

NR360SP1/M - October 21, 2021

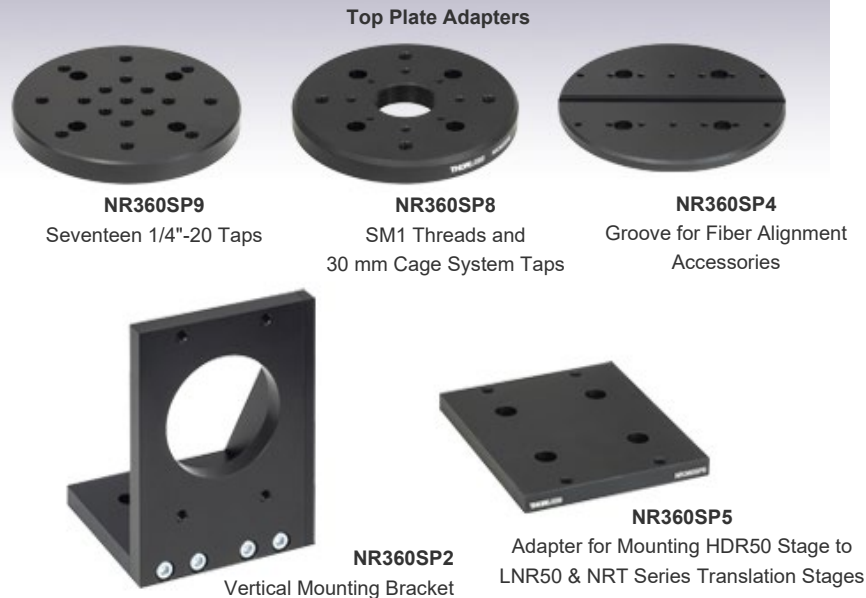
Item # NR360SP1/M was discontinued on October 21, 2021. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

HEAVY-DUTY ROTATION STAGE WITH STEPPER MOTOR

- ▶ Continuous 360° Motorized Rotation
- ▶ 50 kg (110 lbs) On-Axis Load Capacity
- ▶ SM2 (2.035"-40) Threaded Central Bore
- ▶ Variety of Mounting Options



HDR50
 Heavy-Duty Rotation Stage with
 SM2-Threaded Center Hole



NR360SP9
 Seventeen 1/4"-20 Taps

NR360SP8
 SM1 Threads and
 30 mm Cage System Taps

NR360SP4
 Groove for Fiber Alignment
 Accessories

NR360SP2
 Vertical Mounting Bracket

NR360SP5
 Adapter for Mounting HDR50 Stage to
 LNR50 & NRT Series Translation Stages

OVERVIEW

Features

- 50 kg (110 lbs) Maximum On-Axis Load
- SM2 (2.035"-40) Threaded Central Aperture
- 8-32 (M4) Tapped Holes for Optomech or Top Plate Adapters
- Preloaded Worm Gear Drive Mechanism Provides Minimal Backlash
- Top Plate Adapters Attach Using 8-32 (M4) Taps for Additional Mounting Features:
 - NR360SP9(M) Adapter with Seventeen 1/4"-20 (M6) Taps
 - NR360SP8 Adapter with SM1 Threads and Taps for 30 mm Cage Systems
 - NR360SP4(M) Adapter with Groove for Fiber Alignment Accessories
- Mounting Adapters for Vertical Applications or Translation Stage Mounting
- Full Kinesis® Software Control Suite (See *Kinesis Software* Tab for Details)
- Recommended Controller: BSC201



Click to Enlarge
 HDR50 Rotation Stage with
 NR360SP8 Adapter Plate Mounted
 Vertically Using NR360SP2 Bracket
 (Each Sold Separately Below)

The HDR50(M) Heavy-Duty Rotation Stage provides motorized, continuous rotation and can support loads up to 50 kg (110 lbs). It incorporates a micro-stepping motor, worm gear assembly, precision bearings, and a low-profile design with a height of 44.0 mm. The central aperture features an SM2 thread on the rotating and the non-rotating parts, making the stage compatible with our SM2 lens tubes. The stage has four 1/4" (M6) countersunk holes that allow it to be secured directly to a breadboard. The holes are spaced apart such that an imperial stage may also be mounted to a metric breadboard and vice versa. The stage can also be post mounted using the six 1/4"-20 (M6) side-located mounting holes.

Key Specifications ^a	
Travel	360° Continuous Rotation
Speed^{b,c}	50 °/sec (Max)
Acceleration^c	80 °/sec ² (Max)
Accuracy	±820 µrad
Bidirectional Repeatability	±350 µrad
Minimum Incremental Motion	0.8 µrad
On-Axis Load Capacity	50 kg (110 lbs)
Maximum Torque	6 N•m
Motor Type	2 Phase Stepper
Included Extension Cable	PAA613, 3 m Long

a. Refer to the *Specs* Tab for Complete Specifications
 b. The max speed is only achievable as long as the max torque is not exceeded.
 c. Measured Using a BSC201 Controller

Accessories

We offer several types of top plate adapters which mount to the rotating world of the HDR50(/M) stage using 8-32 (M4) screws. We also offer two mounting adapters: the NR360SP2 bracket is designed for secure vertical mounting of the stage and the NR360SP5 adapter enables the HDR50 rotation stage to be mounted to select translation stages.

Software

This stage can be operated with the user friendly Kinesis software package, which allows the user to quickly set up complex move sequences. It also features .NET controls which can be used by 3rd party developers working in the latest C#, Visual Basic, LabVIEW™ or any .NET compatible languages to create custom applications. All relevant operating parameters are set automatically by the software for Thorlabs stage and actuator products. For more details, please see the *Kinesis Software* and *Kinesis Tutorials* tabs.

S P E C S

Stage Specifications	
Translation and Motion Parameters	
Travel	360° Continuous Rotation
Speed ^{a,b}	50 °/sec (Max)
Acceleration ^b	80 °/sec ² (Max)
On-Axis Load Capacity	50 kg (110 lbs)
Drive Mechanism	Worm Drive
Gear Ratio	66:1
Homing Sensor	Hall Effect, Non-Contact
Stage Bidirectional Repeatability	±350 µrad
Stage Bidirectional Accuracy	±820 µrad
Minimum Incremental Motion	0.8 µrad
Homing Bidirectional Repeatability	±203 µrad
Axis Wobble	65 µrad
Torque	6 N•m (Max)
Physical Specifications	
Platform Size	Ø3.86" (Ø98.0 mm)
Central Aperture	SM2 (2.035"-40) Threaded
Platform Mounting Holes	Four 8-32 (M4)
Dimensions	7.46" x 4.55" x 1.73" (189.4 mm x 115.5 mm x 44.0 mm)
Weight	3.34 lbs (1.52 kg)
Attached Cable Length	0.5 m
Included Extension Cable	PAA613, 3 m Long
Operating Temperature Range	5 °C to 40 °C
Humidity	80% RH at 31 °C (Max)

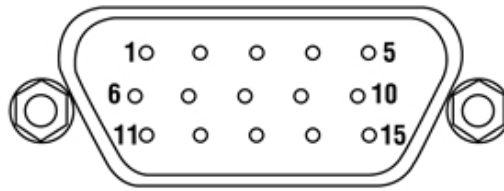
a. The max speed is only achievable as long as the max torque is not exceeded.

b. Measured Using a BSC201 Controller

Motor Specifications	
Motor Type	2-Phase Stepper
Step Angle	1.8° (200 Major Steps per Revolution)
Micro-Stepping	2048 Micro-Steps per Major Step (Total of 409,600 Micro-Steps per Revolution)
Rated Phase Current	0.85 A
Resistance / Phase	3.6 Ω
Inductance / Phase	4.6 mH

P I N D I A G R A M S

Motor Cable Pin Connections D-Type Male



PIN	Description
1	Limit Switch Ground ^a
2	Not Used
3	Clockwise Limit Switch Output
4	Phase B -ve
5	Phase B +ve
6	Phase A -ve
7	Phase A +ve
8 & 9	Not Used
10	5 V ^b
11 & 12	Not Used
13	5 V ^b
14	Not Used
15	Earth

- The limit switch ground is connected to the motor body.
- Pins 10 and 13 are connected inside the D-Type shell.

KINESIS SOFTWARE

Thorlabs' Kinesis[®] software can be used to control devices in the Kinesis or APT™ family, which covers a wide range of motion controllers ranging from small, low-powered, single-channel drivers (such as the K-Cubes and T-Cubes) to high-power, multi-channel, modular 19" rack nanopositioning systems (the APT Rack System).

The Kinesis Software features new .NET controls which can be used by 3rd party developers working in the latest C#, Visual Basic, LabVIEW™ or any .NET compatible languages to create custom applications. Low level DLL libraries are included for applications not expected to use the .NET framework. A Central Sequence Manager supports integration and synchronization of all Thorlabs motion control hardware.

By providing these common software platforms, Thorlabs has ensured that users can easily mix and match any of the APT and Kinesis controllers in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from the low-powered, single-axis to the high-powered, multi-axis systems and control all from a single, PC-based unified software interface.

The software packages allow two methods of usage: graphical user interface (GUI) utilities for direct interaction with and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.

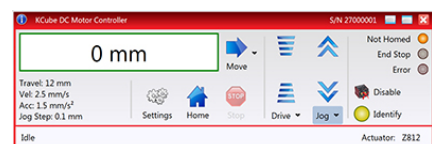
Software

Kinesis Version 1.14.30



The Kinesis Software Package, which includes a GUI for control of Thorlabs' Kinesis and APT™ system controllers.

Also Available:



Kinesis GUI Screen

KINESIS TUTORIALS

Thorlabs' Kinesis® software features new .NET controls which can be used by third-party developers working in the latest C#, Visual Basic, LabVIEW™, or any .NET compatible languages to create custom applications.

C#

This programming language is designed to allow multiple programming paradigms, or languages, to be used, thus allowing for complex problems to be solved in an easy or efficient manner. It encompasses typing, imperative, declarative, functional, generic, object-oriented, and component-oriented programming. By providing functionality with this common software platform, Thorlabs has ensured that users can easily mix and match any of the Kinesis controllers in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from the low-powered, single-axis to the high-powered, multi-axis systems and control all from a single, PC-based unified software interface.

The Kinesis System Software allows two methods of usage: graphical user interface (GUI) utilities for direct interaction and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.

For a collection of example projects that can be compiled and run to demonstrate the different ways in which developers can build on the Kinesis motion control libraries, click on the links below. Please note that a separate integrated development environment (IDE) (e.g., Microsoft Visual Studio) will be required to execute the Quick Start examples. The C# example projects can be executed using the included .NET controls in the Kinesis software package (see the Kinesis Software tab for details).



[Click Here for the Kinesis with C# Quick Start Guide](#)
[Click Here for C# Example Projects](#)
[Click Here for Quick Start Device Control Examples](#)



LabVIEW

LabVIEW can be used to communicate with any Kinesis- or APT-based controller via .NET controls. In LabVIEW, you build a user interface, known as a front panel, with a set of tools and objects and then add code using graphical representations of functions to control the front panel objects. The LabVIEW tutorial, provided below, provides some information on using the .NET controls to create control GUIs for Kinesis- and APT-driven devices within LabVIEW. It includes an overview with basic information about using controllers in LabVIEW and explains the setup procedure that needs to be completed before using a LabVIEW GUI to operate a device.



[Click Here to View the LabVIEW Guide](#)
[Click Here to View the Kinesis with LabVIEW Overview Page](#)



ROTATION MOUNTS AND STAGES

Rotation Mount and Stage Selection Guide

Thorlabs offers a wide variety of manual and motorized rotation mounts and stages. Rotation mounts are designed with an inner bore to mount a $\varnothing 1/2"$, $\varnothing 1"$, or $\varnothing 2"$ optic, while rotation stages are designed with mounting taps to attach a variety of components or systems. Motorized options are powered by a DC Servo motor, 2 phase stepper motor, piezo inertia motor, or an Elliptec™ resonant piezo motor. Each offers 360° of continuous rotation.

Manual Rotation Mounts

Rotation Mounts for $\varnothing 1/2"$ Optics							
Item #	MRM05(/M)	RSP05(/M)	CRM05	PRM05(/M) ^a	SRM05	KS05RS	CT104
Click Photo to Enlarge							
Features	Mini Series	Standard	External SM1 (1.035"-40) Threads	Micrometer	16 mm Cage-Compatible	$\pm 4^\circ$ Kinematic Tip/Tilt Adjustment Plus Rotation	Compatible with CT1 Cage Translator Stage and 1/4"

Translation Stages^b

Additional Details

- a. This mount is available in the PRM05GL5 bundle, which includes the PRM05 rotation mount with the SM05PM5 polarizing prism mount.
- b. The CT104 is compatible with the 1/4" translation stages using our MS103(/M) adapter plate.
- c. The CT104 is compatible with the CT1 cage translation stage, which is designed for use with 30 mm cage systems.

Rotation Mounts for Ø1" Optics

Item #	RSP1(/M)	LRM1	RSP1D(/M)	DLM1(/M)	CLR1(/M)	RSP1X15(/M)	RSP1X225(/M)	PRM1(/M) ^a
Click Photo to Enlarge								
Features	Standard	External SM1 (1.035"-40) Threads	Adjustable Zero	Two Independently Rotating Carriages	Rotates Optic Within Fixed Lens Tube System	Continuous 360° Rotation or 15° Increments	Continuous 360° Rotation or 22.5° Increments	Micrometer

Additional Details

- a. This mount is available in the PRM1GL10 bundle, which includes the PRM1 rotation mount with the SM1PM10 polarizing prism mount.

Rotation Mounts for Ø1" Optics

Item #	LM1-A & LM1-B(/M)	CRM1(/M)	CRM1L(/M)	CRM1PT(/M)	KS1RS	K6XS
Click Photo to Enlarge						
Features	Optic Carriage Rotates Within Mounting Ring	30 mm Cage-Compatible ^a	30 mm Cage-Compatible for Thick Optics ^a	30 mm Cage-Compatible with Micrometer ^a	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Six-Axis Kinematic Mount ^a

Additional Details







- a. This mount also features four 4-40 (M3) holes on the rotation dial for use with the K6A1(/M) prism platform.







Rotation Mounts for Ø2" Optics

Item #	RSP2(/M)	RSP2D(/M)	PRM2(/M)	LM2-A & LM2-B(/M)	LCRM2(/M)	KS2RS	K6X2
Click Photo to Enlarge							
Features	Standard	Adjustable Zero	Micrometer	Optic Carriage Rotates Within Mounting Ring	60 mm Cage-Compatible	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Six-Axis Kinematic Mount

Additional Details








Manual Rotation Stages

Manual Rotation Stages						
Item #	RP005(/M)	PR005(/M)	MSRP01(/M)	RP01(/M)	RP03(/M)	QRP02(/M)
Click Photo to Enlarge						
Features	Standard					Two Hard Stops
Additional Details						



Manual Rotation Stages						
Item #	XRNR1(/M)	XRR1(/M)	PR01(/M)	CR1(/M)	XYR1(/M)	OCT-XYR1(/M)
Click Photo to Enlarge						
Features	Fine Rotation Adjuster and 2" Wide Dovetail Quick Connect	Fine Rotation Adjuster and 3" Wide Dovetail Quick Connect	Fine Rotation Adjuster and SM1-Threaded Central Aperture	Fine Pitch Worm Gear	Rotation and 1/2" Linear XY Translation	
Additional Details						

- The stage profile is higher when it is mounted using the screw slots rather than stacked on another stage or accessory with mating dovetails.
- The OCT-XYR1(/M) stage includes the XYR1A solid sample plate. This plate can be detached from the stage to reveal the same mounting features present on the XYR1(/M) stage.

Motorized Rotation Mounts and Stages

Motorized Rotation Mounts and Stages with Central Clear Apertures							
Item #	DDR25(/M)	PDR1(/M)	K10CR1(/M)	PRM1Z8(/M) ^a	DDR100(/M)	ELL14	HDR50(/M)
Click Photo to Enlarge							
Features	Compatible with SM05 Lens Tubes, 16 mm Cage System, 30 mm Cage System	Compatible with SM05 Lens Tubes, 30 mm Cage System, PD1(/M) and PDX1(/M) Linear Stages	Compatible with SM1 Lens Tubes & 30 mm Cage System		Compatible with SM1 Lens Tubes, 16 mm Cage System, 30 mm Cage System	Compatible with SM1 Lens Tubes, Open Frame Design for OEM Applications	Compatible with SM2 Lens Tubes
Additional Details							

- This stage is available in the KPRMTE(/M), which includes the PRMTZ8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.

Motorized Rotation Mounts and Stages with Tapped Platforms		
Item #	PRMTZ8(/M) ^a	ELL18(/M) ^b
Click Photo to Enlarge		
Features	Tapped Mounting Platform for Mounting Prisms or Other Optics	Tapped Mounting Platform, Open Frame Design for OEM Applications
Additional Details		

- a. This stage is available in the KPRM1E(/M), which includes the PRMT1Z8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.
- b. This stage is available in the ELL18K(/M), which includes an interface board, mounting brackets, and connectors for PC control.

Heavy-Duty Rotation Stage



- ▶ SM2 (2.035"-40) Threaded Central Aperture on Rotating and Non-Rotating Worlds
- ▶ 8-32 (M4) Tapped Holes for Mounting Components or Top Plate Adapters (Available Below)
- ▶ Stage Mounting Features
 - Four 1/4" (M6) Countersunk Holes
 - Four 1/4"-20 (M6) Tapped Mounting Holes (Two Each Side Face)
- ▶ PAA613 3 m Long Extension Cable Included



The HDR50(/M) Heavy-Duty Rotation Stage features SM2-threaded central apertures on the rotating and non-rotating worlds (illustrated in the diagram to the right). The threaded section of the rotating world is 0.27" (6.9 mm) deep and the threaded section of the non-rotating world on the bottom side is 0.16" (4.0 mm) deep. Other mounting features are available using the top plate adapters below. These adapters attach using the 8-32 (M4) tapped holes in the stage's rotating world.

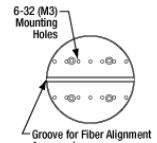
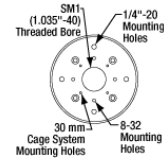
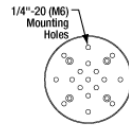
The HDR50(/M) stage can be mounted directly to a breadboard using 1/4"-20 (M6) cap screws (not included) that are at least 1.5" (35 mm) long. It can also be mounted vertically using the holes on each side face or by using the NR360SP2 bracket sold below. The NR360SP5 adapter enables the HDR50 stage to be mounted to an LNR50 or NRT Series Translation Stage.

Part Number	Description	Price	Availability
HDR50/M	Heavy-Duty Rotation Stage with SM2-Threaded Center Hole, Metric	\$2,843.82	5-8 Days
HDR50	Heavy-Duty Rotation Stage with SM2-Threaded Center Hole, Imperial	\$2,843.82	Lead Time

Top Plate Adapters



- ▶ Top Plate Adapters Attach Using #8 (M4) Counterbores
- ▶ NR360SP9(/M) Adapter with Seventeen 1/4"-20 (M6) Taps
- ▶ NR360SP8 Adapter Features:
 - ▶ SM1 (1.035"-40) Thread for Ø1" Lens Tubes
 - ▶ 4-40 Mounting Holes for 30 mm Cage System
 - ▶ Four 1/4"-20 and Four 8-32 Mounting Holes
- ▶ NR360SP4(/M) Adapter with 3 mm Alignment Groove for Fiber Alignment Accessories



These top plate adapters provide additional mounting features for our HDR50(/M) Rotation Stage. The plates mount to the moving world at the top of the stage using four included 8-32 (M4) screws. Note that while imperial adapters come with imperial hardware and metric adapters come with metric hardware, the plates themselves are compatible with either type of stage. For example, an imperial adapter may be attached to a metric stage using four M4 screws. These adapters are also compatible with the retired NR360S(/M) Stage.

Part Number	Description	Price	Availability
NR360SP9/M	Adapter Plate for HDR50 and DDR100 Stages, M6 Taps	\$100.10	Today
NR360SP4/M	Adapter Plate for HDR50 and DDR100 Stages, 3 mm Alignment Groove, M3 Taps	\$127.69	Today
NR360SP9	Adapter Plate for HDR50 and DDR100 Stages, 1/4"-20 Taps	\$100.10	Today
NR360SP8	Adapter Plate for HDR50 Stage, SM1 Threaded, 30 mm Cage Compatible, 1/4"-20 and 8-32 Taps	\$54.65	Today
NR360SP4	Adapter Plate for HDR50 and DDR100 Stages, 3 mm Alignment Groove, 6-32 Taps	\$127.69	Today

Vertical Mounting Bracket



- ▶ Mount HDR50(/M) Rotation Stage Vertically
- ▶ Ø2.68" Bore Accommodates SM2 (2.035"-40) Lens Tubes
- ▶ Seven 1/4" (M6) Counterbores on Base for Breadboard Mounting
- ▶ Mounting Hardware Not Included



Click to Enlarge
HDR50 Stage Mounted
Vertically Using NR360SP2
Bracket

The NR360SP2(/M) vertical mounting bracket allows the HDR50(/M) stage or the retired NR360S(/M) stage to be mounted in a vertical orientation. The Ø2.68" bore allows an SM2 lens tube attached to the bottom of the stage to pass through the bracket. The bracket can be secured to an optical table or optical breadboard using an array of seven 1/4" (M6) counterbored holes. Mounting the HDR50(/M) stage to the bracket requires four 1/4"-20 (M6) cap screws (not included) that are at least 1.5" (35 mm) long.

Part Number	Description	Price	Availability
NR360SP2/M	Vertical Mounting Bracket for HDR50(/M) Stage, Metric Mounting Holes	\$257.54	5-8 Days
NR360SP2	Vertical Mounting Bracket For HDR50(/M) Stage, Imperial Mounting Holes	\$257.54	5-8 Days

Mounting Adapter for LNR & NRT Series Stages



- ▶ Mount HDR50(/M) Rotation Stage to LNR50 or NRT Series Translation Stages
- ▶ Mounting Hardware Not Included



Click for Details
HDR50 Rotation Stage with NR360SP9
Adapter Plate Mounted on NRT150
Translation Stage Using
NR360SP5 Mounting Adapter

The NR360SP5(/M) mounting adapter allows the HDR50(/M) stage or the retired NR360S(/M) stage to be mounted on top of an LNR50 Series Stage, NRT100 Stage, or an NRT150 Stage, as shown in the photo to the right. This adapter requires four 1/4"-20 (M6), 3/8" (10 mm) long cap screws and four 1/4"-20 (M6), 1.5" (35 mm) long cap screws (not included).

Part Number	Description	Price	Availability
NR360SP5/M	Adapter for Mounting HDR50(/M) Stage to LNR or NRT Series Stage, M6 Taps	\$101.46	Today
NR360SP5	Adapter for Mounting HDR50(/M) Stage to LNR or NRT Series Stage, 1/4"-20 Taps	\$101.46	Today

Table Mounting Plate for the Retired NR360S(/M) Stage



- ▶ Enables Our Retired NR360S(/M) Stage to be Mounted on a Breadboard
- ▶ Not Required for Mounting HDR50(/M) Stage



Click to Enlarge
The NR360SP1 plate provides clearance
between the NR360S stage and the
mounting surface.



Click to Enlarge
NR360S Stage with NR360SP1 Plate

The NR360SP1(/M) adapter plate is necessary for the retired NR360S(/M) to be mounted horizontally on a large, flat surface, such as an optical table, because the stepper motor extends below the bottom surface of the rotation stage frame (see image to the right). The 10 mm thick adapter plate provides 2 mm clearance between the stepper motor and the mounting surface.

This mounting plate may be used with the HDR50(/M) stage as a 10 mm riser plate. However, it is not required for mounting the stage directly to a breadboard due to the design of the HDR50, which has integrated feet.

Part Number	Description	Price	Availability
NR360SP1/M	Table Mounting Plate for Retired NR360S(/M) Stage	\$84.14	Today
NR360SP1	Table Mounting Plate for Retired NR360S Stage	\$84.14	Today

