER Get EarthOffset”

All angles are expressed in degrees.

The “Lin” or “Linear” parameter is valid for all Linear axis commands.

When the answer has various parameters, they are separated by a [space] character.

The 3 new commands “Set EarthOffset”, “Set SolarOffset”, “Set OffsetSelector” will produce the definition/calculation of the “Position Offset” sent to the Derotator Main axis.

The “OffsetSelector” radio button or “Set OffsetSelector” DCP command defines the angle to use.

For Earth offset: Pos Offset = EarthOffset

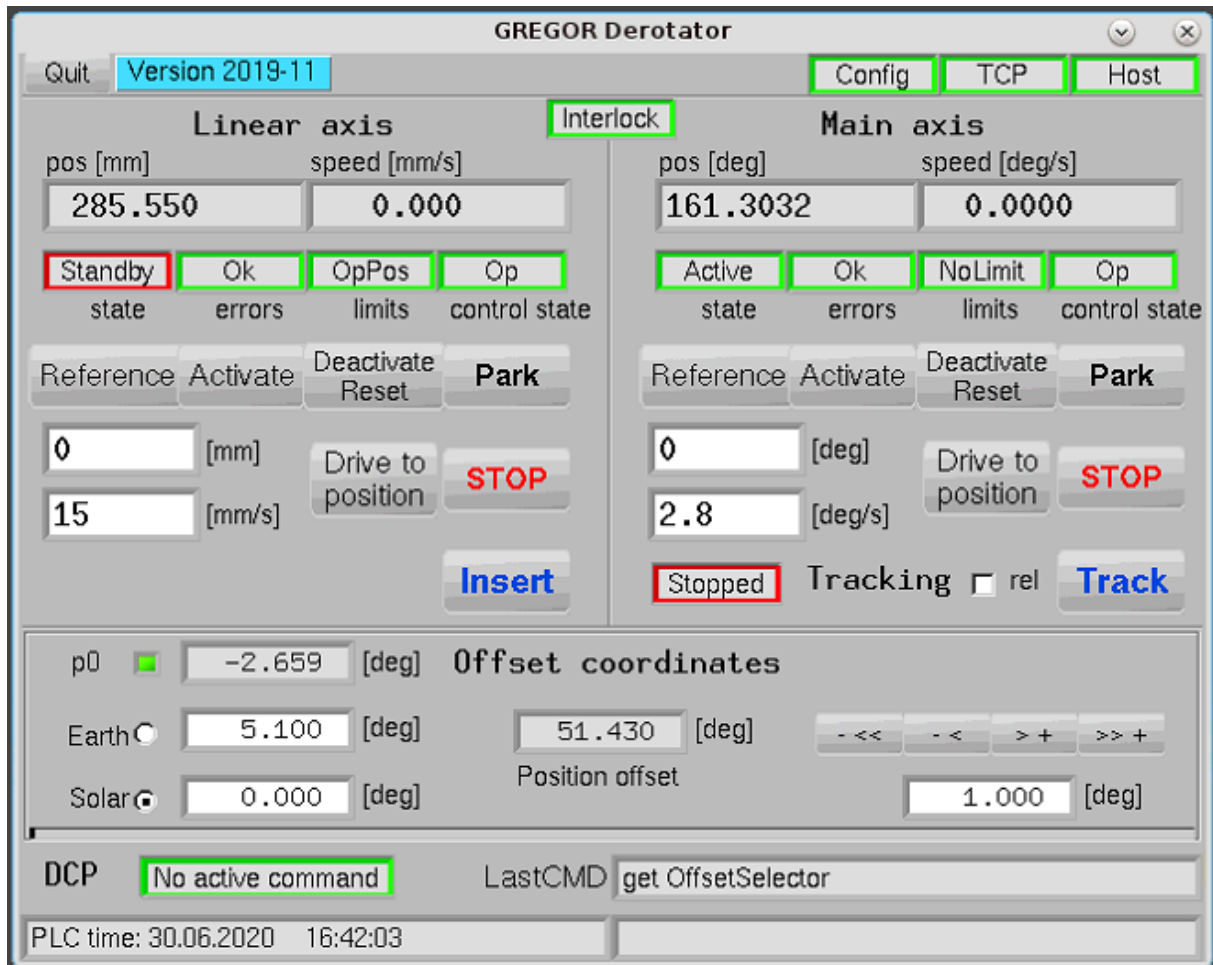
For Solar offset:

$$\text{Pos Offset}_{(\text{indicator})} = 50.1 - \frac{\text{SolarOffset}}{2} \qquad \text{Pos Offset}_{(\text{Derotator})} = 50.1 - \frac{\text{SolarOffset}}{2} - \left[\frac{P0^{(*)}}{2} \right]$$

“50.1” is a local offset angle stored in a configuration file, which was determined such that the GRIS slit is oriented north-south. The users are not allowed to modify this value. The “Config” indicator status in green at the top of the GUI indicates the successful file reading.

P0 is the solar position angle between the geocentric North Pole and the solar rotational North Pole measured eastward from geocentric North; it is calculated internally from the Derotator ephemeris module. (*) The P0 correction is applied to the tracking trajectory and is now directly included in the “Position Offset” indicator value. When using the solar offset for tracking, the P0 angle, even with its very small diurnal variation, is calculated and integrated into the offset angle, every 8 minutes (shown with a count-down progress bar).

The offset increment/decrement buttons will only affect the currently selected angle.



2 Acknowledgment & end-of execution answers

The Derotator interface respects the DCP protocol:

- Unknown command gives back a “2 ACK” single answer.
- Command parameter error gives back a “3 ACK” single answer.
- Command not allowed in this mode gives back a “5 ACK” single answer.
- State level error command returns a “0 ACK” for acknowledgment and a “1 FIN” for error or “3 FIN” answer for aborted, or in its case a “1 [parameter(s)]” or “3 [parameter(s)]” answer; a warning is represented with “-1 [parameter(s)]”.
- In other cases the normal answer message is “0 ACK”, then “0 FIN” or “0 [parameter(s)]” at the end of execution.

The time execution referring to “Get”, “Set Nop” and “Get {data}” commands is generally <100 ms, but it also depends of the instrumental network load. Other “Set” commands that require axis movement/management may generate longer time of execution, depending on the case.

3 DCP (former and valid) commands list

- Get Status
- Get Status2
- Get Pos
- Get Pos2
- Get PosOffset

- Set Nop

3.1 DCP (former and valid) “GET” commands

| command | parameter | format |
|---------------------|---|---------------|
| Get Status | none | none |
| answer | [n] | numeric char. |
| Description: | Gives the Derotator general state by generic answer. “0 FIN”=OperationalAxis “0 [n]” where n: -1=NotOperationalPosition; 1=AxisError; | |
| Error: | “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|--|---------------|
| Get Status2 | none | none |
| answer | [n] | numeric char. |
| Description: | Gives the Derotator Main axis state by generic answer. “0 [n]” where n: -1=NotOperationalPosition; 2=TrackingStopped; 3=TrackingTransient; 4=TrackingLocked. | |
| Error: | “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|---|-------------------|
| Get Pos | none | none |
| answer | [angle] | fractional string |
| Description: | Gives back the Derotator Main axis position angle. | |
| Error: | “5 ACK”=notReferenced / hwStateLinAxisOperatePosition. “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|--|---------------------------------|
| Get Pos2 | none | none |
| answer | [angle] [status] | fractional string/numeric char. |
| Description: | Gives back the Derotator Main axis position. “0 [angle] [status]” where status: -1=NotOperationalPosition; 2=TrackingStopped; 3=TrackingTransient; 4=TrackingLocked. | |
| Error: | “5 ACK”=notReferenced. “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

| command | parameter | format |
|----------------------|---|-------------------|
| Get PosOffset | none | none |
| answer | [angle] | fractional string |
| Description: | Gives back the Derotator Main axis position offset angle. “0 [angle]” Locked and InPosition. “-1 [angle]” NotLocked or NotInPosition. | |
| Error: | “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

3.2 DCP (former and valid) “SET” commands

| command | parameter | format |
|---------------------|--|---------------|
| Set Nop | none | none |
| answer | FIN | text |
| Description: | No operation is done, but it gives back a “0 FIN” answer to the sender client, confirming that the interface is active on the server/network. A small time-out is preferred because answer is immediate. | |
| Scope: | All. | |

4 DCP new commands list

- Get EarthOffset
- Get SolarOffset
- Get OffsetSelector
- Get TrackMode
- Get StateAxis
- Get StateLinAxis
- Get StateMainAxis
- Get StateLimitSW
- Get Status1
- Get Status3
- Get Pos1
- Get Pos3

- Set EarthOffset
- Set SolarOffset
- Set OffsetSelector
- Set TrackMode
- Set ClearDCP
- Set Stop (Lin/Main/All)
- Set Activate (Lin/Main)
- Set Deactivate (Lin/Main)
- Set Insert
- Set Park (Lin/Main)
- Set Track
- Set Pos

4.1 DCP new “GET” commands

| command | parameter | format |
|---|------------------|-------------------|
| Get EarthOffset | none | none |
| answer | [angle] | Fractional string |
| Description: Retrieves the earth offset angle stored in the control box. It is used to compute the Derotator angle when the respective option is selected. (Former Derotator offset angle). | | |
| Scope: All. | | |

| command | parameter | format |
|--|------------------|-------------------|
| Get SolarOffset | none | none |
| answer | [angle] | Fractional string |
| Description: Retrieves the solar offset angle stored in the control box. It is used to compute the Derotator angle when respective option is selected. | | |
| Scope: All. | | |

| command | parameter | format |
|--|------------------|---------------|
| Get OffsetSelector | none | none |
| answer | earth/solar | text |
| Description: Retrieves the selected offset selector option. | | |
| Scope: All. | | |

| command | parameter | format |
|----------------------|--|-------------------------|
| Get TrackMode | none | none |
| answer | 0/1 | numeric char. as binary |
| Description: | Retrieves the “Rel” option box state. It determines how the Derotator angle is computed. Relevant when “Track” operation is executed. | |
| Scope: | All. | |

| command | parameter | format |
|----------------------|--|----------------|
| Get StateAxes | none | none |
| answer | [status] [tracking] [velocity] | numeric string |
| Description: | Retrieves the axes states. 3 numeric values. 1 st value - From LSB to MSB : 1) TPCconnectionSCU / 2) NoErrorLinAxis / 3) NoErrorMainAxis / 4)BothAxesOperational 2 nd value – Track status (2=Stopped / 3=Transient / 4=Locked) 3 rd value – Linear axis velocity | |
| Scope: | All. | |

| command | parameter | format |
|-------------------------|--|----------------|
| Get StateLinAxis | none | none |
| answer | [s cs hw er p v mc bv] | numeric string |
| Description: | Retrieves the Linear axis states. 8 numeric values, respectively: axisStateLinAxis, axisCtrlStateLinAxis, hwStateLinAxis, errorsLinAxis, actPosLinAxis, actVeloLinAxis, motCurrentLinAxis, bridgeVoltageLinAxis. | |
| Scope: | All. | |

| command | parameter | format |
|--------------------------|--|----------------|
| Get StateMainAxis | none | none |
| answer | [s cs hw er p v mc bv po cd mt] | numeric string |
| Description: | Retrieves the Linear axis states. 11 numeric values, respectively: axisStateMainAxis, axisCtrlStateMainAxis, hwStateMainAxis, errorsMainAxis, actPosMainAxis, actVeloMainAxis, motCurrentMainAxis, bridgeVoltageMainAxis, positionOffset, controlDeviation, motorTempMainAxis. | |
| Scope: | All | |

| command | parameter | format |
|-------------------------|--|----------------|
| Get StateLimitSW | none | none |
| answer | [SWm] [SWl] | numeric string |
| Description: | Retrieves the limit switches states of both axes. 2 numeric values, respectively: 1 st value – Main axis limit switch state (0=Park/1=SafeOp/2=NoLimit) 2 nd value – Linear axis limit switch state (from 0 to 7): (HWdown/SWdown/HWup/SWup/ParkPos/OpPos/SafeOp/NoLimit) | |
| Scope: | All | |

| command | parameter | format |
|---------------------|---|--------------------|
| Get Status1 | none | none |
| answer | [n] | text/numeric char. |
| Description: | Gives the Derotator Main axis state by generic answer. “0 FIN” = operational axis. “0 [n]” where n: 0=ErrDisable; 1=Disable; 2=SafeOp; 3=Op | |
| Scope: | All. No test of the Linear axis is done to avoid its possible errors. | |

| Command | parameter | format |
|---------------------|---|---------------|
| Get Status3 | none | none |
| answer | [tracking] | numeric char. |
| Description: | Gives the Derotator Main axis state by generic answer. “0 [tracking]” where tracking: (2=Stopped / 3=Transient / 4=Locked) | |
| Error: | “1 [tracking]” -> On error, tracking = Debug binary value. From LSB to MSB : 1) noTPCconnectionSCU / 2)StateLinAxisNoData&Error / 3) StateMainAxisNoData&Error / 4) CtrlStateBothAxesOperational “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|---|-------------------|
| Get Pos1 | none | none |
| answer | [position] | Fractional string |
| Description: | Retrieves the position angle of the Derotator Main axis. | |
| Error: | “5 ACK”=notReferenced. “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. No test of the Linear axis is done to avoid its possible errors. | |

| command | parameter | format |
|---------------------|---|-----------------------------------|
| Get Pos3 | none | none |
| answer | [position] [tracking] | fractional string / numeric char. |
| Description: | Retrieves the position angle of the Derotator Main axis and tracking state. “0 [position] [tracking]” where tracking: (2=Stopped / 3=Transient / 4=Locked) | |
| Error: | “5 ACK”=notReferenced. “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. No test of the Linear axis is done to avoid its possible errors. | |

| command | parameter | format |
|-----------------------|--|-------------------|
| Get PosOffset1 | none | none |
| answer | [angle] | Fractional string |
| Description: | Retrieves the position offset angle of the Derotator Main axis. “0 [offset angle]” in tracking. | |
| Error: | “-1 [offset angle]”=notTracking. “3 FIN”=noTCPconnectionSCU. | |
| Scope: | All. No test of the Linear axis is done to avoid its possible errors. | |

4.2 DCP new “SET” commands

| command | parameter | format |
|------------------------|--|-------------------|
| Set EarthOffset | [angle] | fractional string |
| answer | FIN | text |
| Description: | Writes the earth offset angle stored into the control box. It is used to compute the Derotator angle when the respective option is selected. (Former Derotator offset angle). Offset is taken in account immediately if the Derotator is tracking. | |
| Error: | “3 ACK”=ParameterError. | |
| Scope: | All, but one at a time. | |

| command | parameter | format |
|------------------------|--|-------------------|
| Set SolarOffset | [angle] | fractional string |
| answer | FIN | text |
| Description: | Writes the solar offset stored into the control box. It is used to compute the Derotator angle when respective option is selected. <i>The offset is taken into account immediately if the Derotator is tracking.</i> | |
| Error: | “3 ACK”=ParameterError. | |
| Scope: | All, but one at a time. | |

| command | parameter | format |
|---------------------------|---|--------|
| Set OffsetSelector | none | none |
| answer | earth/solar | text |
| Description: | Set the selected offset selector option. <i>It takes effect immediately if the Derotator is tracking.</i> | |
| Error: | “3 ACK”=ParameterError. | |
| Scope: | All, but one at a time. | |

| command | parameter | format |
|----------------------|---|-------------------------|
| Set TrackMode | none | none |
| answer | 0/1 | numeric char. as binary |
| Description: | Set the “Rel” option box state. It determines how the Derotator angle is computed. Relevant when “Track” operation is executed in the way to compute the first position/time series. | |
| Error: | “3 ACK”=ParameterError. | |
| Scope: | When “No active command” is set. | |

| command | parameter | format |
|---------------------|--|-------------------------|
| Set ClearDCP | none | none |
| answer | 0/1 | numeric char. as binary |
| Description: | Clear the DCP command state, setting to “No active command”. The binary answer indicates the state before the command. “0” for “No active command” and “1” for “In progress...”. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|---|---------------|
| Set Stop | Lin/Main/All | text |
| answer | FIN | text |
| Description: | Stops the selected axis/axes of the Derotator. | |
| Error: | No error is returned, also if the axis is already stopped or deactivated. “3 ACK”=ParameterError. “5 ACK”=noTCPcommunicationSCU. | |
| Scope: | All. | |

| command | parameter | format |
|---------------------|--|--------------------|
| Set Activate | Main/Lin | text |
| answer | none/[b] | none/numeric char. |
| Description: | Activates the respective Derotator axis. Motor is powered. | |
| Error: | Main: Answers “1 [b]”. Parameter bits represent respectively the: TCPcommunicationSCU, LinAxisOpPosition, MainAxisStandby. Linear: Answers “1 [b]”. Parameter bits represent respectively the: TCPcommunicationSCU, LinAxisStandby. Bad parameter / Wrong mode. No action is performed. | |
| Scope: | Main: Takes effect when the Main axis is in Standby state and Linear axis is in Operation Position. Linear: Takes effect when the Linear axis is in Standby state. | |

| command | parameter | format |
|-----------------------|---|--------------------|
| Set Deactivate | Main/Lin | text |
| answer | FIN/[b] | text/numeric char. |
| Description: | Deactivates the respective Derotator axis. Motor is off. | |
| Error: | Main: Answers “1 [b]”. Parameter bits represent respectively the: TCPcommunicationSCU, MainAxisState. Linear: Answers “1 [b]”. Parameter bits represent respectively the: TCPcommunicationSCU, LinAxisState. Bad parameter / Wrong mode. No action is performed. | |
| Scope: | Main and Linear axes: Takes effect in all states. | |

| command | parameter | format |
|---------------------|--|--------------------|
| Set Insert | none/Lin | none/text |
| answer | FIN/[b] | text/numeric char. |
| Description: | Inserts the Derotator moving the Linear axis to the operation position. | |
| Error: | Answers "1 [b]". Parameter bits represent respectively the: TCPcommunicationSCU, LinAxisActive. Bad parameter / Wrong mode. No action is performed. | |
| Scope: | Takes effect when the Linear axis is active, regardless of the Main axis. One at a time. | |

| command | parameter | format |
|---------------------|---|--------------------|
| Set Park | Main/Lin | text |
| answer | FIN/[b] | text/numeric char. |
| Description: | Moves the respective Derotator axis to their respective parked position. (Linear: SWdown / Main: ParkPos) | |
| Error: | Answers "1 [b]". Parameter bits represent respectively the: Main: TCPcommunicationSCU, LinAxisOpPosition, LinAxisActive. Linear: TCPcommunicationSCU, MainAxisParked, LinAxisRefereced. Bad parameter / Wrong mode. No action is performed. | |
| Scope: | One at a time. Takes effect when: Main: The Linear axis is at the operation position and Main axis is active. Linear: The Linear axis is active and Main axis is at the "park" position. For the Main axis, this behavior differs from the GUI; the PARK command can be sent directly from tracking. | |

| command | parameter | format |
|---------------------|---|--------------------|
| Set Track | none/Main | none/text |
| answer | FIN/[b] | text/numeric char. |
| Description: | Starts the tracking of the Derotator Main axis. | |
| Error: | Answers "1 [b]". Parameter bits represent respectively the: TCPcommunicationSCU, LinAxisOpPosition, LinAxisReferenced. No action is performed. Bad parameter / Wrong mode. | |
| Scope: | Takes effect when the Linear axis is at the operation position and Main axis is at least referenced and active. One at a time. | |

| command | parameter | format |
|---------------------|---|-----------------------------------|
| Set Pos | [position] | fractional string |
| answer | [b] [position] | numeric char. / fractional string |
| Description: | Moves the Main axis to the defined angle position. Answers "0 [position]" where position is the reached destination. | |
| Error: | "1 [b] [position]". (The last position). Parameter b bits represent respectively the: TCPcommunicationSCU, LinAxisOpPosition, MainAxisActiveTrackStopped. Bad parameter / Wrong mode. No action is performed. | |
| Scope: | Takes effect when the Linear axis is at the operation position and Main axis is in active mode (not tracking). | |