SK433 *Velay* - PI2D Compensator

Inputs

Feed-forward

UTB EXP / SMA FP — FFWI

The Feed-forward input is used to compensate a disturbance by applying an open-loop command.
This compensation signal is obtained from a measurement of the disturbing signal.
The Feed-forward signal can be also used for jumping from the current lock point.

FFWG → PGA → FFW

Feed-Forward Gain
The transmission is programmable from -100% to +100%.

ACQM, FFWE → enable (SPDT) → 0V

This switch is used to engage the open-loop command signal. It is either controlled *via* remote command or ACQI.

Feed-Forward

Feedback

SMA FP / UTB EXP — FBKI

FBKE → Feedback (enable; 1: X; 0: MUX) → 0V

Low-Noise Difference Amplifier

Error Sign Selector

ERRN → select (SPDT)

ERRC → write → DAC

Error Offset Compensation Fine Control
A small DC-voltage may be added to the error signal.

The gain is programmable from -20dB to +26dB.

Error Gain

ERRG → select (PGA)

Error

enable (SPDT) → 0V; ERRE

ERR

LOCK, INTS → enable (SPDT) → 0V

High-Frequency Integrator
Up to 16 unity-gain frequencies are available.
The integrator action is automatically controlled by an internal state machine. It should be enabled for low-noise operation.

HFIF, LOCK → error int / ugf select / preset

Up to 16 unity-gain frequencies are available for the differentiator.
Its action is automatically controlled by an internal state machine.

LOCK, DIFS → enable (SPDT) → 0V

High-Frequency Differentiator

HFDF, HFDG → error diff / ugf sel. / gain sel

Low-Frequency Integrator

Up to 16 unity-gain frequencies are available for the LF integrator.
Its action is automatically controlled by an internal state machine.
It must be enabled to acquire lock using the search pattern signal.

LFIF, LOCK → error int / preset / ugf select / preset

LOCK, INTS → enable (SPDT) → 0V

OFSS → write → DAC

Command Output Offset
Fast actuator biasing.

OFSE → enable (SPDT) → 0V

REFS → select (0; 2; 1; X; MUX) → 0V

Reference Source

STPS → write → DAC

Reference Setpoint
Low-noise, bipolar DC-voltage.

Reference

SMA FP / UTB EXP — REFI

Search Pattern

UTB EXP / SMA FP — PATI

This input provides the compensator with specific search patterns instead of the internal ramp.

PATI

Provides a fixed-amplitude (2Vpp) ramp voltage as search pattern signal.
Period can be selected among 8 values.

Internal Search Pattern Generator

PATP → period

PATS: RMP, PATI

Search Pattern Source

select (MUX; 1; 2; 0; X) → 0V

PATA → gain (PGA)

Search Pattern Amplitude
The amplitude of the search pattern signal can be controlled *via* this programmable gain amplifier.

SPAT → PATD → select (SPDT)

Search Pattern Destination
This switch selects whether the search signal is applied to the fast actuatot or the slow one.

Acquisition

SMA FP / UTB EXP — ACQI

ACQI

The ACQI signal is used to trigger specific actions : lock/unlock control, autolock, feed-forward control...

CMD, SLW → **Peak Detectors**
Commands signals are monitored to detect levels close to saturations. The peak voltage values are also acquired for remote reading.

Several threshold levels are available. The ACQI operating mode is also configurable to provide specific event-triggered actions.

ACQM, ACQT

Analog Comparator — AC → ISR

Microcontroller — ADC → ISR; STMS, RMON; spi → DACs, leds driver...; gpio → Muxes, switches...; gpio, i2c, uart, gpio, gpio, int

Misc.

DIOs

UTB, EXP — RFU-DIO{0-3} → gpio

PCB — CFG-SW{0-3} → gpio

Config. Switches

Reverse- Over-Voltage & In-rush Current protections

Outputs

To fast-actuator's driver.
Command — CMDO — FP SMA / EXP UTB

CMD

Test and diagnostic.
Monitoring — MONO — EXP UTB / FP SMA

MONO Signal Selection

MONS → select (1; 2; 3; 4; 5; X; 6; 7; 0; MUX) → 0V

ERR, CMD, SLW, SPAT, SLE, EBW, EAC

To slow-actuator's driver.
Slow Command — SLWO — FP SMA / EXP UTB

SLW

Slow-Loop Error Sign

SLEN → select (SPDT)

SLE

LOCK, INTS → enable (SPDT) → 0V

Slow-Loop Integrator
Up to 9 unity-gain frequencies are available for this integrator.
Its action is automatically controlled by an internal state machine.
It is provided to prevent the saturation of the command signal of the fast compensator. It must be enabled to acquire lock using the search pattern signal.

SLIF, LOCK → error int / preset / ugf select / preset

SLOS → write → DAC

Slow-Loop Command Offset
This DC-voltage is used to bias the slow actuator.

SLOE → enable (SPDT) → 0V

Front-Panel Display

PI2D Compensator

CM, SL, ER, AQ, LK, FF — FP

RA, RE — FP

Remote Control

spi

Led indicators are used to display minimal information on the current status of the instrument.

Static Leds Driver

Remote Control

EXP, UTB, BKP — /STATUS
BKP — I2C {SDA, SCL}
BKP — UART {RX, TX, /CTS, /RTS}

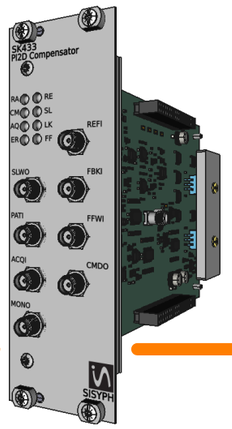
BKP — /SLOT
BKP — ID{0... 3}

The module is controlled through these lines.

Power Supplies

{P5V, DGND} BKP
{P15V, N15V, AGND} BKP
PWRGOOD BKP

The module is powered through these lines.



View of the SK433 Compensator module

- Only main functionalities are represented. Refer to the *User's Guide* for detailed information.
- Refer to the *User's Programming Guide* for a complete description of the remote control commands.

Symbols

Coaxial connector	
I/O line	
Indicator	
CMD Command	
Jumper	

Locations

	Mezzanine board
PCB	Printed circuit board
BKP	Backplane connector
UTB	User's terminal blocks
EXP	Expansion connector
FP	Front panel

Domains

Optical, Digital, Analog, HF

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