

GX75

XENON
WEATHER
METER

Suga Test Instruments
Co.,Ltd.



*Are you satisfied with your
current weather meter?*

This is the World Wide Model

*Since
1920*

The history of Suga Test Instruments is the history of weather meters. Our weathering tests are in correlation with ISO and other international standards (ISO4892-2, SAE J2527, ASTM G155, etc.).

Since 1958, Suga Test Instruments has been taking part in conferences for international standards such as ISO, JIS, ASTM, AATCC, GIE and IEC.

*ISO 4892-2
SAE J2527
ASTM G155*

GX75 is designed to artificially reproduce outdoor and indoor deterioration factors such as sunlight, high and low temperatures, rainfall and dew. It exposes materials to these factors and accelerates the deterioration process to predict their lifespan in a relatively short period of time.

The weathering technology demanded by Japanese automotive manufacturers and customers from many different industrial fields have established an incomparable xenon long life irradiation system and a direct irradiance-temperature control system on a specimen plane.

GX75 promises long lasting, uniform, stable and precise tests.

Global General-Purpose Model Compatible with International Standards

The specimen rack with 648mm diameter can place up to 63 pieces of specimen (150 x 70mm in dimension).

7.5kW Water-Cooled Xenon Long Life Arc Lamp and Filters Developed by Suga Exclusively for its Weather Meters (P.3, P.4)

1. 7.5kW high-rated power lamp and ϕ 60mm outer filter keep arc wattage fluctuation and irradiance in infrared range to a minimum, and allow for approximately 2500 hours of use at 60 W/m², (300 and 400nm).
2. The 180 mm distance between the electrodes inside the xenon lamp is designed to allow highly even distribution of irradiance to all the specimens.
3. Accurately simulates the spectral irradiance distribution of both indoor and outdoor sunlight with the combination of the inner and outer filters. The spectral power distribution is in total conformance with daylight filters and window glass filters specified in ISO, ASTM, SAE and JIS.
4. The Suga-developed filters for xenon lamps have a very minimal solarization*, making them capable of approximately 2500 hours of use. The lamp and the filters can be replaced simultaneously (excluding certain filters).

Solarization*
A phenomenon where colour and transmittance of materials such as glass and plastic transform when exposed to ultraviolet light.

Established the Irradiance and Temperature Direct Control System on a Specimen Plane (P.5, P.6)

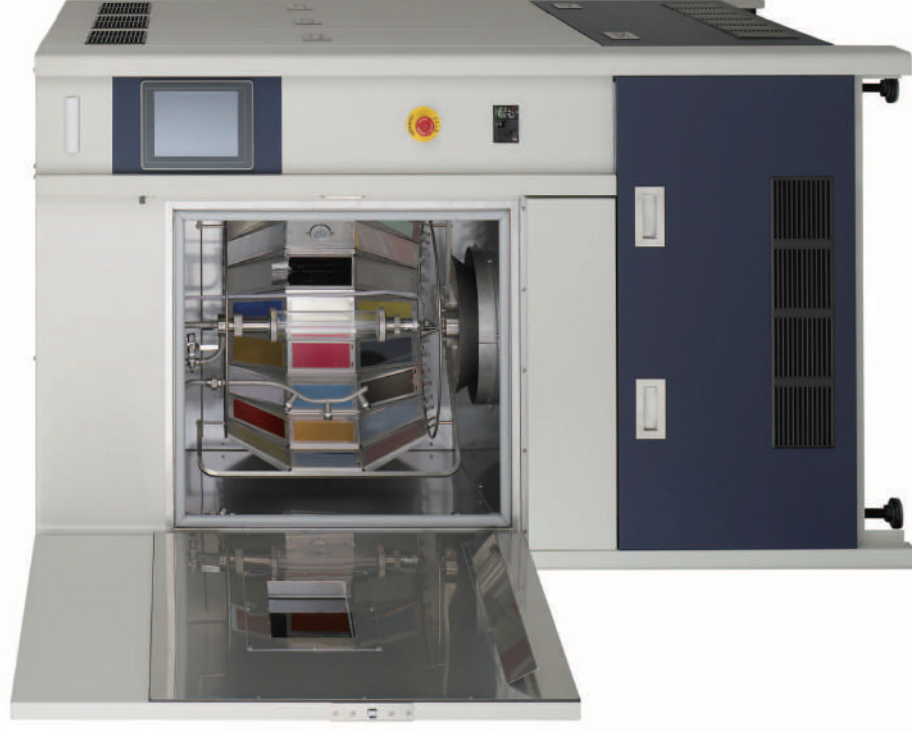
The irradiance on the specimen plane and the black panel temperature are directly measured and controlled at the same position as the specimens as they rotate, maintaining repeatability and test reproducibility. It is also capable of simultaneous control of black panel temperature and chamber air temperature.

Advanced weathering technology in a compact body

Large 8.4 Inch Colour Touch Panel Controller (P.8) - Lamp and the Instrument Both Manufactured In-House (P.4)

With an easy-to-understand direct control system, it automatically controls the irradiance, temperature and humidity.

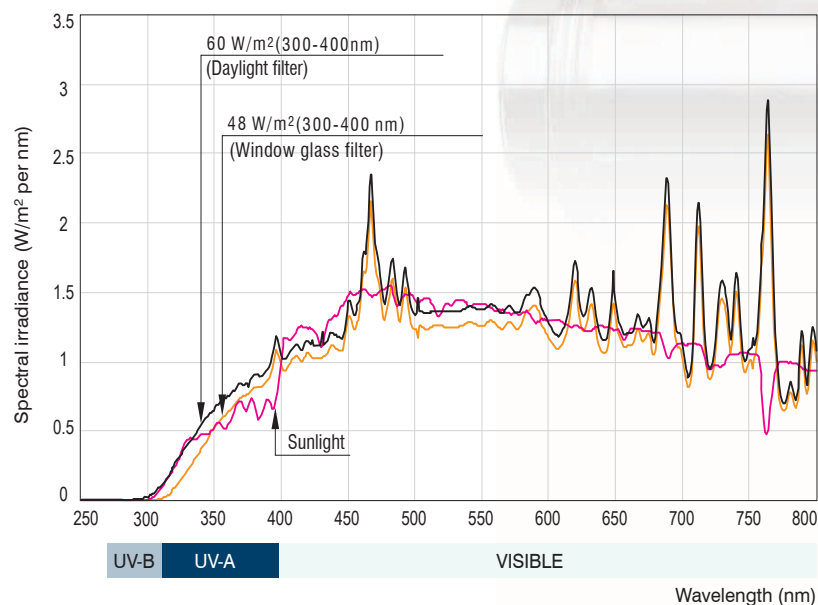
The lamp including its electrodes is produced in-house, making the lamp and the instrument a perfect match.



7.5 kW WATER-COOLED XENON LONG LIFE ARC LAMP



Spectral-power-distribution Comparison between xenon arc lamp and sunlight

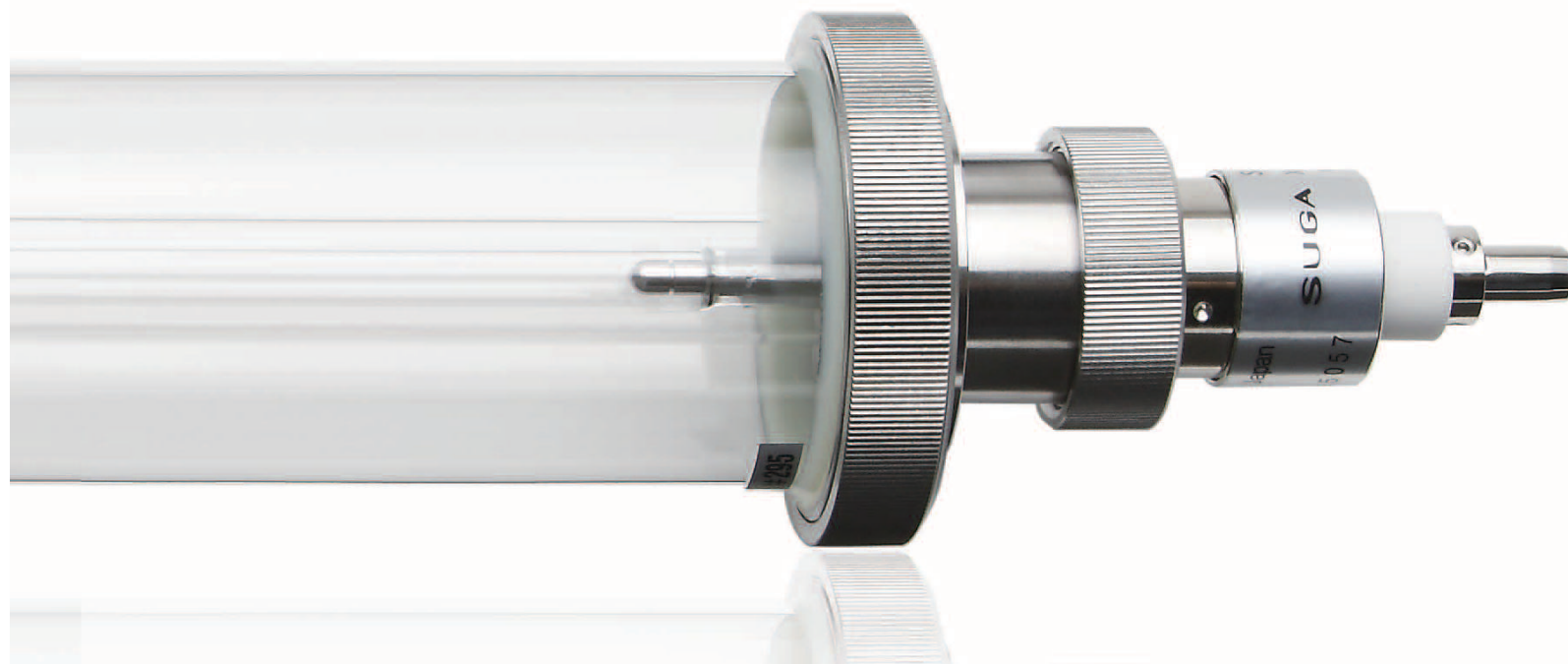


Accurately simulates sunlight

The 7.5kW water-cooled xenon long life arc lamp used for the light source of GX75 can accurately simulate the spectral irradiance distribution of both indoor and outdoor sunlight via combination of inner and outer filters. The spectral power distribution is in total conformance with the composition of daylight filters and window glass filters specified in ISO, ASTM, SAE and JIS.

Suga Xenon Long Life System

The xenon lamp of GX75 is a “long life lamp” capable of 2500 hours of use at 60 W/m², (300 and 400 nm). Commonly, xenon lamp’s irradiance (especially in the ultraviolet range, which is the main cause of material degradation) becomes reduced as metal vapor produced during discharge adhere to the interior surface of the lamp’s arc tube, degrading the transmittance of the interior surface of the lamp. Then the arc wattage is increased in order to sustain the irradiance in the ultraviolet range, but this also increases the irradiance in the infrared range. Suga’s xenon weathering technology solves these problems and allows for an incomparable xenon long-life system and a high irradiance test reproducibility.



Lamp and the instrument both manufactured in-house

The lamp for accelerated weathering test instrument is manufactured in-house along with its electrode to provide a perfect match of lamp, ignition and instrument.

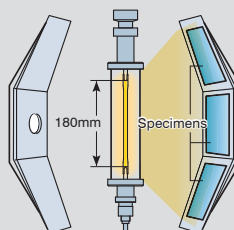
Reduction of ultraviolet irradiance kept minimum with extra lamp power

A high power rating of 7.5kW allows for enough elbow room that can minimize the power fluctuation during irradiation for 2500 hours after the initial irradiation, which keeps the reduction factor of the ultraviolet range and the incremental factor of the infrared range to a minimum.

Because there is enough reserve power with 7.5kW, it is capable of testing at twice the ultraviolet irradiance of sunlight (60W/m^2 to 120W/m^2 between 300 and 400nm).

Capable of delivering even distribution of irradiance to specimens

The light is emitted from the distance of 180mm between the electrodes, delivering highly even distribution of irradiance to a maximum of 63 specimens placed around the lamp.

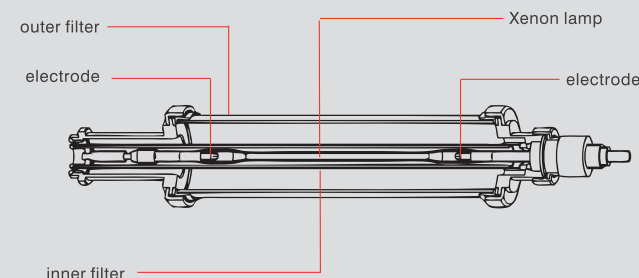


Efficiently cuts the infrared range, preventing the chamber air temperature from rising

To prevent the chamber from overheating is an important factor to improve test reproducibility. In order to effectively cut the infrared portion of light, which increases as the lamp is more used, the amount of water (which absorbs infrared light) between the lamp and the filter is thickened by determining the outer filter's size as $\phi 60\text{mm}$.

Filter with less solarization: high transmittance of ultraviolet range

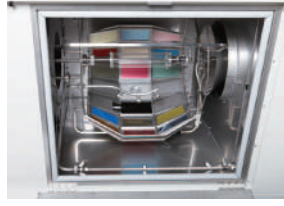
The filter developed by Suga exclusively for its xenon lamps has very minimal solarization, allowing for about 2500 hours of use, and has an excellent transmittance for ultraviolet range, which is the crucial factor for material degradation. This allows for the filters of Suga's xenon lamp house and the lamp to be replaced simultaneously (excluding certain filters).



IRRADIANCE- TEMPERATURE DIRECT CONTROL SYSTEM ON THE SPECIMEN PLANE

Tests that are performed multiple times under the same settings must be able to generate the same test results. Repeatability and reproducibility are crucial factors.

In order to improve the test reproducibility, GX75 is equipped with an irradiance-temperature direct control system developed by Suga. It measures and controls the irradiance and the temperature while being in the same position, rotation, and condition with the specimens. Here are our leading weathering technologies we have established with our customers from the Japanese automotive manufactures and many other industrial fields.



Controls the irradiance on the specimen surface at a constant value.

GX75 automatically and consistently controls the irradiance from the light source with its light receptor attached to the specimen rack that rotates together with the other specimens. It controls at the ultraviolet broadband of 300 to 400nm, which is the main factor for material degradation (narrow band control of 340nm or 420nm are also available). The periodic calibration of the light receptor is to guarantee the accurate irradiance and the test reproducibility. Rather than removing the lamp house and attaching an expensive calibration standard lamp, the light receptor can be checked and calibrated with the simple operation of the attached calibration radiometer (RAX). The calibration radiometer (RAX) is accurately calibrated with our calibration technology accredited by ISO / IEC17025.

Controls the temperature and humidity (dew) to a constant

The black panel thermometer attached to the specimen rack displays the maximum surface temperature. The black panel temperature, together with the chamber air temperature and humidity, are automatically controlled via a system composed of heater, vaporizer and temperature-humidity control unit.

The black panel temperature is constantly and automatically controlled by the black panel thermal sensor attached to the specimen rack which rotates together with the specimens. It is capable of switching to chamber air temperature control, or to a simultaneous control of black panel temperature and chamber air temperature.

GX75 incorporates the air vent method of introducing ambient air to control the temperature and the humidity.

Suga's calibration ability that supports the test's stability and reproducibility

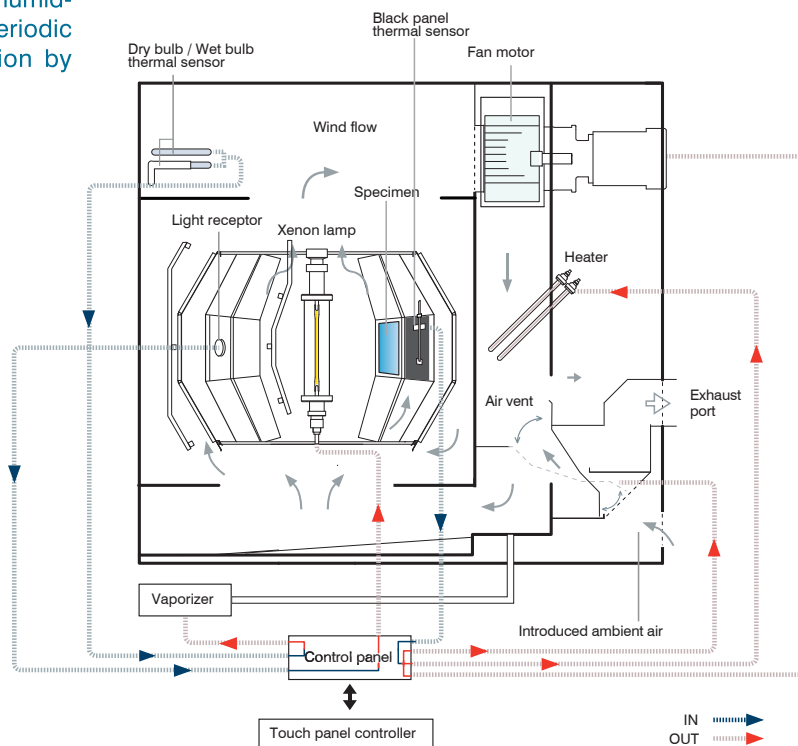
The stability of the light receptor and the temperature control is determined by the accuracy of the black panel temperature and the temperature-humidity sensor of the chamber. The light receptor can be calibrated with a calibration radiometer (RAX), and the black panel thermal sensor can be calibrated with the calibration black panel thermometer.

Calibration radiometer (RAX), calibration black panel thermometer, along with the thermal sensor and the chamber air temperature-humidity sensor need an annual periodic calibration (Annual calibration by Suga is recommended).

Controls the quality of the water for spray

It is also important for the test's reproducibility to control the spray water's temperature and quality.

We ask for our users to prepare water with the quality that meets the below standard: Electrical conductivity $5\mu\text{S}/\text{cm}$, solid content under 1ppm, silica concentration under 0.1ppm (ASTM G155)



A calibration radiometer comes as a standard accessory.



This model consecutively measures the irradiance (W/m^2 or kW/m^2) and the radiant exposure (kJ/m^2 or MJ/m^2) while attached to the weather meter's specimen rack. The irradiance at a specimen plane can be accurately checked and calibrated at any time.

Accredited by Japan Calibration Service System (JCSS)*, we calibrate our radiometers with precision, using our standard xenon lamp traceable with an international standard lamp**.



The above picture is the calibration process of RAX using a 7.5kW xenon lamp (calibrated by JCSS).

*Businesses accredited by JCSS meet the technological requirements for calibration laboratories laid out in ISO/IEC 17025.

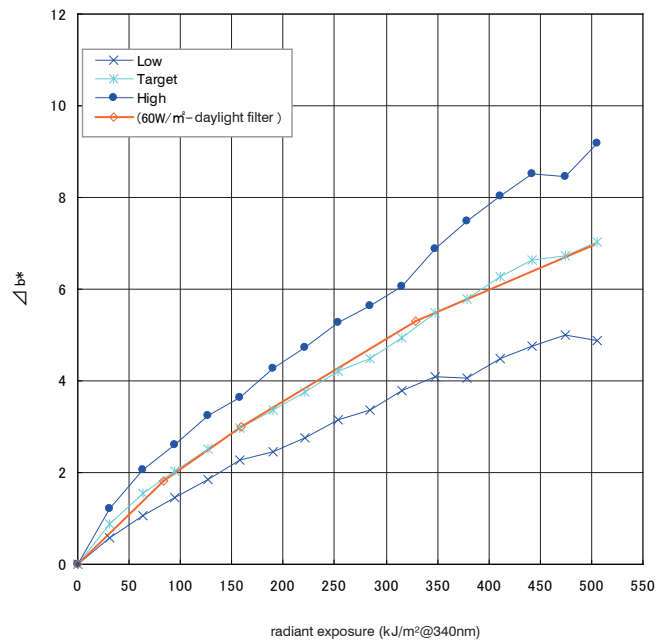
** Spectral irradiance standard lamp by the National Institute of Advanced Industrial Science and Technology

RELIABLE TEST RESULTS

GX75 utilizes the latest control technology that allows for a wide range of irradiance, temperature and humidity at high accuracy.

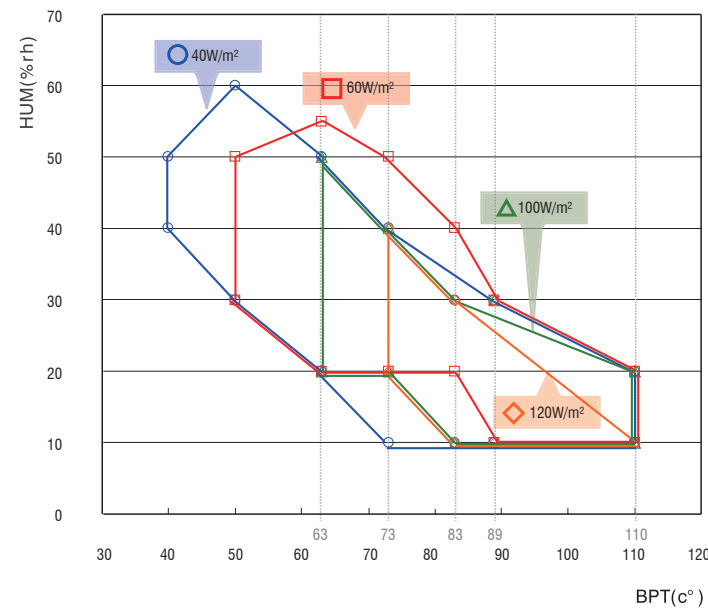
As a global standard model, its performance is confirmed via testing its accuracy and repeatability with the SAE reference specimen.

Test result of GX75



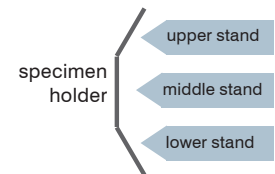
The above graph is the result of measurement using a polystyrene film as specified in SAE J2527.(daylight filter)

Controllable range of GX75



The graph is the controllable range of the black panel temperature and the relative humidity for each irradiance. (W/m²: 300 and 400nm)

Distribution of irradiance and temperature of GX75



Distribution of irradiance (W/m²) Distribution of temperature (c°)

upper stand	60.0	upper stand	64.5
middle stand	60.0	middle stand	63.0
lower stand	61.1	lower stand	61.4

Irradiance : 60W/m² (300 and 400nm)
Test condition : BPT63 c° CAT38c° 50%rh
(simultaneous control)

The figure above is the result of measuring the irradiation and the specimen's surface temperature on the top,middle and the bottom sections of the specimen holder. All sections achieved uniform values.

OPERATING SYSTEM



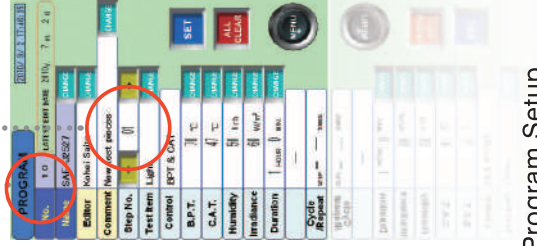
LAN connection capability
Our attached central management software, GX-LAN, displays the running conditions on a distant PC monitor.

GX75 is operated with an 8.4 inch liquid crystal colour touch panel controller that allows for easy and direct operation. It provides data record and USB memory port.



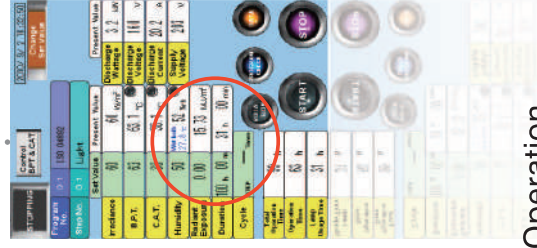
Menu

The buttons are divided by colour, allowing the user to visually distinguish which buttons to press, thus reducing the stress of pressing the wrong button.



Program Setup

Up to 15 test programs can be set up. Each program will be composed of up to 19 different test items as required. Each item can be set up on a same screen. Also includes a warning display that informs the user when there is an input error.



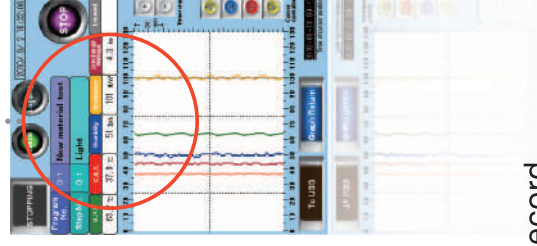
Operation

All the running conditions can be checked on a same screen. The set value and the present value are displayed in green and white respectively, allowing the user to distinguish the two at a glance.



Running condition

Up to 10 items for each program is observed in the same screen. The condition of the ongoing test can be checked at a glance.



Record

Black panel temperature, chamber air temperature, humidity, irradiance, and discharge wattage can be displayed and recorded together with test item, test duration and present time. The data can be taken out by USB memory.



Safety device

Over 20 safety devices protect the test specimens and the instrument. The deflection and the possible causes are displayed on the same screen, making it easier for the user to resolve the problem. The error record can be viewed by pressing the error record button.

SPECIFICATION AND COMPATIBLE STANDARDS

GX75 and RAX are CE-compliant instrument which coincide with EN standard.
 * BPT stands for Black Pannel Temperature CAT stands for Chamber Air Temperature

Light source	Lamp: 7.5-kW water-cooled xenon lamp Filter: Daylight filter (The other filters such as Window Glass, Extended UV, etc. are available on option.)
Test condition	Light-on, Light-on and surface spray, Light-off, Light-off and back spray, Light-off and surface and back spray
Irradiance	40 ~ 120W/m ² at 300-400nm
Temperature and humidity range	Light-on: BPT 63 ~ 110±2c°, 50%rh±5%rh During Light-on test, it is possible to control BPT only or BPT and CAT* (It depends on irradiance and temperature) Light-off: CAT 38±2c°, 95%rh± 5%rh
Electrical requirement	Three phase, 200V, 55A,** 50 or 60 Hz **Any electrical modifications are available on option. (The step-down transformer with leakage breaker is attached)
Number of specimens	63pieces of 150x70x1mm
External dimension	1030(W) x 1270(D)x 1850(H)mm [weight: app.500 kg]
Related standards	ISO,ASTM,SAE,JIS,JASO and AATCC (subject to different accessories) Simultaneous BPT and CAT control (SAE) available.

Industries	Standard	ISO	IEC	ASTM	AATCC	SAE	JIS	JASO
Plastics		ISO 4892-1 ISO 4892-2					JIS K 7350-1 JIS K 7350-2	
Paints		ISO 11341		ASTM D 6695			JIS K 5600-7-7 JIS A 1415 JIS A 1439	
Building materials		ISO 11431					JIS K 5701-1	
Printed matters & Inks		ISO 12040						
Textiles		ISO 105-B02 ISO 105-B04 ISO 105-B06			AATCC TM16 AATCC TM169		JIS L 0843 JIS L 0891	
Aluminium		ISO 2135					JIS H 8685-1	
Rubber		ISO 4665					JIS K 6266	
Electric / Electronics			IEC 60068-2-5 IEC 60068-2-9					
Automotive		ISO 3917				SAE J2527 SAE J2412	JIS D 0202 JIS D 0205	JASO M 346 JASO M 351
Railway							JIS E 4037 JEITA CP-3901	
Photography		ISO/TR 18930		ASTM G 151 ASTM G 155				
Non-metallic Materials								
Safety sing		ISO 17398					JIS Z 9107	
Test Instruments							JIS B 7754 JIS C 8917 JIS C 8938	
PV modules			IEC 61215 IEC 61646					

ISO:	International Organization of Standardization	SAE:	Society of Automotive Engineers
IEC:	International Electrotechnical Commission	JIS:	Japanese Industrial Standards
ASTM:	American Society for Testing and Materials	JASO:	Japanese Automotive Standards Organization
AATCC:	American Association of Textile Chemists and Colourists	JEITA:	Japan Electronics and Information Technology Industries Association

HISTORY OF SUGA TEST INSTRUMENTS' WEATHER METER TECHNOLOGY

1980s

1980 Completion of Hidaka Laboratory

1981 Foundation of Suga Weathering Technology Foundation

(Testing, researching, awarding, granting of research aid, educational support, speeches and international symposiums for weathering technology)

1984 Suga Test Instruments' weather meter registered in ISO 2135 and ASTM G 23, 26, and 53

1985 Development of Snow Falling Chamber

1988 Development of Super Xenon Weather Meter

1988 Development of Xenon Lamp Factory at Hidaka Factory

2000s

2000 Accreditation by the Japanese government as a JCSS optical laboratory (ISO/IEC17025 certification)

2002 Accreditation by the Japanese government as a JNLA testing laboratory (ISO/IEC17025 certification)

2005 Development of Vertical Rotating Metal Halide Weather Meter

2008 Completion of the Kawagoe Factory

2009 Development of Super Xenon Combined Weather Chamber (with eight xenon lamps) for Photovoltaic Modules

1960s

1965 Took part in the conference for ISO/TC61 (Plastics)

Continues to take part in ISO, JIS, ASTM, AATCC, CIE and IEC conferences to this day.

1969 Development of Sun Follow Weather Meter

1940s

1949 Incorporated under the name "Toyo Rika Kogyo Instruments."

1920s

1920 Foundation

1930s

1952 Development of Carbon Arc Weather Meter

1958 Took part in the conference for ISO/TC38 (Textiles)

1959 Development of Xenon Weather Meter

1950s

1974 Company name changed to "Suga Test Instruments Co., Ltd."

1970s

1993 Development of Metal Halide Weather Meter

1990s

For more information, please visit <http://www.sugatest.co.jp/english/about/history.html>. You can also view our history of corrosion testing instruments and colour meters.

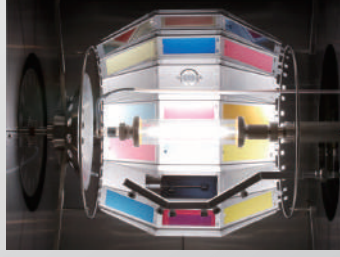


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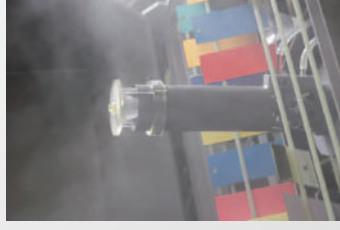
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Weathering test instruments are designed to artificially simulate indoor and outdoor environments such as sunlight, temperature, humidity and wetting, and accelerate the deterioration of products and materials in order to predict their lifespan. Since in 1949, Suga Test Instruments has provided a variety of equipments that answer to many needs, such as weatherability, correlation, test standards, operability, economic efficiency, etc. They are used globally in various fields such as automotive, paint, plastic, rubber, metal, architecture, fiber and digital colour print, etc.

Weathering Test Instruments

(since 1952)



Testing for corrosion protection is important even from the perspectives of resource conservation. Many different researches are being conducted in order to accurately predict the corrosion of metal and surface treatments.

Corrosion test instruments are used to simulate and accelerate real-life corrosion conditions by bringing various corrosion factors for prompt prediction of the lifespan of materials. We provide a wide range of products from simple salt spray test instruments to combined cyclic test instruments that can answer to various needs.

Corrosion Test Instruments

(since 1956)



The optical property of products is an important factor that determines their commercial value. Suga's optical property measuring instruments, which accurately express colour as numerical value, are gaining importance in many different industrial fields. In order to respond to the industrial fields where colour measurement is gaining importance, we provide a variety of high-end models to support their demanding colour management.

Optical Property Measuring Instruments

(since 1957)