Interface Control Document

TELESCOPE CONTROL SYSTEM(TCS)

TMT

THIRTY METER TELESCOPE

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TELESCOPE CONTROL SYSTEM(TCS)

This document describes the API for the TMT Telescope Control System. The main functions of the TCS are: 1) A command sequencer to control, synchronize, and monitor the telescope subsystems. 2) A pointing model to convert target RA and DEC positions into corrected subsystem demands. 3) wavefront control software for seeing limited instruments and blending AO offloads. The TCS provides high level control for the telescope mount, enclosure, M1, M2, M3, instrument components (rotators, WFS probes, ADCs),the Global Metrology System (GMS), and the Commissioning and Acquisition System (CAGS). The TCS provides coordination of the following operating modes: initialization, slewing, pointing, acquisition, tracking, guiding, nodding/dithering, and halting. The TCS is synchronized with the instruments and AO systems via the Observatory Control Software.

Telescope Enclosure Subsystem Assembly (tcsENCAssembly)

The enclosure subsystem (ENC) is a rotating structure housing the telescope. ENC Assembly sends lifecycle and operational commands to ENC subsystem in order to control lifecycle and operations of enc. ENC assembly sends position demands to enc subsystem, receives and processes events from ENC.

Subsyatem	Name	Prefix	Type	WBS ID
TCS	ENCAssembly	TCS.TC.ENCA	Assembly	tmt.tel.cont.tcs.enc

Items Published by ENCAssembly

Events Published by ENCAssembly

Events: CurrentPosition

This assembly publishes the current position for the base and cap.

Min Rate	Max Rate	Archive
20.0 Hz	20.0 Hz	no

Attributes for CurrentPosition

Name	Description	Type	Units
base	This is the Current Base Position.	double	deg
cap	This is the Current Cap Position	double	deg
time	This is the reported by the PLC associated with the position	double	time

Events: state

State information from ENC

Min Rate	Max Rate	Archive
20.0 Hz	20.0 Hz	no

Attributes for state

Name	Description	Type
lifecycleState	This is the Current Lifecycle State of ENC	enum: (Initalized, Running)
operationalState	This is the Current Operational State of ENC	enum: (Ready, Running, Slewing, Halted, Tracking, Inposition, Degraded, Disconnected, Faulted)
health	This is the Current Health of ENC	enum: (Good, Ill, BAD, UNKNOWN, Disconnected)
operationalMode	This is the Current Operation Mode of ENC	enum: (Local, Remote)
shutterState	This is the Current State of Shutter	enum: (Open, Closed)
innerVentState	This is the Current State of Inner Vents.	enum: (Open, Closed)
outerVentState	This is the Current State of Outer Vents	enum: (Open, Closed)
flapState	This is the Current State of Flaps	enum: (Open, Closed)

Alarms published by ENCAssembly

Name	Description	Severity	Archive
enclosureInBadStatus	ENC Assembly will be configured to generate an alarm in case ENC is in ILL or BAD status	minor	false

Items Subscribed to by ENCAssembly

ENC processes events received and sends it to ENC subsystem.

Events Subscribed to by ENCAssembly

Subsystem	Component	Name	Required Rate	Max Rate	Usage
TCS	tcsPK	encDemands	20.0	20.0	ENC assembly uses AZ,EL position demands from tcs pointing kernel for tracking moves.

Commands for ENCAssembly

TCS ENC Assembly commands.

Configuration: Initialize

Requirements:

After execution of Initialize command enc assembly transits to Running state.

Arguments:

n/a

Configuration: Shutdown

Requirements:

After exe of shutdown command assembly trans to Initialize state.

Arguments:

n/a

Configuration: SetDirection

Requirements:

Instruct the assembly to generate a path for the Clockwise CounterClockwise or shortest path

Arguments:

Name	Description	Type	Required
direction	This parameter value is used to perform enclosure movement	enum: (Clockwise, CounterClockwise, ShortestPath)	yes

Configuration: Move

Requirements:

This command will be used to move enclosure.

Arguments:

Name	Description	Type	Required
operation	This will be used to move ENC to specific Base and Cap positions	enum: (On, Off)	no
mode	Its value can be smooth or fast based upon movement specified for Movement.	enum: (Smooth, Fast)	no
base	This will be used to define Base movement coordinates.	double	no
cap	This will be used to define Cap movement coordinates.	double	no
time	Time is used in Smooth Mode to specify enclosure movement timing.	double	no

Configuration: Track

Requirements:

This command will be used to mark enclosure in Track mode or get it out of track mode

Arguments:

Name	Description	Type	Required
operation	This will be used to mark Enclosure in Track Mode or get it out of track mode.	enum: (On, Off)	no
mode	This will be used to define either as Smooth or fast	enum: (Smooth, Fast)	no
base	This will be used to define Base movement coordinates.	double	no
cap	This will be used to define Cap movement coordinates.	double	no
time	Time is used in Smooth Mode is selected to specify enclosure movement timing	double	no

Configuration: Halt

Requirements:

Stop all ENC motion.

Arguments:

n/a

Configuration: AntiFreeze

Requirements:

Send the enclosure into and out of antifreeze mode.

Arguments:

Name	Description	Type	Required
operation	This will be used to Start or Stop Antifreeze mode.	enum: (On, Off)	no
rotationspeed	It defines the dome rotation speed to start antifreezing mode.	double	no

Configuration: shutterControl

Requirements:

Opens closes or stops shutter motion

Arguments:

Name	Description	Type	Required
operation	Its value can either be Open Close or Halt based upon which shutter will be opened closed or halted.	enum: (open, close, halt)	yes

Configuration: exhaustControl

Requirements:

Opens or closes the exchaust.

Arguments:

Name	Description	Type	Required
operation	Its value can either be open or Close based upon which exhaust will be opened or closed.	enum: (open, close)	yes

Configuration: ventControl

Requirements:

Opens or closes the inner and outer vents

Arguments:

Name	Description	Type	Required
venttype	This will be used to specify either Inner or Outer Vent for operation.	enum: (Inner, Outer)	no
operation	Its value can either be open or Close.	enum: (open, close)	no

Configuration: flapControl

Requirements:

Opens or closes inner and outer Flaps.

Arguments:

Name	Description	Type	Required
operation	Its value can be either open or close.	enum: (open, close)	yes

Configurations Sent to Other Components

Name	Component	Subsystem
Initialize	ENCHCD	TCS
Shutdown	ENCHCD	TCS
SmoothMove	ENCHCD	TCS
FastMove	ENCHCD	TCS
SmoothMoveToTrack	ENCHCD	TCS
FastMoveToTrack	ENCHCD	TCS
TrackOff	ENCHCD	TCS
DomeHalt	ENCHCD	TCS
AntiFreezeOn	ENCHCD	TCS
AntiFreezeOff	ENCHCD	TCS
OpenShutter	ENCHCD	TCS
CloseShutter	ENCHCD	TCS
HaltShutter	ENCHCD	TCS
OpenExhaust	ENCHCD	TCS
CloseExhaust	ENCHCD	TCS
OpenAllInnerVent	ENCHCD	TCS
CloseAllInnerVent	ENCHCD	TCS
OpenAllOuterVent	ENCHCD	TCS
CloseAllOuterVent	ENCHCD	TCS
OpenAllInnerFlap	ENCHCD	TCS
CloseAllInnerFlap	ENCHCD	TCS
OpenAllOuterFlap	ENCHCD	TCS
CloseAllOuterFlap	ENCHCD	TCS