HORIBA

Explore the future

[ENG] Safety manual
SLFA series

[DEU] Sicherheitsanleitung
SLFA Serie

[FRA] Manuel de sécurité
Série SLFA

[ITA] Manuale sulla sicurezza
Serie SLFA

[SWE] Säkerhetshandbok
SLFA serie

[SPA] Manual de seguridad
Serie SLFA

[POL] Instrukcja bezpiecznego użytkowania
Seria SLFA

[NLD] Veiligheidshandleiding
SLFA serie

[JPN] 安全マニュアル
SLFA シリーズ

CODE:I2005135000-3200648153-GZ0000437506

[ENG] Correspondence table
[DEU] Tabelle der Entsprechungen
[FRA] Tableau de correspondance
[ITA] Tabella delle corrispondenze
[SWE] Tabell över motsvarighet
[SPA] Tabla de correspondencias
[POL] Tabela odpowiedniości
[NLD] Correspondentietabel
[JPN] 対応表

[ENG] This manual describes safety information on the SLFA series.
The following tables shows the relevant products and the labels attached on them.

[DEU] Dieses Handbuch beschreibt die Sicherheitsinformationen für die SLFA Serie.
Die folgenden Tabellen zeigen die relevanten Produkte und die an ihnen angebrachten Etiketten.

[FRA] Le présent manuel décrit les consignes de sécurité relatives aux série SLFA.
Le tableau suivant répertorie les produits pertinents et leurs étiquettes.

[ITA] In questo manuale vengono riportate informazioni di sicurezza sulla serie SLFA.
Le tabelle riportate di seguito mostrano i prodotti rilevanti e le relative etichette attaccate sugli stessi.

[SWE] Denna anvisning beskriver säkerhetsinformation för SLFA serien.
Följande tabeller visar relevanta produkter och etiketter som finns på dem.

[SPA] En este manual se describe información de seguridad relativa a la serie SLFA.
En las siguientes tablas se muestran los productos relevantes y las etiquetas fijadas a los mismos.

[POL] W niniejszym podręczniku przedstawiono informacje dotyczące bezpieczeństwa użytkowania serii SLFA.
W poniższych tabelach wymieniono produkty oraz przedstawiono umieszczone na nich etykiety.

[NLD] Deze handleiding bevat veiligheidsinformatie over de SLFA serie.
In de volgende tabel worden de betreffende producten vermeld en de etiketten die erop aangebracht zijn.

[JPN] 本書はSLFAシリーズの安全マニュアルです。
下表に、関係する製品と製品に貼りつけられているラベルの関係を示します。

[ENG] Label ID information [DEU] Schild-ID-Information [FRA] Informations d'identification de l'étiquette [ITA] Informazioni ID etichetta [SWE] Etikett-ID-information [SPA] Información de ID de etiqueta [POL] Informacje identyfikacyjne etykiet [NLD] Informatie over label-ID [JPN] ラベル識別情報	DANGER GEFAHR DANGER 危険	DANGER GEFAHR DANGER 危険
	ELECTRIC SHOCK STROMSCHLAG DÉCHARGE ÉLECTRIQUE 感電	ELECTRIC SHOCK STROMSCHLAG DÉCHARGE ÉLECTRIQUE 感電
	3200646911	3200646958
[ENG] Page [DEU] Seite [FRA] Page [ITA] Pagina [SWE] Sida [SPA] Página [POL] Strona [NDL] Pagina [JPN] ページ	14	16
SLFA-60	√	√
SLFA-6100	√	√
SLFA-6800	√	√

[ENG] Label ID information [DEU] Schild-ID-Information [FRA] Informations d'identification de l'étiquette [ITA] Informazioni ID etichetta [SWE] Etikett-ID-information [SPA] Información de ID de etiqueta [POL] Informacje identyfikacyjne etykiet [NLD] Informatie over label-ID [JPN] ラベル識別情報	WARNING WARNUNG AVERTISSEMENT 警告	CAUTION VORSICHT ATTENTION 注意
	ELECTRIC SHOCK STROMSCHLAG DÉCHARGE ÉLECTRIQUE 感電	TOXIN TOXIN TOXINE 毒物
	3200646958	3200646933
[ENG] Page [DEU] Seite [FRA] Page [ITA] Pagina [SWE] Sida [SPA] Página [POL] Strona [NDL] Pagina [JPN] ページ	18	20
SLFA-60	√	√
SLFA-6100	√	√
SLFA-6800	√	√

[ENG] Label ID information [DEU] Schild-ID-Information [FRA] Informations d'identification de l'étiquette [ITA] Informazioni ID etichetta [SWE] Etikett-ID-information [SPA] Información de ID de etiqueta [POL] Informacje identyfikacyjne etykiet [NLD] Informatie over label-ID [JPN] ラベル識別情報	CAUTION VORSICHT ATTENTION 注意	CAUTION VORSICHT ATTENTION 注意
	TOXIN TOXIN TOXINE 毒物	X-RAY RÖNTGENSTRAHLUNG RAYONS X X線
	3200646958	3200646951
[ENG] Page [DEU] Seite [FRA] Page [ITA] Pagina [SWE] Sida [SPA] Página [POL] Strona [NDL] Pagina [JPN] ページ	22	24
SLFA-60	√	√
SLFA-6100	√	√
SLFA-6800	√	√

[ENG] Label ID information [DEU] Schild-ID-Information [FRA] Informations d'identification de l'étiquette [ITA] Informazioni ID etichetta [SWE] Etikett-ID-information [SPA] Información de ID de etiqueta [POL] Informacje identyfikacyjne etykiet [NLD] Informatie over label-ID [JPN] ラベル識別情報	CAUTION VORSICHT ATTENTION 注意	CAUTION VORSICHT ATTENTION 注意
	X-RAY RÖNTGENSTRAHLUNG RAYONS X X線	X-RAY RÖNTGENSTRAHLUNG RAYONS X X線
	3200646952	3200646953
[ENG] Page [DEU] Seite [FRA] Page [ITA] Pagina [SWE] Sida [SPA] Página [POL] Strona [NDL] Pagina [JPN] ページ	26	28
SLFA-60		√
SLFA-6100	√	√
SLFA-6800	√	√

[ENG] Label ID information [DEU] Schild-ID-Information [FRA] Informations d'identification de l'étiquette [ITA] Informazioni ID etichetta [SWE] Etikett-ID-information [SPA] Información de ID de etiqueta [POL] Informacje identyfikacyjne etykiet [NLD] Informatie over label-ID [JPN] ラベル識別情報	CAUTION VORSICHT ATTENTION 注意	CAUTION VORSICHT ATTENTION 注意
	X-RAY RÖNTGENSTRAHLUNG RAYONS X X線	X-RAY RÖNTGENSTRAHLUNG RAYONS X X線
	3200646958	3200646954
[ENG] Page [DEU] Seite [FRA] Page [ITA] Pagina [SWE] Sida [SPA] Página [POL] Strona [NDL] Pagina [JPN] ページ	30	32
SLFA-60	√	√
SLFA-6100	√	√
SLFA-6800	√	√

[ENG] Preface

Be sure to read this manual before using the product to ensure proper and safe operation of the product. Also safely store the manual so it is readily available whenever necessary.

Product specifications and appearance, as well as the contents of this manual are subject to change without notice.

Warranty and responsibility

Refer to each instruction manual for the product.

Installation environment

These products are not intended for use in industrial environments, defined in EN61326-1.
In an industrial environment, electromagnetic environmental effects may cause the incorrect performance of the products in which case the user may be required to take adequate measures.

The products are designed for the following environment, defined in EN61010-1.

- Overvoltage category II
- Pollution degree 2

Hazard classification and warning symbols

Warning messages are described in the following manner. Read the messages and follow the instructions carefully.

DANGER This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is to be limited to the most extreme situations.

WARNING This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

[DEU] Vorwort

Lesen Sie vor der Verwendung des Produkts unbedingt diese Anleitung, um den ordnungsgemäßen und sicheren Betrieb des Produkts zu gewährleisten. Bewahren Sie die Anleitung sicher auf, damit sie bei Bedarf jederzeit zur Hand ist.

Die technischen Daten und das Erscheinungsbild des Produkts sowie der Inhalt dieser Anleitung können unangekündigt geändert werden.

Garantie und Verantwortlichkeit

Nehmen Sie auf jede Gebrauchsanleitung für das Produkt Bezug.

Installationsumgebung

Diese Produkte sind nicht zum Gebrauch in industriellen Umgebungen, wie in EN61326-1 definiert, vorgesehen.
In einer industriellen Umgebung können die elektromagnetischen Störungen eventuell zu Produktfehlfunktionen führen. Um dieses Produkt unter solchen Umständen verwenden zu können, muss der Benutzer ggf. angemessene Maßnahmen ergreifen.

Die Produkte sind gemäß EN61010-1 für die folgende Umgebung vorgesehen.

- Überspannungskategorie II
- Verschmutzungsgrad 2

Gefahrenklassifikation und Warnsymbole

Warnmeldungen werden wie folgt beschrieben. Lesen Sie die Meldungen und befolgen Sie die Anleitungen sorgfältig.

GEFAHR

Dies weist auf eine unmittelbar gefährliche Situation hin, die im Tod oder in schweren Verletzungen resultiert, falls sie nicht vermieden wird. Dies ist auf die extremsten Situationen zu begrenzen.

WARNUNG

Dies weist auf eine potentiell gefährliche Situation hin, die im Tod oder in schweren Verletzungen resultieren könnte, falls sie nicht vermieden wird.

VORSICHT

Dies weist auf eine potentiell gefährliche Situation hin, die in leichten oder mäßigen Verletzungen resultieren könnte, falls sie nicht vermieden wird. Sie kann auch zur Warnung vor unsicheren Praktiken verwendet werden.

[FRA] Préface

Veillez à lire le présent manuel avant d'utiliser le produit de manière à garantir son utilisation correcte et sûre. De même, rangez le manuel dans un lieu sûr de manière à pouvoir vous y reporter lorsque cela est nécessaire.

Les spécifications et l'aspect du produit, ainsi que le contenu du présent manuel peuvent être modifiés sans notification préalable.

Garantie et responsabilité

Reportez-vous à chaque manuel d'instructions du produit.

Environnement d'installation

Ces produits ne sont pas destinés à une utilisation dans des environnements industriels, tels que définis dans la norme EN61326-1.
Dans un environnement industriel, les interférences électromagnétiques peuvent entraîner un dysfonctionnement des produits. Pour utiliser les produits dans ce type d'environnements, l'utilisateur peut avoir à prendre des mesures appropriées.

Les produits sont conçus pour l'environnement suivant, tel que défini dans la norme EN61010-1.

- Catégorie de surtension II
- Degré de pollution 2

Classification des risques et symboles d'avertissement

Les messages d'avertissement sont décrits comme suit. Lisez les messages et suivez attentivement les instructions.

DANGER

Cela indique une situation dangereuse imminente qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves. Cela fait uniquement référence aux situations les plus extrêmes.

AVERTISSEMENT

Cela indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.

ATTENTION

Cela indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées. Cela peut également être utilisé pour signaler des pratiques dangereuses.

[ITA] Prefazione

Leggere attentamente questo manuale prima di utilizzare il prodotto al fine di utilizzarlo in modo sicuro e adeguato. Inoltre, conservare in un luogo sicuro il manuale per poterlo consultare se necessario.

Le specifiche e l'aspetto del prodotto, nonché i contenuti di questo manuale, sono soggetti a modifica senza preavviso.

Garanzia e responsabilità

Fare riferimento al manuale di istruzioni del prodotto.

Ambiente di installazione

Questi prodotti non sono stati progettati per essere utilizzati in ambienti industriali, secondo la norma EN61326-1.
In un ambiente industriale, le interferenze elettromagnetiche potrebbero causare un malfunzionamento dei prodotti. Per utilizzare i prodotti in tali ambienti, all'utente potrebbe essere richiesto di adottare le contromisure necessarie.

I prodotti sono designati per il seguente ambiente, definito nello standard EN61010-1.

- Categoria di sovratensione II
- Livello di inquinamento 2

Categoria di pericolo e simboli di avvertenza

I messaggi di avvertenza sono descritti come segue. Leggere i messaggi e seguire con attenzione le istruzioni.

PERICOLO	Indica un pericolo immediato che, se non evitato, può causare il decesso o lesioni gravi. Limitato alle situazioni più estreme.
AVVERTENZA	Indica una situazione potenzialmente pericolosa che, se non evitata, potrebbe causare il decesso o lesioni gravi.
ATTENZIONE	Indica una situazione potenzialmente pericolosa che, se non evitata, potrebbe causare lesioni di media e piccola entità. Potrebbe essere usato anche per informare circa pratiche non sicure.

[SWE] Förord

Se till att du läser denna handbok innan du börjar använda produkten för en korrekt och säker användning av den. Spara sedan handboken på en säker och lättåtkomlig plats så att du kan konsultera den när så behövs.

Produktspecifikationerna och utseendet, samt även innehållet i denna handbok, kan komma att ändras utan föregående meddelande därom.

Garanti och ansvar

Läs alla bruksanvisningar till produkten.

Installationsmiljö

Dessa produkter är ej avsedda för användning i industriella miljöer enligt riktlinjerna i EN61326-1.
Om de används i industrimiljöer kan de elektromagnetiska störningarna orsaka tekniska fel hos produkterna. Om produkterna ska användas i sådana miljöer kan användaren behöva vidta lämpliga åtgärder för att lösa dessa problem.

Produkterna är utformade för användning i följande miljöer, i enlighet med SS-EN 61010-1.

- Överspänningskategori II
- Föroreningsgrad 2

Riskklassificering och varningssymboler

Varningsmeddelandena beskrivs på följande sätt. Läs meddelandena och följ anvisningarna noggrant.

FARA — Denna varnar för en omedelbart risksituation som kan orsaka allvarliga personskador eller dödsfall om den inte följs. Detta omfattar endast de mest extrema situationerna.

VARNING — Denna varnar för en potentiell risksituation som kan orsaka allvarliga personskador eller dödsfall om den inte följs.

OBSERVER — Denna varnar för en potentiell risksituation som kan orsaka mindre person- eller materialskador om den inte följs. Den kan även användas för att indikera olämplig användning.

[SPA] Prefacio

Asegúrese de leer este manual antes de utilizar el producto para garantizar un uso correcto y seguro del mismo. Asimismo, guarde de forma segura el manual para que esté disponible siempre que sea necesario.

El aspecto y las especificaciones del producto, así como el contenido de este manual, están sujetos a cambios sin previo aviso.

Garantía y responsabilidad

Lea cada manual de instrucciones del producto.

Entorno de instalación

Estos productos están diseñados para su uso en entornos industriales, tal y como se define en EN61326-1.
En un entorno industrial, las interferencias electromagnéticas pueden provocar un funcionamiento incorrecto de los productos. Para usar los productos en tales entornos, el usuario debe tomar las medidas adecuadas.

Los productos se han diseñado para el siguiente entorno, definido en EN61010-1.

- Categoría de sobretensión II
- Nivel de contaminación 2

Clasificación de peligrosidad y símbolos de advertencia

Los mensajes de advertencia se describen de la siguiente manera. Lea los mensajes y siga las instrucciones atentamente.

PELIGRO

Esto indica una situación de peligro inminente que, si no se evita, tendrá como resultado la muerte o lesiones graves. Esto se debe limitar a las situaciones más extremas.

ADVERTENCIA

Esto indica una posible situación de peligro que, si no se evita, podría tener como resultado la muerte o lesiones graves.

ATENCIÓN

Esto indica una posible situación de peligro que, si no se evita, puede tener como resultado lesiones leves o moderadas. También se puede usar para alertar de prácticas no seguras.

[POL] Przedmowa

Przed przystąpieniem do użytkowania tego produktu należy dokładnie zapoznać się z niniejszą instrukcją, aby zapewniona była prawidłowa i bezpieczna eksploatacja produktu. Instrukcję przechowywać w bezpiecznym miejscu, aby w razie potrzeby była zawsze dostępna.

Specyfikacja i wygląd produktów oraz treść niniejszej instrukcji może ulec zmianie bez wcześniejszego powiadomienia.

Gwarancja i zakres odpowiedzialności

Patrz instrukcje obsługi poszczególnych produktów.

Środowisko instalacji

Te produkty nie są przeznaczone do użytkowania w środowisku przemysłowym, zgodnie z definicją określoną w normie EN61326-1.
W środowisku przemysłowym zakłócenia elektromagnetyczne mogą powodować nieprawidłowe działanie produktów. Możliwe, że aby użytkować produkty w takich środowiskach, użytkownik będzie musiał podjąć stosowne środki zaradcze.

Produkty są przeznaczone do użycia w poniższym środowisku zdefiniowanym w normie EN61010-1.

- Kategoria przepięciowa II
- Stopień zanieczyszczenia 2

Klasyfikacja zagrożeń i symbole ostrzegawcze

Ostrzeżenia są opisane w następujący sposób. Należy zapoznać się z ostrzeżeniami i ściśle przestrzegać instrukcji.

NEBEZPIECZEŃSTWO

Oznacza bezpośrednio niebezpieczną sytuację, która — jeśli do niej dojdzie — spowoduje zgon lub poważne obrażenia ciała. To ostrzeżenie dotyczy najbardziej skrajnych sytuacji.

OSTRZEŻENIE

Oznacza potencjalnie niebezpieczną sytuację, która — jeśli do niej dojdzie — może spowodować zgon lub poważne obrażenia ciała.

PRZESTROGA

Oznacza potencjalnie niebezpieczną sytuację, która — jeśli do niej dojdzie — może spowodować niewielkie lub umiarkowane obrażenia ciała. Ten rodzaj ostrzeżenia może także być używany do ostrzegania przed niebezpiecznymi sposobami postępowania.

[NLD] Woord vooraf

Lees deze handleiding voordat u dit product gebruikt zodat u het op de juiste manier en veilig kunt gebruiken. Bewaar de handleiding goed zodat u hem wanneer nodig kunt raadplegen.

De specificaties en het uiterlijk van het product en de inhoud van deze handleiding kunnen zonder voorafgaande kennisgeving worden gewijzigd.

Garantie en verantwoordelijkheid

Raadpleeg alle handleidingen van het product.

Installatieomgeving

Deze producten zijn niet bedoeld voor gebruik in een industriële omgeving zoals gedefinieerd in EN 61326-1.
In een industriële omgeving kan de elektromagnetische interferentie de werking van deze producten storen. Voor gebruik van de producten in een dergelijke omgeving moet de gebruiker mogelijk maatregelen treffen om de storing te verhelpen.

De producten zijn ontworpen voor de volgende omgeving, gedefinieerd in EN 61010-1.

- Overspanningscategorie II
- Vervuilingsgraad 2

Indeling naar gevarencategorie en waarschuwingssymbolen

De waarschuwingen hebben de volgende betekenis. Lees de uitleg en volg de instructies aandachtig.

GEVAAR

Dit wijst op een onmiddellijk gevaarlijke situatie die zal leiden tot dodelijk of ernstig letsel als die niet wordt vermeden. Dit wordt alleen in de meest extreme gevallen gebruikt.

WAARSCHUWING

Dit wijst op een mogelijk gevaarlijke situatie die kan leiden tot dodelijk of ernstig letsel als die niet wordt vermeden.

VOORZICHTIG

Dit wijst op een mogelijk gevaarlijke situatie die kan leiden tot klein of matig letsel als die niet wordt vermeden. Dit kan ook gebruikt worden als waarschuwing tegen onveilig gebruik.

[JPN] はじめに

ご使用になる前に、本書を必ずお読みください。お読みになった後は必要なときにすぐに取り出せるように大切に保管してください。
ご使用の際、安全に関してお気付きの点がありましたら、弊社にご連絡ください。
製品の仕様・外観は、改良のため予告なく変更することがあります。
また、本書に記載されている内容も予告なく変更される場合があります。あらかじめご了承ください。

保証と責任の範囲

各製品の取扱説明書を参照してください。

設置環境

これらの製品は、EN61326-1で定義される工業環境で使用することを想定した製品ではありません。
工業環境においては、電磁妨害の影響を受ける可能性があり、その場合には使用者が適切な対策を講ずることが必要となることがあります。

これらの製品は、EN61010-1で定義される以下の環境用に設計されています。

- 過電圧カテゴリーII
- 汚染度2

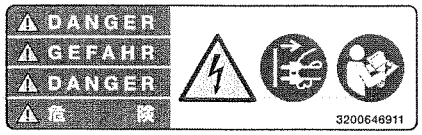
警告の種類と表示方法

本書および製品では、以下のような警告表示をしています。内容をよく理解して、正しく安全にご使用ください。

危　険　取り扱いを誤った場合、使用者が死亡または重傷を負うことがあり、かつその切迫の度合いが高いもの

警　告　取り扱いを誤った場合、使用者が死亡または重傷を負う可能性が想定されるもの

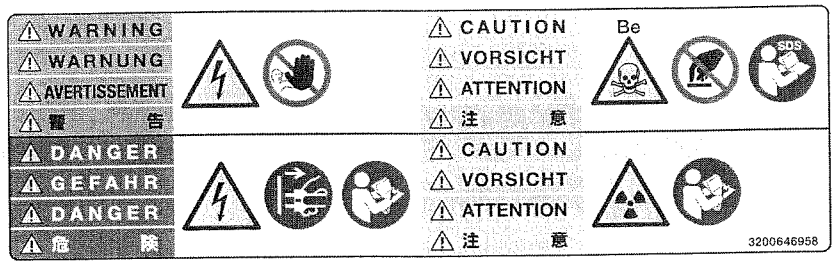
注　意　取り扱いを誤った場合、使用者が傷害を負うことが想定されるか、または物的損害の発生が想定されるもの



3200646911

[ENG] DANGER ELECTRIC SHOCK For service personnel	ELECTRIC SHOCK When opening, disconnect the power source to prevent electric shock. Open only when necessary. Perform work according to the Service Manual.
[DEU] GEFAHR STROMSCHLAG Für das Wartungspersonal	STROMSCHLAG Vor dem Öffnen die Stromquelle abtrennen, um einen Stromschlag zu verhindern. Nur öffnen, wenn erforderlich. Die Arbeiten gemäß der Wartungsanleitung ausführen.
[FRA] DANGER DÉCHARGE ÉLECTRIQUE Pour le personnel d'entretien	DÉCHARGE ÉLECTRIQUE Lors de l'ouverture, déconnectez la source d'alimentation afin d'éviter toute décharge électrique. N'ouvrez que lorsque cela est nécessaire. Effectuez les travaux conformément au manuel d'entretien.
[ITA] PERICOLO SCOSSE ELETTRICHE Per il tecnico riparatore	SCOSSE ELETTRICHE Al momento dell'apertura, scollegare la sorgente elettrica per evitare scosse elettriche. Aprirlo solo se necessario. Eseguire il lavoro seguendo le istruzioni del Manuale di manutenzione.

ELEKTRISKA STÖTAR För att undvika elektriska stötar bör du alltid koppla bort elkabeln innan du öppnar enheten. Öppna endast enheten i undantagsfall. Utför allt arbete i enlighet med anvisningarna i servicehandboken.	[SWE] FARA ELEKTRISKA STÖTAR För servicetekniker
DESCARGA ELÉCTRICA Antes de la apertura, desconecte la fuente de alimentación para evitar una descarga eléctrica. Ábralo solo cuando sea necesario. Realice el trabajo de acuerdo con el Manual de servicio.	[SPA] PELIGRO DESCARGA ELÉCTRICA Para personal de mantenimiento
PORAŻENIE ELEKTRYCZNE Przed otwarciem odłączyć źródło zasilania, aby uniknąć porażenia elektrycznego. Nie otwierać bez potrzeby. Prace wykonywać zgodnie z Instrukcją serwisową.	[POL] NIEBEZPIECZEŃSTWO PORAŻENIE ELEKTRYCZNE Dla serwisanta
ELEKTRISCHE SCHOK Vóór het openen eerst de stroombron uitschakelen om een elektrische schok te voorkomen. Alleen openen wanneer dat noodzakelijk is. Het werk uitvoeren volgens de onderhoudshandleiding.	[NLD] GEVAAR ELEKTRISCHE SCHOK Voor onderhoudspersoneel
感電注意 感電防止のため、開けるときには、電源接続をはずしてください。 必要なときのみ、開けてください。 サービスマニュアルに従って作業してください。	[JPN] 危険 感電 サービスマン向け



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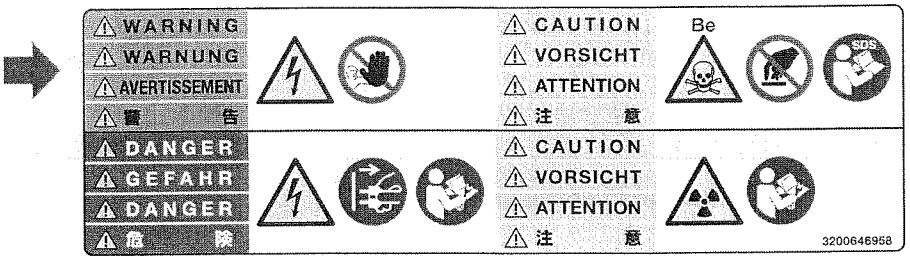
[ENG]	ELECTRIC SHOCK When opening, disconnect the power source to prevent electric shock. Open only when necessary. Perform work according to the Service Manual.
DANGER	
ELECTRIC SHOCK	
For service personnel	
[DEU]	STROMSCHLAG Vor dem Öffnen die Stromquelle abtrennen, um einen Stromschlag zu verhindern. Nur öffnen, wenn erforderlich. Die Arbeiten gemäß der Wartungsanleitung ausführen.
GEFAHR	
STROMSCHLAG	
Für das Wartungspersonal	
[FRA]	DÉCHARGE ÉLECTRIQUE Lors de l'ouverture, déconnectez la source d'alimentation afin d'éviter toute décharge électrique. N'ouvrez que lorsque cela est nécessaire. Effectuez les travaux conformément au manuel d'entretien.
DANGER	
DÉCHARGE ÉLECTRIQUE	
Pour le personnel d'entretien	
[ITA]	SCOSSE ELETTRICHE Al momento dell'apertura, scollegare la sorgente elettrica per evitare scosse elettriche. Aprirlo solo se necessario. Eseguire il lavoro seguendo le istruzioni del Manuale di manutenzione.
PERICOLO	
SCOSSE ELETTRICHE	
Per il tecnico riparatore	

ELEKTRISKA STÖTAR För att undvika elektriska stötar bör du alltid koppla bort elkabeln innan du öppnar enheten. Öppna endast enheten i undantagsfall. Utför allt arbete i enlighet med anvisningarna i servicehandboken.	[SWE] FARA ELEKTRISKA STÖTAR För servicetekniker
DESCARGA ELÉCTRICA Antes de la apertura, desconecte la fuente de alimentación para evitar una descarga eléctrica. Ábralo solo cuando sea necesario. Realice el trabajo de acuerdo con el Manual de servicio.	[SPA] PELIGRO DESCARGA ELÉCTRICA Para personal de mantenimiento
PORAŻENIE ELEKTRYCZNE Przed otwarciem odłączyć źródło zasilania, aby uniknąć porażenia elektrycznego. Nie otwierać bez potrzeby. Prace wykonywać zgodnie z Instrukcją serwisową.	[POL] NIEBEZPIECZEŃSTWO PORAŻENIE ELEKTRYCZNE Dla serwisanta
ELEKTRISCHE SCHOK Vóór het openen eerst de stroombron uitschakelen om een elektrische schok te voorkomen. Alleen openen wanneer dat noodzakelijk is. Het werk uitvoeren volgens de onderhoudshandleiding.	[NLD] GEVAAR ELEKTRISCHE SCHOK Voor onderhoudspersoneel
感電注意 感電防止のため、開けるときには、電源接続をはずしてください。 必要なときのみ、開けてください。 サービスマニュアルに従って作業してください。	[JPN] 危険 感電 サービスマン向け



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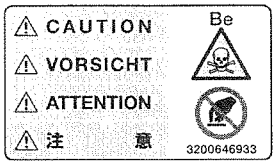
[ENG] WARNING ELECTRIC SHOCK	ELECTRIC SHOCK Do not open. Doing so risks electric shock.
[DEU] WARNUNG STROMSCHLAG	STROMSCHLAG Nicht öffnen. Andernfalls besteht Stromschlaggefahr.
[FRA] AVERTISSEMENT DÉCHARGE ÉLEC-TRIQUE	DÉCHARGE ÉLECTRIQUE N'ouvrez pas. Cela présente un risque de décharge électrique.
[ITA] AVVERTENZA SCOSSE ELETTRICHE	SCOSSE ELETTRICHE Non aprire. Ciò potrebbe causare scosse elettriche.

	[SWE]
ELEKTRISKA STÖTAR Får ej öppnas. Om du gör det finns det risk för elektriska stötar.	VARNING
	ELEKTRISKA STÖTAR
	[SPA]
DESCARGA ELÉCTRICA No abrir. Si lo hace se arriesga a sufrir una descarga eléctrica.	ADVERTENCIA
	DESCARGA ELÉC-TRICA
	[POL]
PORAŻENIE ELEKTRYCZNE Nie otwierać. Groziłoby to porażeniem elektrycznym.	OSTRZEŻENIE
	PORAŻENIE ELEK-TRYCZNE
	[NLD]
ELEKTRISCHE SCHOK Niet openen. Daardoor ontstaat risico op een elektrische schok.	WAARSCHUWING
	ELEKTRISCHE SCHOK
	[JPN]
感電注意 開けないでください。 感電のおそれがあります。	警告
	感電



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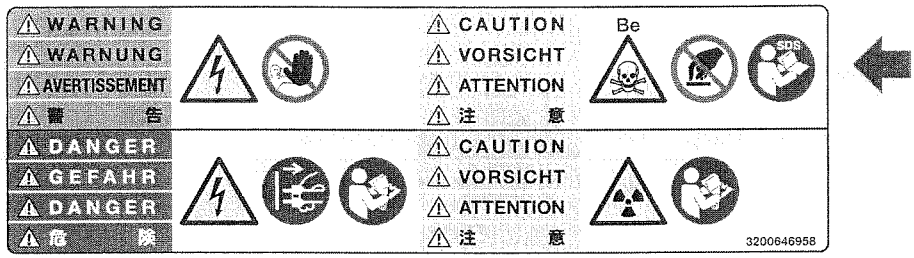
[ENG] CAUTION TOXIN 	TOXIN (Beryllium) Do not touch the beryllium foil for the window. Inhaling a broken piece may damage your health. Handle properly with reference to the safety data sheet.
[DEU] CAUTION TOXIN 	TOXIN (Beryllium) Berühren Sie nicht die Beryllium-Folie für das Fenster. Das Einatmen eines zerbrochenen Teils kann die Gesundheit beeinträchtigen. Ordnungsgemäß unter Bezugnahme auf das Sicherheitsdatenblatt handhaben.
[FRA] ATTENTION TOXINE 	TOXINE (béryllium) Ne touchez pas la feuille de béryllium de la vitre. L'inhalation d'un morceau cassé est dangereuse pour la santé. Manipulez correctement en vous reportant à la fiche de données de sécurité.
[ITA] ATTENZIONE TOSSINA 	TOSSINA (berillio) Non toccare la pellicola di berillio per la finestra. L'eventuale inspirazione di un pezzo rotto potrebbe causare danni alla salute. Maneggiare con cautela facendo riferimento alla scheda tecnica di sicurezza.

TOXIN (beryllium) Vidrör ej berylliumfoliet för fönstret. Om du andas in en trasig bit kan det orsaka hälsoproblem. Följ anvisningarna i datasäkerhetsbladet för en säker hantering.	[SWE] OBSERVER TOXIN
TOXINA (berilio) No toque la lámina de berilio para la ventana. La inhalación de una pieza rota puede ser perjudicial para su salud. Manéjelo correctamente de acuerdo con la ficha de datos de seguridad.	[SPA] ATENCIÓN TOXINA
TOKSYNA (beryl) Nie dotykać folii berylowej na oknie. Wdychanie po uszkodzeniu elementu może mieć szkodliwy wpływ na zdrowie. Postępować zgodnie z kartą charakterystyki.	[POL] PRZESTROGA TOKSYNA
TOXINE (beryllium) De berylliumfolie voor het venster niet aanraken. Inademing van een afgebroken deel kan schadelijk zijn voor de gezondheid. Voorzichtig hanteren zoals vermeld in het veiligheidsinformatieblad.	[NLD] VOORZICHTIG TOXINE
毒物注意(ベリリウム) 窓部のベリリウム膜に触れないでください。 破損した破片を吸い込むと健康被害のおそれがあります。 安全データシートを参照し、適切に対処してください。	[JPN] 注意 毒物



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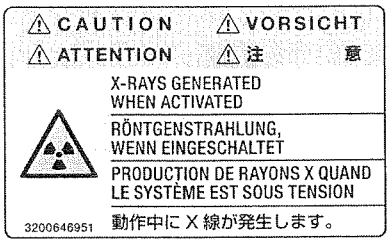
[ENG]	TOXIN (Beryllium) Do not touch the beryllium foil for the window. Inhaling a broken piece may damage your health. Handle properly with reference to the safety data sheet.
CAUTION	
TOXIN	
[DEU]	TOXIN (Beryllium) Berühren Sie nicht die Beryllium-Folie für das Fenster. Das Einatmen eines zerbrochenen Teils kann die Gesundheit beeinträchtigen. Ordnungsgemäß unter Bezugnahme auf das Sicherheitsdatenblatt handhaben.
CAUTION	
TOXIN	
[FRA]	TOXINE (béryllium) Ne touchez pas la feuille de béryllium de la vitre. L'inhalation d'un morceau cassé est dangereuse pour la santé. Manipulez correctement en vous reportant à la fiche de données de sécurité.
ATTENTION	
TOXINE	
[ITA]	TOSSINA (berillio) Non toccare la pellicola di berillio per la finestra. L'eventuale inspirazione di un pezzo rotto potrebbe causare danni alla salute. Maneggiare con cautela facendo riferimento alla scheda tecnica di sicurezza.
ATTENZIONE	
TOSSINA	

	[SWE]
TOXIN (beryllium) Vidrör ej berylliumfoliet för fönstret. Om du andas in en trasig bit kan det orsaka hälsoproblem. Följ anvisningarna i datasäkerhetsbladet för en säker hantering.	OBSERVER
	TOXIN
	[SPA]
TOXINA (berilio) No toque la lámina de berilio para la ventana. La inhalación de una pieza rota puede ser perjudicial para su salud. Manéjelo correctamente de acuerdo con la ficha de datos de seguridad.	ATENCIÓN
	TOXINA
	[POL]
TOKSYNA (beryl) Nie dotykać folii berylowej na oknie. Wdychanie po uszkodzeniu elementu może mieć szkodliwy wpływ na zdrowie. Postępować zgodnie z kartą charakterystyki.	PRZESTROGA
	TOKSYNA
	[NLD]
TOXINE (beryllium) De berylliumfolie voor het venster niet aanraken. Inademing van een afgebroken deel kan schadelijk zijn voor de gezondheid. Voorzichtig hanteren zoals vermeld in het veiligheidsinformatieblad.	VOORZICHTIG
	TOXINE
	[JPN]
毒物注意(ベリリウム) 窓部のベリリウム膜に触れないでください。 破損した破片を吸い込むと健康被害のおそれがあります。 安全データシートを参照し、適切に対処してください。	注意
	毒物



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[ENG] CAUTION X-RAY	X-RAY X-rays are generated during operation. X-rays will be generated when the key is set to ON.
[DEU] VORSICHT RÖNTGENSTRAH-LUNG	RÖNTGENSTRAHLUNG Während des Betriebs entsteht Röntgenstrahlung. Die Röntgenstrahlung wird erzeugt, wenn der Schlüssel auf EIN gestellt ist.
[FRA] ATTENTION RAYONS X	RAYONS X Des rayons X sont générés pendant le fonctionnement. Des rayons X seront générés lorsque la clé sera réglée sur ON.
[ITA] ATTENZIONE RAGGI X	RAGGI X Dei raggi X vengono generati durante il funzionamento. Dei raggi X vengono generati quando il tasto è impostato su ON.

	[SWE]
RÖNTGEN Röntgenstrålar genereras under drift. Röntgenstrålar kommer att genereras när nyckeln är inställd på PÅ.	OBSERVER
	RÖNTGEN
	[SPA]
RAYOS X Se generan rayos X durante el funcionamiento. Se generarán rayos X al ajustar la tecla en ON.	ATENCIÓN
	RAYOS X
	[POL]
PROMIENIOWANIE RTG Podczas pracy generowane jest promieniowanie RTG. Gdy kluczyk znajduje się w położeniu ON (WŁ.), generowane jest promieniowanie RTG.	PRZESTROGA
	PROMIENIOWANIE RTG
	[NLD]
RÖNTGENSTRALING Röntgenstraling wordt gegenereerd tijdens de werking. Röntgenstraling zal worden gegenereerd als de sleutel is ingesteld op AAN.	VOORZICHTIG
	RÖNTGENSTRALING
	[JPN]
X線注意 動作中にX線が発生します。 鍵がONのとき、X線が発生します。	注意
	X線

3200646952

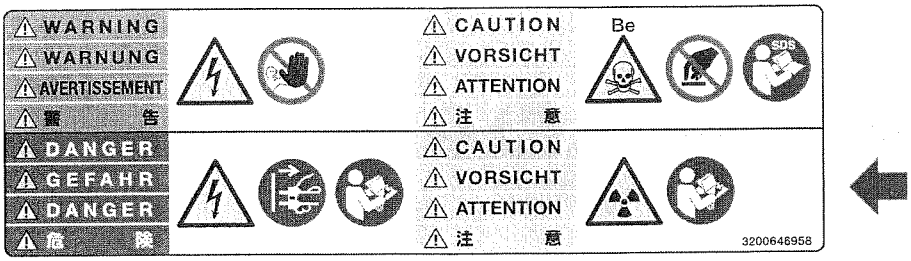
[ENG] CAUTION X-RAY	X-RAY Inside the sample chamber is a radiation controlled area.
[DEU] VORSICHT RÖNTGENSTRAH-LUNG	RÖNTGENSTRAHLUNG Innerhalb der Probenkammer befindet sich ein Strahlungskontrollbereich.
[FRA] ATTENTION RAYONS X	RAYONS X L'intérieur de la chambre d'échantillons est une zone de rayonnement contrôlée.
[ITA] ATTENZIONE RAGGI X	RAGGI X All'interno della camera di campionatura vi è una zona di radiazione controllata.

RÖNTGEN Inuti provkammaren finns ett strålningskontrollerat område.	[SWE] OBSERVER RÖNTGEN
RAYOS X El interior de la cámara de muestras es una zona de radiación controlada.	[SPA] ATENCIÓN RAYOS X
PROMIENIOWANIE RTG Wewnątrz komory próbki znajduje się kontrolowany obszar promieniowania.	[POL] PRZESTROGA PROMIENIOWANIE RTG
RÖNTGENSTRALING Binnen de monsterkamer is een straling gecontroleerde zone.	[NLD] VOORZICHTIG RÖNTGENSTRALING
X線注意 試料室内部は放射線管理区域です。	[JPN] 注意 X線

3200646953

[ENG]	X-RAY There is an X-ray source inside the device. Be careful when handling and perform work according to the Service Manual.
CAUTION	
X-RAY	
For service personnel	
[DEU]	RÖNTGENSTRAHLUNG Das Gerät ist mit einer Röntgenstrahlenquelle ausgestattet. Bei der Handhabung vorsichtig vorgehen und Arbeiten gemäß der Wartungsanleitung vornehmen.
CAUTION	
RÖNTGENSTRAH-LUNG	
Für das Wartungsperso-nal	
[FRA]	RAYONS X L'appareil contient une source de rayons X à l'intérieur. Faites attention lors de la manipulation et effectuez les travaux conformément au manuel d'entretien.
ATTENTION	
RAYONS X	
Pour le personnel d'entretien	
[ITA]	RAGGI X All'interno del dispositivo è presente una sorgente di raggi X. Fare attenzione a maneggiare il dispositivo ed eseguire le operazioni di manutenzione seguendo le istruzioni del Manuale di manutenzione.
ATTENZIONE	
RAGGI X	
Per il tecnico riparatore	

	[SWE]
RÖNTGEN Den finns en röntgenenhet inne i denna enhet. Var försiktig när du hanterar enheten och utför arbete i enlighet med anvisningarna i servicehandboken.	OBSERVER
	RÖNTGEN
	För servicetekniker
	[SPA]
RAYOS X Existe una fuente de rayos X dentro del dispositivo. Tenga cuidado durante el manejo y actúe de acuerdo con el Manual de servicio.	ATENCIÓN
	RAYOS X
	Para personal de mantenimiento
	[POL]
PROMIENIOWANIE RTG Wewnątrz urządzenia znajduje się źródło promieniowania RTG. Zachować ostrożność podczas obsługi i wykonywać prace zgodnie z Instrukcją serwisową.	PRZESTROGA
	PROMIENIOWANIE RTG
	Dla serwisanta
	[NLD]
RÖNTGENSTRALING Het apparaat bevat aan de binnenkant een röntgenbron. Wees voorzichtig tijdens hantering en voer het werk uit volgens de onderhoudshandleiding.	VOORZICHTIG
	RÖNTGENSTRALING
	Voor onderhoudspersoneel
	[JPN]
X線注意 装置内にX線源があります。 取り扱いに注意し、サービスマニュアルに従って作業してください。	注意
	X線
	サービスマン向け



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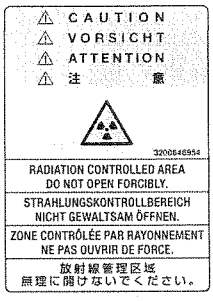
[ENG]	X-RAY There is an X-ray source inside the device. Be careful when handling and perform work according to the Service Manual.
CAUTION	
X-RAY	
For service personnel	
[DEU]	RÖNTGENSTRAHLUNG Das Gerät ist mit einer Röntgenstrahlenquelle ausgestattet. Bei der Handhabung vorsichtig vorgehen und Arbeiten gemäß der Wartungsanleitung vornehmen.
CAUTION	
RÖNTGENSTRAH-LUNG	
Für das Wartungsperso-nal	
[FRA]	RAYONS X L'appareil contient une source de rayons X à l'intérieur. Faites attention lors de la manipulation et effectuez les travaux conformément au manuel d'entretien.
ATTENTION	
RAYONS X	
Pour le personnel d'entretien	
[ITA]	RAGGI X All'interno del dispositivo è presente una sorgente di raggi X. Fare attenzione a maneggiare il dispositivo ed eseguire le operazioni di manutenzione seguendo le istruzioni del Manuale di manutenzione.
ATTENZIONE	
RAGGI X	
Per il tecnico riparatore	

	[SWE]
RÖNTGEN Den finns en röntgenenhet inne i denna enhet. Var försiktig när du hanterar enheten och utför arbete i enlighet med anvisningarna i servicehandboken.	OBSERVER
	RÖNTGEN
	För servicetekniker
	[SPA]
RAYOS X Existe una fuente de rayos X dentro del dispositivo. Tenga cuidado durante el manejo y actúe de acuerdo con el Manual de servicio.	ATENCIÓN
	RAYOS X
	Para personal de mantenimiento
	[POL]
PROMIENIOWANIE RTG Wewnątrz urządzenia znajduje się źródło promieniowania RTG. Zachować ostrożność podczas obsługi i wykonywać prace zgodnie z Instrukcją serwisową.	PRZESTROGA
	PROMIENIOWANIE RTG
	Dla serwisanta
	[NLD]
RÖNTGENSTRALING Het apparaat bevat aan de binnenkant een röntgenbron. Wees voorzichtig tijdens hantering en voer het werk uit volgens de onderhoudshandleiding.	VOORZICHTIG
	RÖNTGENSTRALING
	Voor onderhoudspersoneel
	[JPN]
X線注意 装置内にX線源があります。 取り扱いに注意し、サービスマニュアルに従って作業してください。	注意
	X線
	サービスマン向け



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[ENG] CAUTION X-RAY	X-RAY Inside the sample chamber is a radiation controlled area. Do not force the sample chamber's cover open.
[DEU] VORSICHT RÖNTGENSTRAH-LUNG	RÖNTGENSTRAHLUNG Innerhalb der Probenkammer befindet sich ein Strahlungskontrollbereich. Lassen Sie die Abdeckung der Probenkammer nicht geöffnet.
[FRA] ATTENTION RAYONS X	RAYONS X L'intérieur de la chambre d'échantillons est une zone de rayonnement contrôlée. Ne pas forcer l'ouverture du couvercle de la chambre d'échantillons.
[ITA] ATTENZIONE RAGGI X	RAGGI X All'interno della camera di campionatura vi è una zona di radiazione controllata. Non forzare l'apertura del coperchio della camera di campionatura.

RÖNTGEN Inuti provkammaren finns ett strålningskontrollerat område. Öppna inte provkammarens lucka med våld.	[SWE] OBSERVER RÖNTGEN
RAYOS X El interior de la cámara de muestras es una zona de radiación controlada. No abra forzadamente la cubierta de la cámara de muestras.	[SPA] ATENCIÓN RAYOS X
PROMIENIOWANIE RTG Wewnątrz komory próbki znajduje się kontrolowany obszar promieniowania. Nie otwierać pokrywy komory próbki na siłę.	[POL] PRZESTROGA PROMIENIOWANIE RTG
RÖNTGENSTRALING Binnen de monsterkamer is een straling gecontroleerde zone. Forceer het deksel van de monsterkamer niet open.	[NLD] VOORZICHTIG RÖNTGENSTRALING
X線注意 試料室内部は放射線管理区域です。 試料室カバーを無理に開けないでください。	[JPN] 注意 X線

HORIBA, Ltd.

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http://www.horiba.com

【Design Concept】

HORIBAグループのアプリケーション・イメージを全体的にコラージュ。
ナノサイズから地球レベルへと変化するスケールを水の流れるようなイメージでストーリー展開しています。

The HORIBA Group application images are collected in a collage of the following design:
Beginning from a nano-sized element, the scale of our story enlarges all the way up to the earth, incorporating a sinuous flow of water.

HORIBA

Explore the future

Sulfur-in-oil Analyzer
SLFA-6100/6800

Instruction Manual

CODE:I2003868000D-3200582715-GZ0000385344D

Preface

This manual describes the operation of the Sulfur-in-oil Analyzer, SLFA-6100/6800.
Be sure to read this manual before using the product to ensure proper and safe operation of the product. Also safely store the manual so it is readily available whenever necessary.

Product specifications and appearance, as well as the contents of this manual are subject to change without notice.

Warranty and responsibility

HORIBA, Ltd. warrants that the Product shall be free from defects in material and workmanship and agrees to repair or replace free of charge, at option of HORIBA, Ltd., any malfunctioned or damaged Product attributable to responsibility of HORIBA, Ltd. for a period of one (1) year from the delivery unless otherwise agreed with a written agreement. In any one of the following cases, none of the warranties set forth herein shall be extended;

- Any malfunction or damage attributable to improper operation
- Any malfunction attributable to repair or modification by any person not authorized by HORIBA, Ltd.
- Any malfunction or damage attributable to the use in an environment not specified in this manual
- Any malfunction or damage attributable to violation of the instructions in this manual or operations in the manner not specified in this manual
- Any malfunction or damage attributable to any cause or causes beyond the reasonable control of HORIBA, Ltd. such as natural disasters
- Any deterioration in appearance attributable to corrosion, rust, and so on
- Replacement of consumables

HORIBA, LTD. SHALL NOT BE LIABLE FOR ANY DAMAGES RESULTING FROM ANY MALFUNCTIONS OF THE PRODUCT, ANY ERASURE OF DATA, OR ANY OTHER USES OF THE PRODUCT.

Trademarks

- Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and other countries

Other company names and brand names are either registered trademarks or trademarks of the respective companies. (R), (TM) symbols may be omitted in this manual.

Regulations

Conformable Directive

This equipment conforms to the following directives and standards:

CE

EMC: EN61326-1
Class B, Basic electromagnetic environment
Safety: EN61010-1
EN61010-2-91
RoHS: EN50581
9.Industrial Monitoring and Control Instruments

Warning: This product is not intended for use in industrial environments. In an industrial environment, electromagnetic environmental effects may cause the incorrect performance of the product in which case the user may be required to take adequate measures.

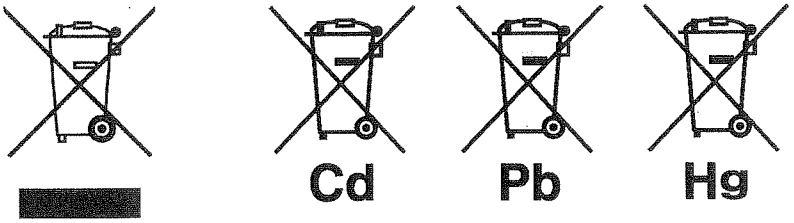
Installation environment

This product is designed for the following environment.

- Overvoltage Category II
- Pollution degree 2

Information on disposal of electrical and electronic equipment and disposal of batteries and accumulators

The crossed out wheeled bin symbol with underbar shown on the product or accompanying documents indicates the product requires appropriate treatment, collection and recycle for waste electrical and electronic equipment (WEEE) under the Directive 2012/19/EU, and/or waste batteries and accumulators under the Directive 2006/66/EC in the European Union.
The symbol might be put with one of the chemical symbols below. In this case, it satisfies the requirements of the Directive 2006/66/EC for the object chemical.
This product should not be disposed of as unsorted household waste.
Your correct disposal of WEEE, waste batteries and accumulators will contribute to reducing wasteful consumption of natural resources, and protecting human health and the environment from potential negative effects caused by hazardous substance in products.
Contact your supplier for information on applicable disposal methods.



FCC rules

Any changes or modifications not expressly approved by the party responsible for compliance shall void the user's authority to operate the equipment.

Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Korea certification

B급 기가 (가정용 방송통신기자재)

이 기기는 가정용(B 급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

For Your Safety

Hazard classification and warning symbols

Warning messages are described in the following manner. Read the messages and follow the instructions carefully.

Hazard classification

⚠ DANGER	This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is to be limited to the most extreme situations.
⚠ WARNING	This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Warning symbols

Description of what should be done, or what should be followed

Description of what should never be done, or what is prohibited

Safety precautions

This section provides precautions for using the product safely and correctly and to prevent injury and damage. The terms of DANGER, WARNING, and CAUTION indicate the degree of imminency and hazardous situation. Read the precautions carefully as it contains important safety messages.

⚠ DANGER

High voltage
Do not touch inside the analyzer with the power ON.

⚠ WARNING

Fire
- For your safety, make sure to unplug the power plug from the electrical outlet when not in use.
- Clear dust on the power plug periodically (a few times a year).

If the power supply cord is left plugging into the electrical outlet for a long period of time, electrical tracking may occur due to dust and moisture, and it may result in an ignition or a fire.

Fire or electric shock
- Do not bundle the power supply cord during use.
- Do not damage the power supply cord nor apply an excessive load to it, such as bending and stretching it repeatedly, putting a heavy thing on it.
- If it cannot be plugged into an electrical outlet firmly, stop use of the power supply cord.

If may result in overheating, a fire, an electrical shock, or breakdown.

Fire or electric shock
Do not apply an excessive load to the cables, such as bending and stretching them repeatedly, Do not put anything on the cables. Otherwise such a load may cause a fire, electric shock, or breakdown.

Electric shock
To avoid electric shock, do not touch inside the analyzer.

Many samples are inflammable.
Keep samples and unit away from fire.

DBDS has a very strong unpleasant odor. Handle in a well-ventilated hood to avoid sickness and nausea.

⚠ CAUTION

Radiation
Inside the sample chamber is a radiation controlled area. Do not force the sample chamber open.

Radiation
If measurement is performed with unit being damaged, this may cause a risk of X-ray leaks.
If unit is damaged, stop measuring immediately and contact your local service representative.

⚠ CAUTION
Hazardous substance Do not touch beryllium at the window. It is harmful to the human body when breathe in the coarse particulate which occurs when a beryllium foil was broken.
As soon as the measurement is complete, take out the sample cell from the instrument. The sample chamber from the inflammable vapor may catch fire. Especially, be careful of a highly volatile sample.
Do not remove any covers. This product contains X-rays and high voltages. It may result in an electrical shock or radiation exposure.
Caution against sample splash A sample might splash when a sample cell is prepared or disassembled. For protection, wear a mask, gloves and goggles, etc. when working.

Product Handling Information

Operational precautions

Use of the product in a manner not specified by the manufacturer may impair the protection provided by the product. And it may also reduce product performance.
Exercise the following precautions.

- Only use the product including accessories for their intended purpose.
- Ensure to close the sample chamber lid, and check that the open lever is located to the "CLOSE" position. If the lever should stop in the halfway, move the open lever to the CLOSE position by closing the sample chamber lid.
- Do not use any other power cords for this product other than what is provided with the instrument.
- Inside the analyzer, X-ray generator or high-voltage generation circuit are incorporated. Disassembling the analyzer such as removing the outer cover is dangerous. Do not disassemble the analyzer.
- Ground the instrument to prevent electrification.
- Do not insert a finger, a rod, or any hard object into the lock hole for the sample-chamber lid.
- Do not press the micro-switch of the sampler by fingers or stick.
- Do not force to turn or push the turntable.
- Be sure to put the exclusive sample cell into the holes numbered 1 to 8 of the turntable. Do not use other sample cell except the exclusive one or put objects on the other places except the holes on the turntable.
- Make sure to use the provided power supply cable to power this product.

Disposal of the product

When disposing of the product, follow the related laws and/or regulations of your country for disposal of the product.
Both the X-ray tube and the X-ray detector (proportional counter) uses metal beryllium film, which is specified as Group I substance in the Ordinance on Prevention of Hazards due to Specified Chemical Substances.
Be sure to check the regulations and laws of your country for the proper disposal of any components containing beryllium.

Notification of product

This product uses X-ray. Notify the authorities of X-ray usage in advance as necessary, and follow all laws designated for your country.

Manual Information

Description in this manual

Note

This interprets the necessary points for correct operation and notifies the important points for handling the product.

Reference

This indicates the part where to refer for information.

Tip

This indicates reference information.

Original language

This is the English translation of an original Japanese document.

CONTENTS

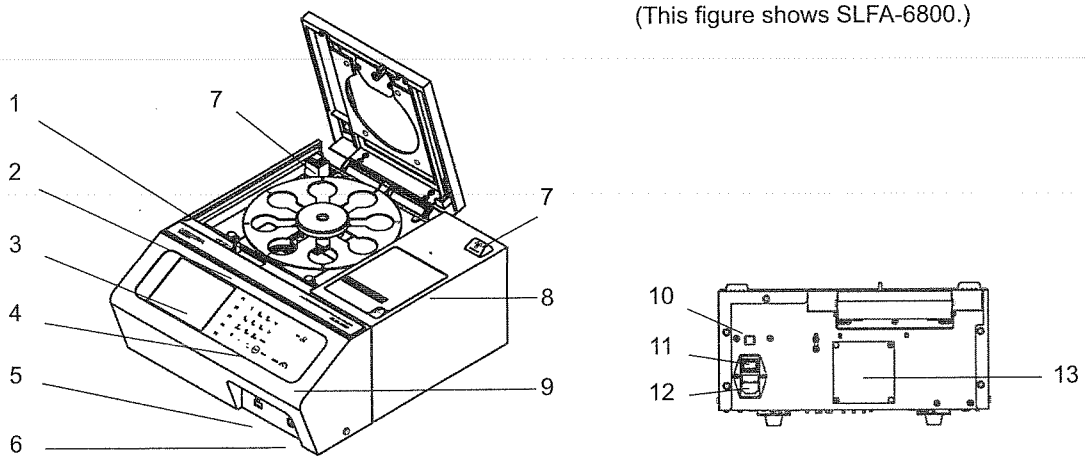
Overview

SLFA-6100/6800 can measure sulfur content quickly and accurately for petroleum based products. This analysis method is compliant to JIS K2541, JIS B7995, ISO 8574 and ASTM-D4294.

Names and functions of each part

Front and rear view

(This figure shows SLFA-6800.)



Front view

Rear view

Fig. 1 Names of each part

No.	Name	Description
1	Turntable (For the SLFA-6800) Sample tray assembly (For the SLFA-6100)	The place that set the sample cell. For the SLFA-6800, up to eight cells can be placed on this turntable; for the SLFA-6100, only one cell. Set the sample cell so that it does not catch with the turntable or the sample tray.
2	Lever of the sample-chamber lid	Setting the lever to the OPEN position allows you to open the sample-chamber lid. Closing the sample-chamber lid returns the lever to the CLOSE position.
3	Display	Various messages are displayed on screen. (Refer to "Display" (page 3).)
4	Keypad	Used to operate the SLFA-6100/6800. (Refer to "Operation" (page 4).)
5	USB(A) connector	Connects the USB flash drive. (Refer to "USB flash drive setting" (page 11).)
6	Key switch	Switches ON/OFF of X-ray.
7	X-ray ON lamps	Indicates the X-ray generation condition. Illuminates to red when X-ray is generated. It also temporarily comes on once you turned on power to check the lighting circuit. The warning symbol for X-ray generating is printed on two lamp covers. 

No.	Name	Description
8	Printer	Prints measurement results, calibration curve formula, calibration curve graph, and error information. (Refer to “Printer setting” (page 9).)
9	MEAS key	Used to start measurement.
10	USB(B) connector	Connects the USB cable for the PC connection. (Refer to “Data output to PC by USB cable connection” (page 88).)
11	Power switch	Switches ON/OFF of power.
12	Inlet for power cord	Connects the attached power cord.
13	Fan	This is the cooling fan.

Display

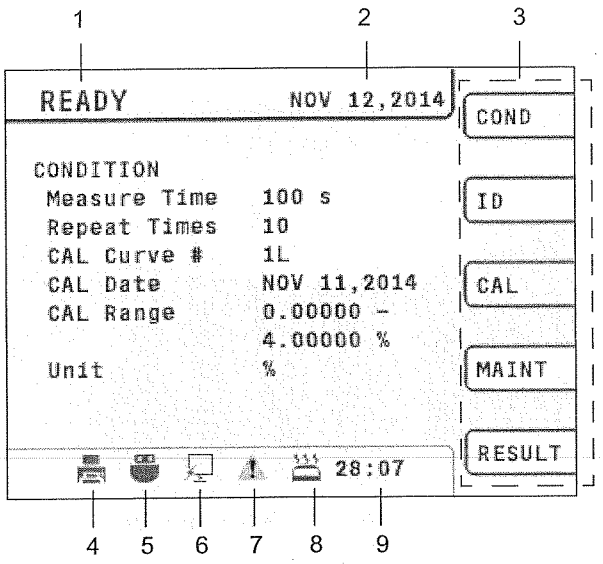
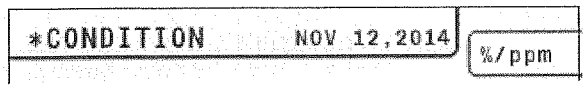


Fig. 2 Display part

No.	Name	Description
1	Title of current screen	The title of current screen is displayed. Changing the condition shows the "*" (asterisk) mark at the left of the title. 
2	Date	Displays date.
3	Selection screen	These five fields show the screens available for selection; they correspond to the function keys F1 to F5.
4	Printer status icon	Displays valid/invalid of print mode.
5	USB flash drive status icon	Displays valid/invalid of USB flash drive.
6	PC communication status icon	Displays valid/invalid of the PC connection.
7	Error status icon	When displayed in yellow, indicates the occurrence of error.
8	Warm-up/Clock icon	The warm-up icon is displayed for 30 minutes after power is turned ON. The clock icon is displayed after warm-up is finished.
9	Time	During warm-up: Displays residual warm-up time. After warm-up: Displays time of day.

Note

Control of back-light brightness
If no key is pressed for approximately 45 minutes, the back light for the control screen will darken, even though the unit is in measuring operation. Pressing any key will turn on the back-light.

Operation

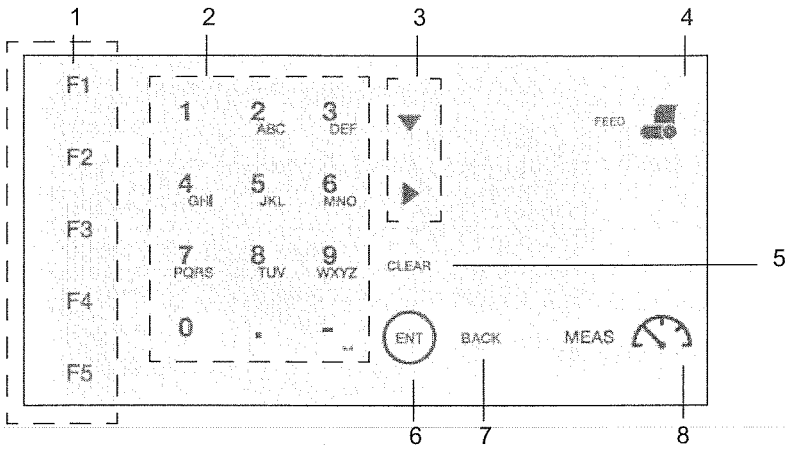


Fig. 3 Operation part

No.	Name	Description
1	Function keys	Used to select function. Each function key corresponds to a selected screen that is displayed in the display field on the left hand side respectively. Pressing a function key will establish a selected screen that is displayed in the frame located at the upper left part of the screen.
2	Numerical keys	Used to enter data. Alphabets written under a figure on each key are used to specify ID#. When input characters exceed the 15th digits, the buzzer sounds once.
3	Cursor keys	Used to move the cursor downward and rightward.
4	FEED key	Used to paper feed.
5	CLEAR key	Used to clear the values that have already been input, and used to delete a calibration curve. Pressing the key without any numerical values to delete sounds the buzzer.
6	ENT key	Used to enter values and select mode which was chosen with the cursor.
7	BACK key	Returns to the previous screen.
8	MEAS key	Used to start measurement.

Installation

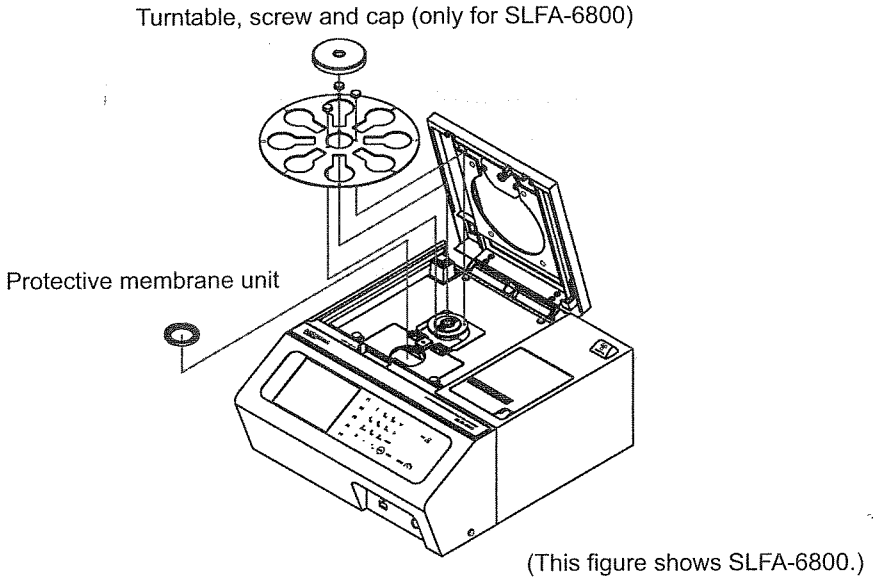
Unpacking

First unpack the package to check its contents.
The package contains the analyzer and accessories as listed below.

• Analyzer (SLFA-6100/SLFA-6800)	1 pc
• Turntable with 3 screws for fixing the turntable and cap (only for SLFA-6800)	1 set
• Protective membrane unit	1 pc
• Cell windows (containing 100 pcs)	1 box
• Cell frames (containing 30 pcs)	1 box
• Disposable cells (containing 50 pcs)	2 boxes
• Tool jig (for disposable cell)	1 pc
• Printer paper (containing 5 rolls)	1 box
• Key	2 pcs
• Power cord	1 pc
• PC USB driver install CD	1 copy
• Instruction manual	1 copy

Mounting the units

Mount the turntable-only for SLFA-6800 and protective membrane unit.
Face the surface, on which the position numbers are written, of the turntable upward.
For the protective membrane unit, refer to "Replacing protective membrane" (page 69).



(This figure shows SLFA-6800.)

Fig. 4 Mounting the turntable and protective membrane unit

Contact for installation

Manufacturer: HORIBA, Ltd.
2 Miyanohigashi, Kisshoin Minami-ku, Kyoto 601-8510 Japan

Installing conditions

Installation environment

- Install the analyzer in a place free from sudden changes in temperature (the change in more than ±5°C will cause the measurement error) or from direct sunlight. Avoid installing the analyzer near the entrance of a room, facing a passageway, or near a window.
- Install the analyzer in a place where the humidity is kept low without condensation or freezing.
- Install the analyzer in a place where the altitude is lower than 3000 meters.
- Install the analyzer in a place where the levels of corrosive gas and dust is low enough with good ventilation.
- Install the analyzer in a place where the vibration level is low.
- Install the analyzer on level surface.
- There should be no source generating electric noise near the analyzer.
- Install the analyzer in a place without fire or anything generating sparks.
- Install the analyzer in a place where the power cord can be quickly disconnected during an emergency.
- The mass of SLFA-6100/6800 is over 21 kg. Wear the gloves, and moving the analyzer must be done by two or more people. Hold the bottom at the four corners to move it.
- Install the analyzer without blocking the fan, and create more than 10 centimeters space from back of the analyzer.

Wiring for power source

Be sure to connect the power cord to an outlet for the corrected rated power source.
Be sure to use dedicated power cord and a dedicated power source for the instrument.

Grounding

The analyzer incorporates high-voltage circuit. For safety, be sure to ground the grounding terminal on the power cord.

Power specification

This model has the range from 100 V to 240 V AC, 50 Hz/60 Hz.
It is not necessary to change any of the set voltage.

Preparation

Startup of system

Startup procedure

1. **Turn ON the key switch located on the front panel.**
2. **Turn ON the power switch on the rear panel.**
   The model name will be displayed. The X-Ray ON lamps will be activated after 30 seconds, and then the READY menu will be displayed.

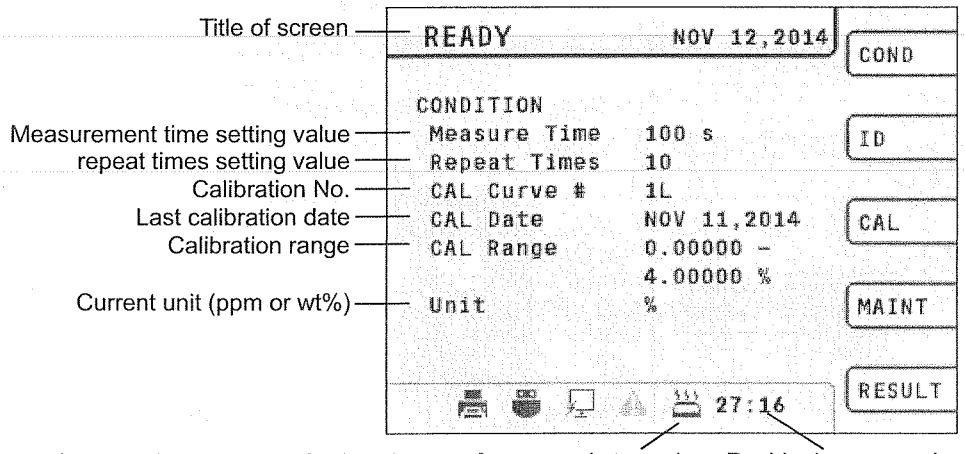


Fig. 5 READY menu

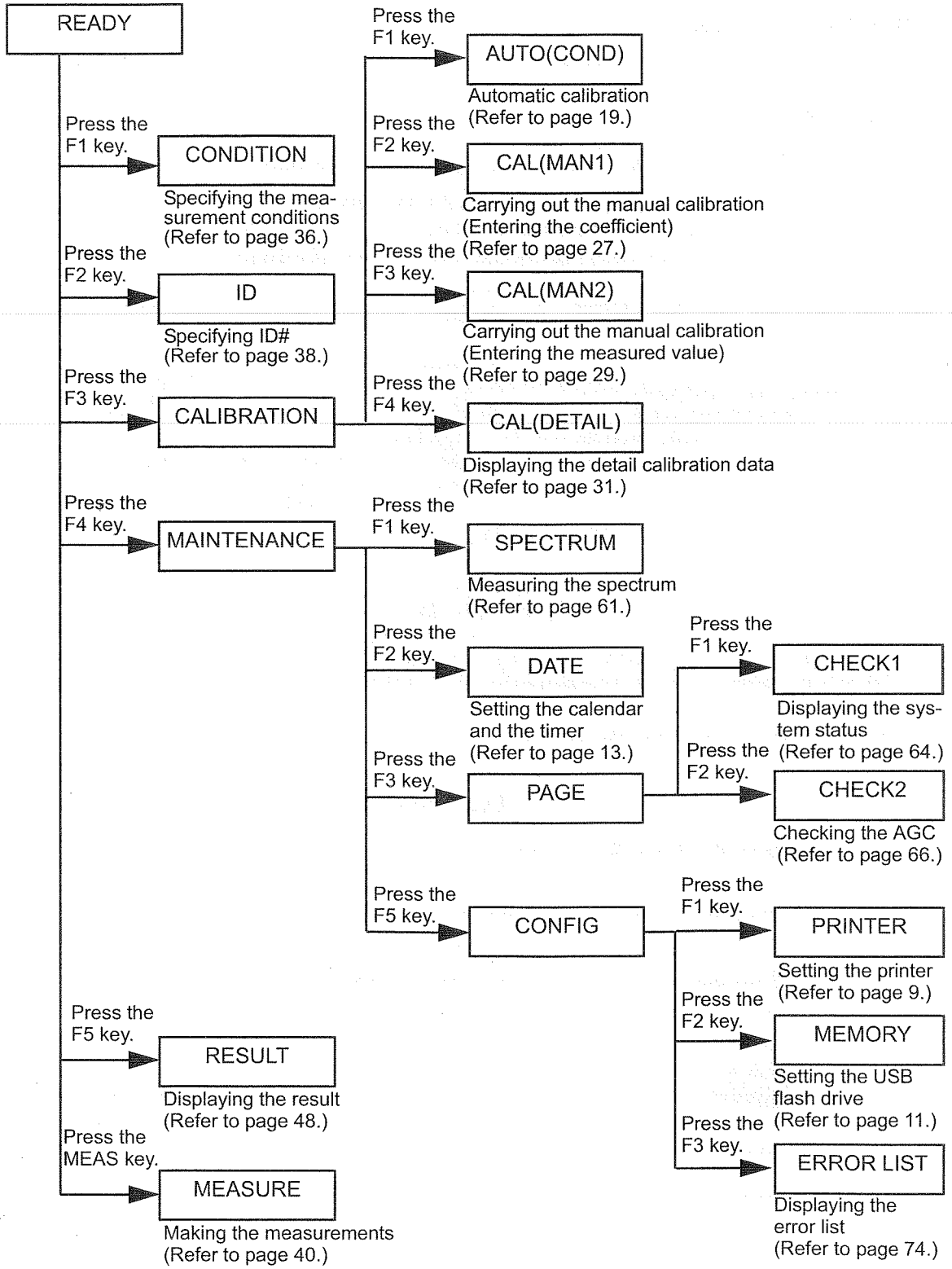
3. **Install printer paper if necessary.**
   For installing printer paper, refer to "Printer setting" (page 9).
4. **Connect the USB flash drive if necessary.**
   For installing USB flash drive, refer to "USB flash drive setting" (page 11).
5. **Connect the PC connection cable if necessary.**
   For installing the PC connection, refer to "Data output to PC by USB cable connection" (page 88).

Note

- **When the X-ray ON lamps do not light up, despite the key switch is ON, contact your local service representative.**
- **The sample chamber lid has a PVC view port that can be used to observe the inside of the sample chamber. If this view port is damaged, stop measuring immediately and contact your local service representative. If measurement is performed with a view port being damaged, this may cause a risk of X-ray leaks.**

Screen configuration

The screens on the display function in the order below.
Screen can be switched by the function keys.



Tip

- **Press the BACK key in each screen returns to previous screen.**
- **Press the F4 key (EXIT) in each screen returns to the READY menu.**

Measurement preparation

Printer setting

The printer output mode can be switched ON/OFF.
Also, three printing modes are available as follows.

- STANDARD
  Outputs measurement condition, measurement value, average value and standard deviation.
- ADVANCED
  Adding to STANDARD, outputs such internal information as fluorescence X-ray intensity, scattered X-ray intensity, total counting rate, pile-up counting rate, temperature, and atmospheric pressure.
- SERVICE
  Adding to ADVANCED, outputs spectrum graph.

Reference

For printing example, refer to "For ending the measurement" (page 46).

1. **Press the F4 key (MAINT) on the READY menu (Fig. 5).**
   The MAINTENANCE menu is displayed.

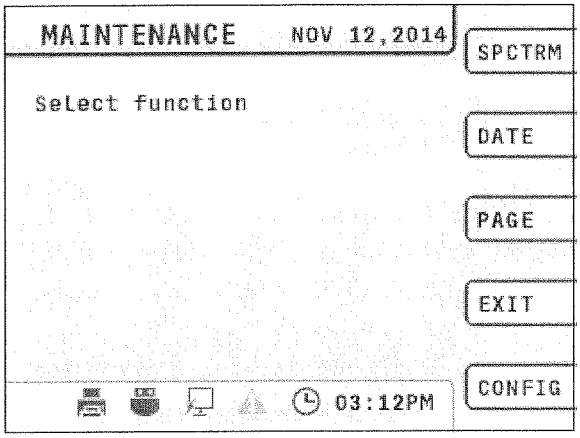


Fig. 6 MAINTENANCE menu

2. **Press the F5 key (CONFIG).**
   The CONFIG menu is displayed.

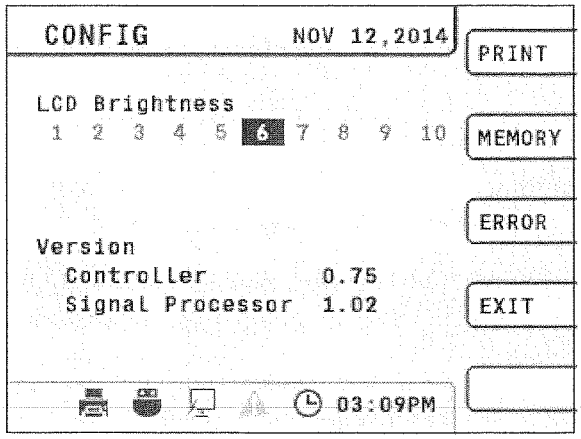


Fig. 7 CONFIG menu

3. **Press the F1 key (PRINT).**
   The PRINTER menu is displayed.

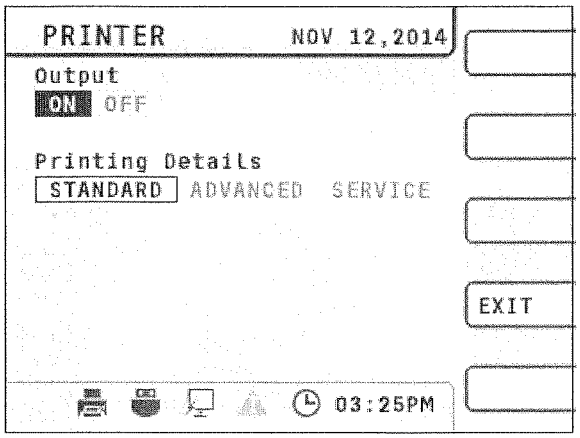


Fig. 8 PRINTER menu

4. **Press the right cursor key on Output, and select ON/OFF for the printer.**
   - Selecting ON enables printing.
   - Selecting OFF disables printing.
5. **Press the down cursor key.**
   The cursor moves to the Printing Details parameter.
6. **Press the right cursor key on Printing Details, and select the printing mode.**
7. **Press the F4 key (EXIT).**
   The setting is activated, and the screen returns to the READY menu.

USB flash drive setting

In the USB flash drive, such information as measurement result, calibration curve data, and spectrum data can be saved.
Also, three saving modes are available as follows.

- STANDARD
  Saves measurement condition, measurement value, average value and standard deviation.
- ADVANCED
  Adding to STANDARD, saves such internal information as fluorescence X-ray intensity, scattered X-ray intensity, total counting rate, pile-up counting rate, temperature, and atmospheric pressure.
- SERVICE
  Adding to ADVANCED, saves spectrum data.

Note

- **Note that some USB flash drives may not work with the SLFA. In this case, try with another type. If you need the USB flash drive manufactured and verified by HORIBA, contact your local service representative.**
- **For the output specification to the USB flash drive, refer to "USB output format" (page 81).**
- **Insert the USB flash drive before starting measurement.**
  Inserting the USB flash drive during measurement may cause failure.

Ensure to use the USB flash drive after formatting by the analyzer.

Formatting USB flash drive

Note

All the data stored in the USB flash drive will be deleted by this operation. If any necessary data has been saved, first restore such data to the PC, and start formatting.

1. **Insert the USB flash drive to the USB (A) connector on the front panel.**
2. **Press the F4 key (MAINT) on the READY menu (Fig. 5).**
   The MAINTENANCE menu (Fig. 6) is displayed.
3. **Press the F5 key (CONFIG).**
   The CONFIG menu (Fig. 7) is displayed.
4. **Press the F2 key (MEMORY).**
   The MEMORY menu is displayed.

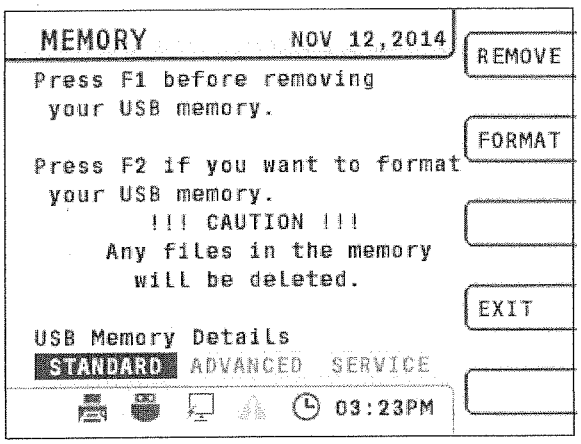


Fig. 9 MEMORY menu

5. **Press the F2 key (FORMAT).**
   The screen to confirm formatting is displayed.

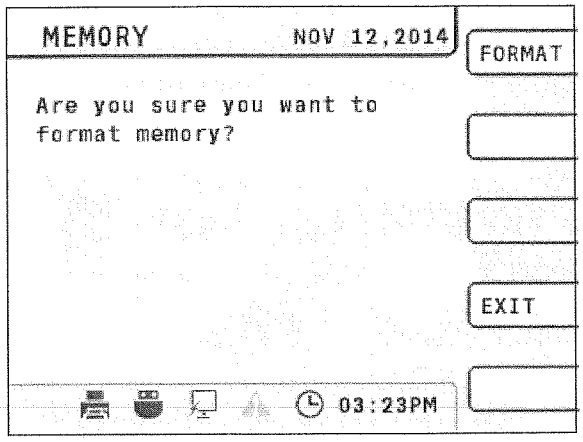


Fig. 10 FORMAT menu

6. **Press the F1 key (FORMAT).**
   The USB flash drive is formatted.
   If the formatting of USB flash drive is not desired, press the F4 key (EXIT) or the BACK key to return to the MEMORY menu.

Removing USB flash drive

Remove the USB flash drive by the following steps.

1. **Press the F1 key (REMOVE) on the MEMORY menu (Fig. 9).**
   The display icon of USB flash drive disappears.
2. **Remove the USB flash drive.**

Calendar, timer setting

Once setting the calendar and timer, requires no further setting. When the analyzer is not used for a long time, or when the battery icon is displayed, correctly set the calendar and time before starting the measurement.

Tip

When the battery icon is always displayed after power is ON, this means the backup battery has reached its product life time. Contact your local service representative.

1. **Press the F4 key (MAINT) on the READY menu (Fig. 5).**
   The MAINTENANCE menu (Fig. 6) is displayed.
2. **Press the F2 key (DATE).**
   The DATE menu is displayed.

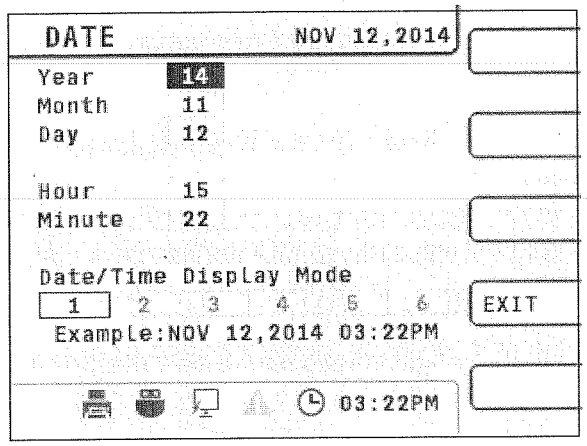


Fig. 11 DATE menu

3. **Press the numerical key and input year.**
4. **Press the ENT key or the down cursor key.**
   The cursor moves to the month.
5. **Set month, day, hour, and minute.**
6. **Press the right cursor key and select indication form.**
   There are six kinds of indication forms.

NO.	Indication example
1	NOV 12,2014 03:22PM
2	12 NOV 2014 03:22PM
3	2014 / 11 / 12 03:22PM
4	NOV 12,2014 15:22
5	12 NOV 2014 15:22
6	2014 / 11 / 12 15:22

7. **Press the F4 key (EXIT).**
   At this point, date is changed, second starts from 00, and the screen returns to READY menu.

Tip

Time can be strictly set to the second unit by setting the date and time by the steps 3. to 5., and pressing the F4 key (EXIT) according to the time signal.

Setting printer paper

1. Open the printer cover.
2. Insert the paper roll.

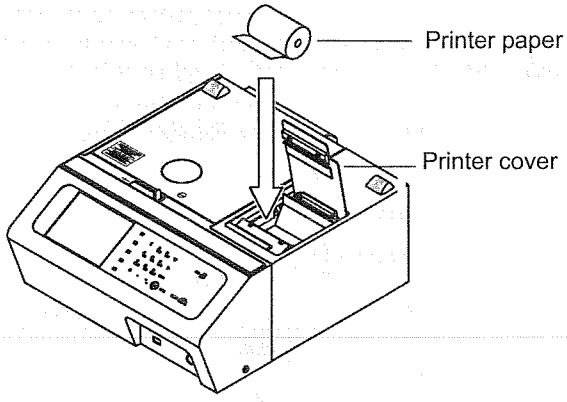


Fig. 12 Insert the paper roll

Note

The thermal paper has a front and back side. Set the paper to the correct orientation by referring to the figure above.

3. Pull up the roller release lever, and insert the printer paper to the printer unit.

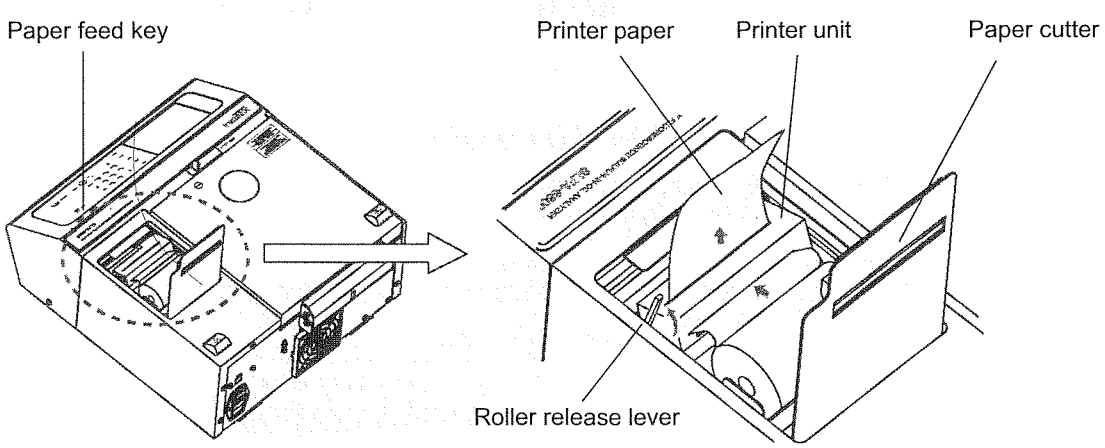


Fig. 13 Insert the printer paper to the printer unit

4. Take out the printer paper from the top of printer unit until the paper is long enough to be passed through the paper cutter of the printer cover.
5. Pull down the roller release lever.
6. Press the paper feed key to feed the paper, and ensure that the paper is fed straight.
   If the paper is fed diagonally, pull up the roller release lever, adjust the slant, and pull it down again.
7. Pass the printer paper through the paper cutter of the printer cover.
8. Close the printer cover.
   After closed, lightly pull the printer paper to remove any slack.

Calibration

Calibration curves

Number of calibration curves

In this product, three calibration curves (Calibration Code: L, M, and H) can be registered as each of calibration set numbers, No. 1 to 5, totaling 15 calibration curves. It becomes possible to use and switch among calibration curves. The CONDITION menu is used to switch among the calibration curves to be used for measurement.
Moreover, three calibration curves within each calibration set number can be automatically selected during measurement. For the setting method, refer to "Measurement condition setting" (page 36).
The current setting values for calibration curve is displayed on the READY menu.

Tip

Even when the same sample is measured, the measurement result differs depending on the calibration curve to be used.

Automatic selection of calibration curve

When the calibration code is set to A (AUTOMATIC), the calibration curves are selected as followed.
Define a concentration range for three calibration curves, L (Low), M (Middle), H (High), respectively. Use the concentration range to select an optimal calibration curve.
For a concentration range, refer to "Concentration range of calibration curve" (page 17)

- Calculate a concentration value by using calibration curve L. If the results of calculation fall within the concentration range of calibration curve L, these results constitute measurement results.
  - If the results of calculation fall outside the concentration range of calibration curve L, calculate a concentration value by using calibration curve M. Similarly, repeats these steps until calibration curve H and measurement results fall within the concentration range thereof.
  - If calculation results do not fall within any of the concentration ranges of calibration curves L, M and H, use the calibration curve with the nearest concentration range.
- When measuring repeatedly, use the calibration curve selected at the first time, after the second measurement.
- The calibration curve number used is printed.

Note

- **Calculated in order of calibration curve L, M, N. Finish the calculation when the optimal calibration curve is decided.**
- **The calibration curve number is printed out by number (1 to 5) and alphabet (L, M, H) combination. Number is the calibration set number and alphabet is the calibration code.**

Calibration set number

Three calibration curves (Calibration Code: L, M, and H) can be registered as each of calibration set numbers, No.1 to No. 5. If the "Automatic selection of calibration curve" function is used and a calibration curve that has been created from a standard sample whose composition is different from that of the sample to be measured, this results in a wrong calibration curve being selected. If there is a calibration curve with a different composition, use a separate calibration set number for each composition.

Preparing a calibration curve

Calibration curves can be created using one of the following three modes, automatic calibration, manual calibration (coefficient input) and manual calibration (measurement value input).

Automatic calibration

First, enter the concentration values of multiple standard samples, and measure the standard samples. A calibration curve is created automatically from the results of the measurements.

Manual calibration (coefficient input)

Manually enter the coefficients A, B, and C for the calibration curve.

Manual calibration (measurement value input)

Manually enter both the concentration value and the K value for the calibration curve. This mode can be used (1) when you wish to add data to improve the accuracy of the calibration curve created in the automatic mode, or (2) when you wish to delete data that includes any abnormal values.

Tip

The K value is the ratio of the fluorescent X-rays from sulfur (NS) to the scattered X-rays (NB).
K = NS/NB (refer to "Measuring principle" (page 79)).

Degrees of calibration curve

For the degrees of the calibration curve, linear and quadratic are available. When creating the calibration curve in automatic calibration and manual calibration (measurement value input), coefficient of calibration curve is calculated according to the setting of linear, quadratic, and automatic.
The degrees of the calibration curve set in automatic are as follows.

Using 2 to 3 standard-sample values.	Linear
Using 4 standard-sample values and the highest concentration value is 1% or less.	
Using 4 standard-sample values and the highest concentration value is more than 1%.	Quadratic
Using more than 5 standard-sample values.	

Number of standard samples required for calibration varies depending on the setting degrees. For linear and automatic, samples of two or more are necessary. For quadratic, samples of three or more are necessary.

Weighted calculation of calibration curve

Creating the calibration curve using the automatic and manual (measurement value input).
The calculations are based on the weighted least squares method.
The weighing is automatically done corresponding to the concentration values.
The calculations allow accurate measurements due to finding either low or high concentration levels with the respective calibration range.

Measurement time and repeat times

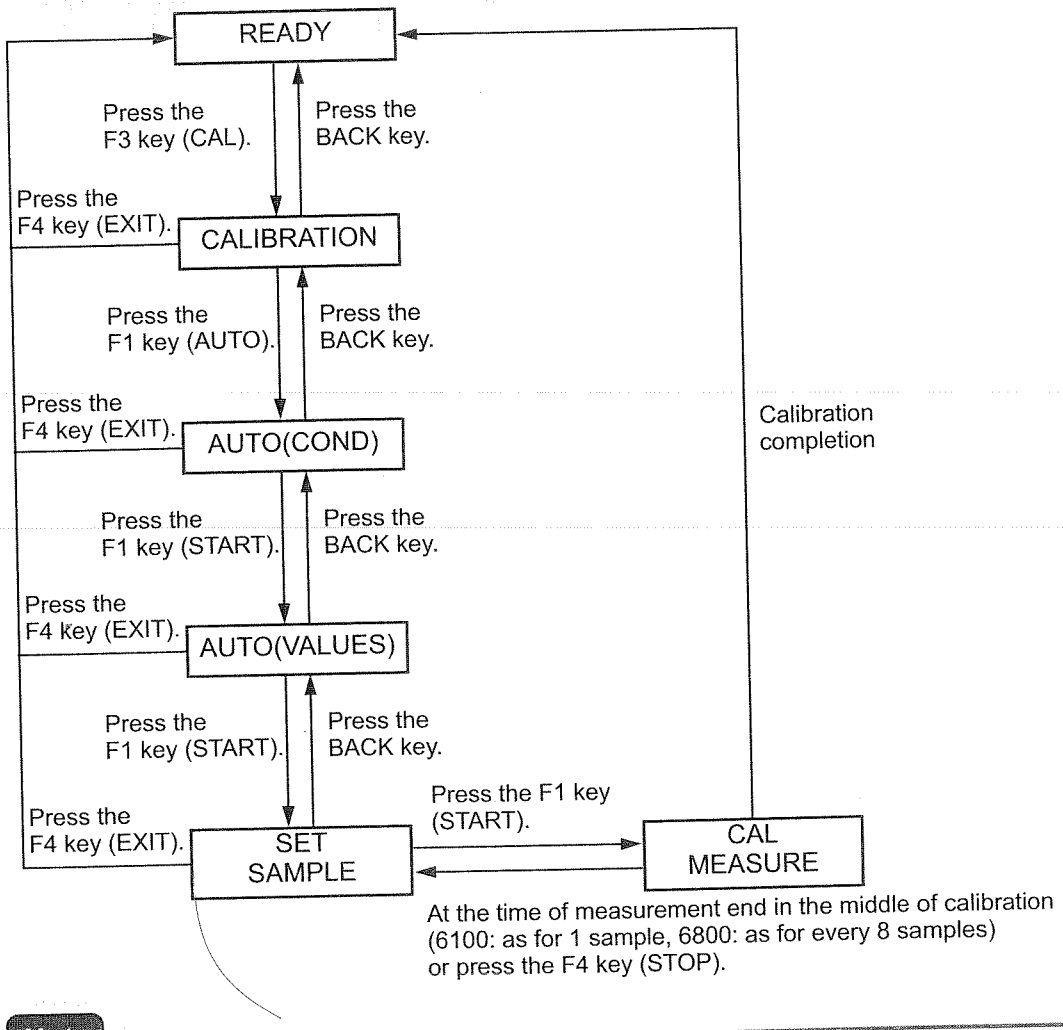
To create more accurate calibration curves, longer measurement time and more repeat times are recommended.

Concentration range of calibration curve

When a measured result falls out of the allotted calibration range, the readout maybe out of specification. Therefore, ensure that the concentration of the sample to be measured falls within the calibration range. Any measured value that falls out of the range will be printed with a "*" (asterisk) mark. For further information, refer to "Internal insertion method" (page 35).

Flow schematic of automatic calibration

During automatic calibration, the screen changes as follows.



Note

If the user stops the measurement by pressing the F4 key (STOP) and then wants to resume the measurement by pressing the F1 key (START), the measurement will then be cleared and have to be re-measured. The previous measurements will not be cleared, because the instrument already measured them in its entire run.

Automatic calibration

For calibration, two or more samples of known concentration (standard sample) are necessary. Since the analyzer applies C/H (carbon to hydrogen mass ratio) correction, the influence of C/H can be ignored in normal measurement. However, it is recommended to use the standard sample which property is as close as possible to the sample to measure.

Operation steps

1. **Press the F3 key (CAL) on the READY menu (Fig. 5).**
   The CALIBRATION menu is displayed.

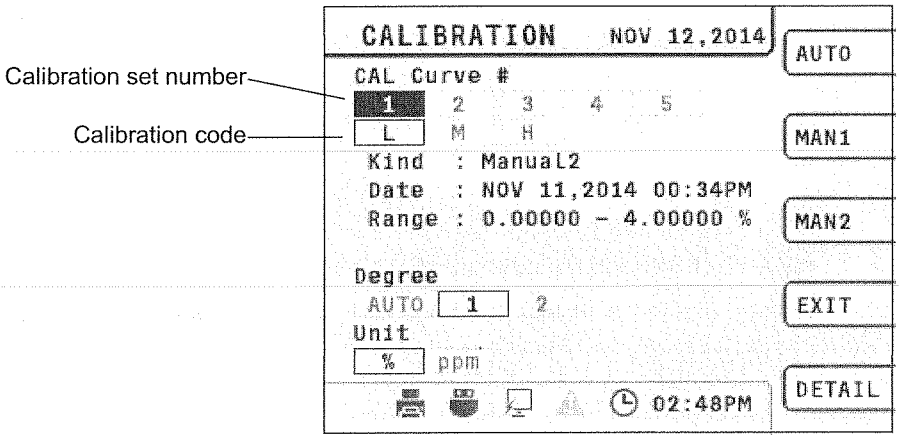


Fig. 14 CALIBRATION menu

On the CALIBRATION menu, calibration curve number, creation method, latest calibration date of the calibration curve, concentration range, degree of formula and concentration unit are displayed.

Tip

- **When the calibration code is set to automatic (A), the calibration curve L is displayed.**
- **To check a coefficient of calibration curve, press the F5 key (DETAIL) and use the CAL(DETAIL) menu.**

2. **Press the cursor key, select calibration curve number, degree of formula, and concentration unit.**

Parameter	Description
Calibration curve number (Calibration set number + Calibration code)	• Calibration set number: Select from 1 to 5. • Calibration code: Select from L, M, H.
Degree of formula	Select from AUTO, 1 or 2
Concentration unit	Select either % or ppm

Note

- **Pressing the CLEAR key, displays the menu to confirm the deletion of the calibration curve. Pressing the F1 key (DELETE) on this menu deletes a displayed calibration curve.**

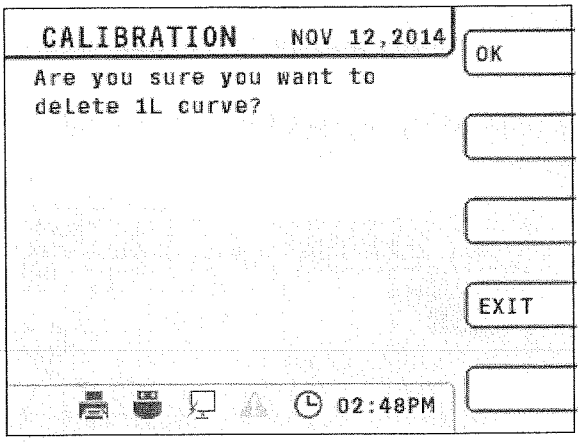
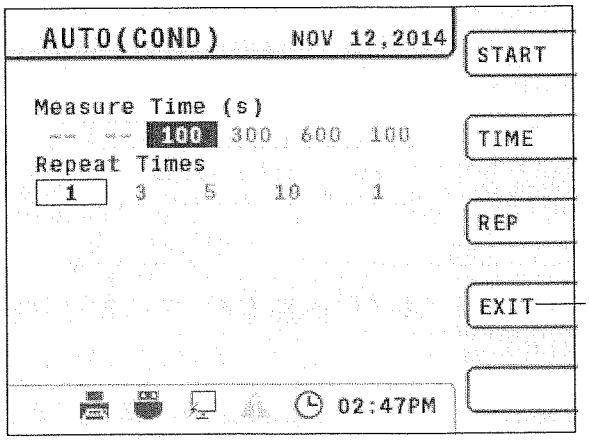


Fig. 15 Calibration clear confirm menu

- **If the CALIBRATION menu returns to the READY by pressing the F4 key (EXIT) or the BACK key is pressed, the calibration curve number defined on the CONDITION menu, not the calibration curve number selected on the CALIBRATION menu, will be selected.**

3. **Press the F1 key (AUTO).**
The AUTO(COND) menu is displayed.



Press the F4 key (EXIT) will stop the calibration and return to the READY menu.

Fig. 16 AUTO(COND) menu

4. **Press the cursor key, and select measure time and repeat times.**

Parameter	Description
Measure time	● Select from preset values (100, 300, 600 (s)). or ● Move the cursor to the right end or press the F2 key (TIME), and set arbitrary the value in the range of 100 to 600.
Repeat times	● Select from preset values (1, 3, 5, 10 (times)) or ● Move the cursor to the right end or press the F3 key (REP), and set arbitrary the value in the range of 1 to 99.

Note

After inputting values by the numerical key, press the ENT key or the down cursor key, to determine the value.

5. **Press the F1 key (START).**
   The condition is determined, and the screen changes to the AUTO(VALUES) menu.

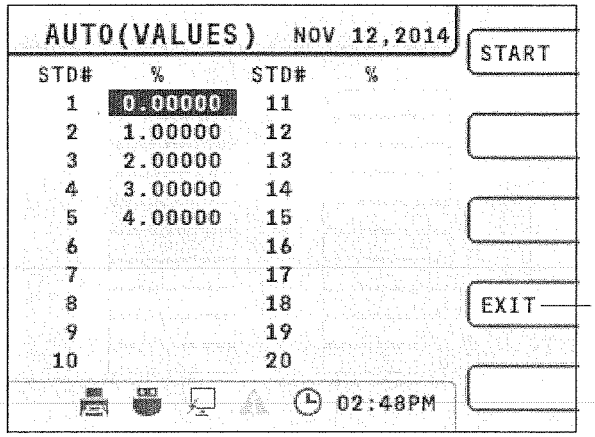


Fig. 17 AUTO(VALUES) menu

6. **Press the numerical key, and input the standard value of each sample used for calibration from STD#1.**
   A total of 20 standard samples can be used for calibration.
7. **Press the ENT key or the down cursor key.**
   The cursor moves to the next STD#.
8. **Input the standard value of all samples used for calibration by repeating the steps 6. and 7.**
   Setting the conditions for calibration is completed.
   Next, measure the standard samples and create a calibration curve. Procedures for SLFA-6800 is different from that for SLFA-6100.

   SLFA-6800: Refer to the page 22
   SLFA-6100: Refer to the page 24

Tip

To delete one of the standard values that have been entered, move the cursor to the standard value you want to delete, and press the CLEAR key.

● **For SLFA-6800**

After setting the standard value of all samples, follow the procedure below.

1. **Press the F1 key (START) on the CAL(AUTO) menu.**
   The SET SAMPLE menu displayed.
   The values set for the standard samples are shown at each position, i.e., POS#1 to 8.

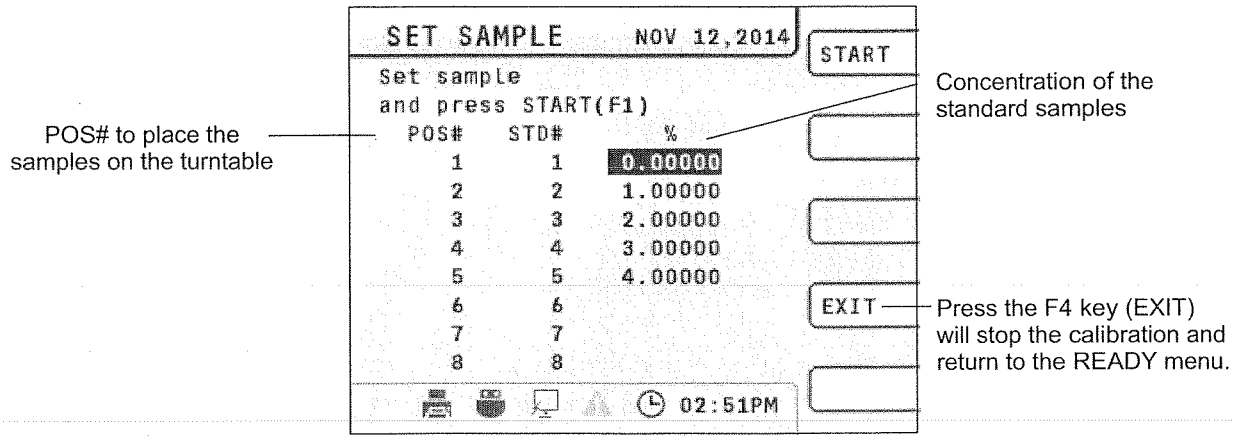


Fig. 18 SET SAMPLE menu (NO. 1 to 8, SLFA-6800)

2. **Open the sample-chamber lid, and place the standard samples corresponding to the POS# on the turntable.**
3. **Close the sample-chamber lid.**
4. **Press the F1 key (START).**
   The CAL MEASURE menu is displayed.

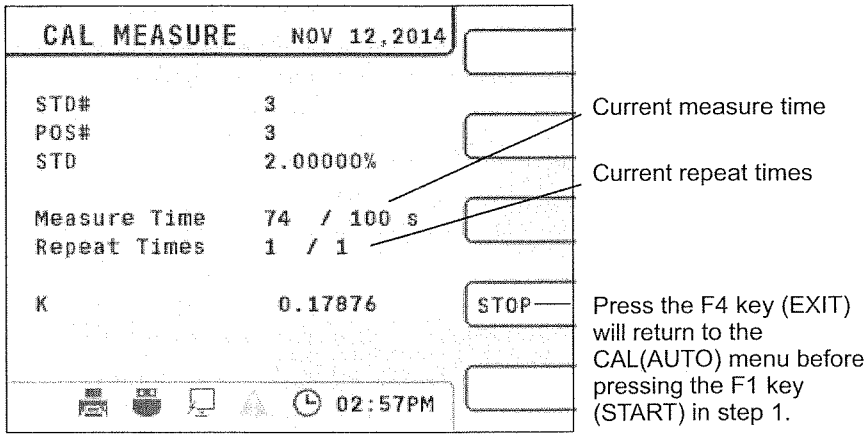


Fig. 19 CAL MEASURE menu

Turntable moves down, and measurement for the mounted sample on POS #1 is started.

- After the first measurement is completed, calibration date, measure time, number of standard samples, repeat times, calibration curve number, degree of formula, and the first measured value are printed.
- In the case of repetitive measurements for some samples, the average value (AVE) and the standard deviation (STD.DEV) are printed when measurement for the first sample is completed.

5. If you have input values for more than nine standard samples, after measuring the eighth sample, the screen will return to the SET SAMPLE menu for STD#9 to STD#16 will be shown. Repeat the step 2. to 4.

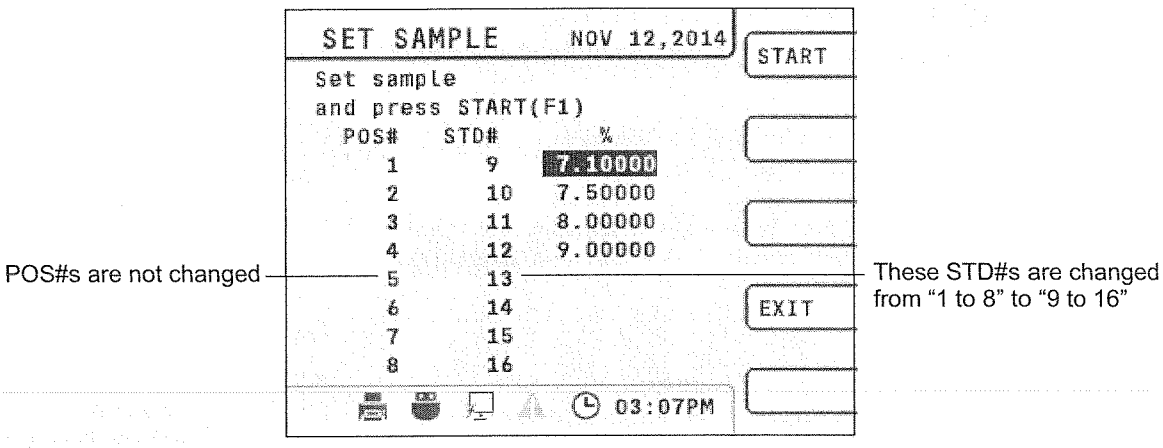


Fig. 20 SET SAMPLE menu (No. 9 to 16, SLFA-6800)

Note

When calibrating with more than 17 standard samples, measurements are repeated for three times.

When all the measurements are completed, coefficients of the calibration curve (A, B, C), concentration range, and standard deviation are printed.
Also, standard values input in order from STD#1, measured K values, average of K values (case of repetitive measurement), and calibration curve chart are printed.
After the screen returns to the READY menu, the calibration date is updated.

Note

- **When the printer output is set to OFF, printing is disabled.**
- **Do not release the roller release lever at the start of printing. Or the printer does not run.**
- **During printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **With the USB flash drive activated, data such as measurement result of each sample, coefficients of calibration curve (A, B, C), concentration range, and standard deviation is saved in the USB flash drive.**
- **With the PC connection activated, data such as measurement result of each sample, coefficients of calibration curve (A, B, C), concentration range, and standard deviation is transmitted to the PC.**

Reference

- **For the results of printout, refer to "Printing example of automatic calibration" (page 26).**
- **For the concentration range, refer to "Concentration range of calibration curve" (page 17).**

● **For SLFA-6100**

After setting the standard value of all samples, follow the procedure below.

1. **Press the F1 key (START) on the CAL(AUTO) menu.**
   The SET SAMPLE menu is displayed.
   The value set for the standard sample is shown.

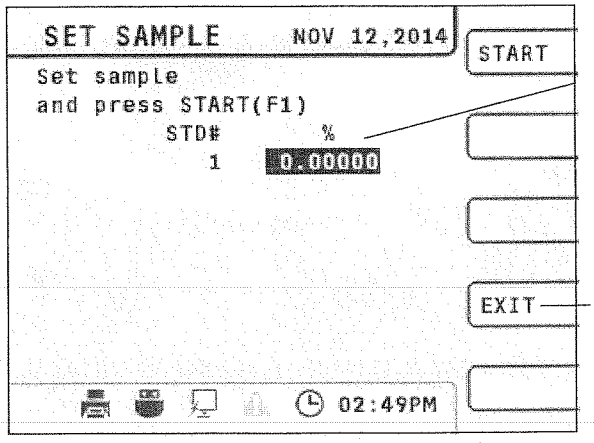


Fig. 21 SET SAMPLE menu (SLFA-6100)

2. **Open the sample-chamber lid, and place the standard sample.**
3. **Close the sample-chamber lid.**
4. **Press the F1 key (START).**
   The CAL MEASURE menu is displayed.

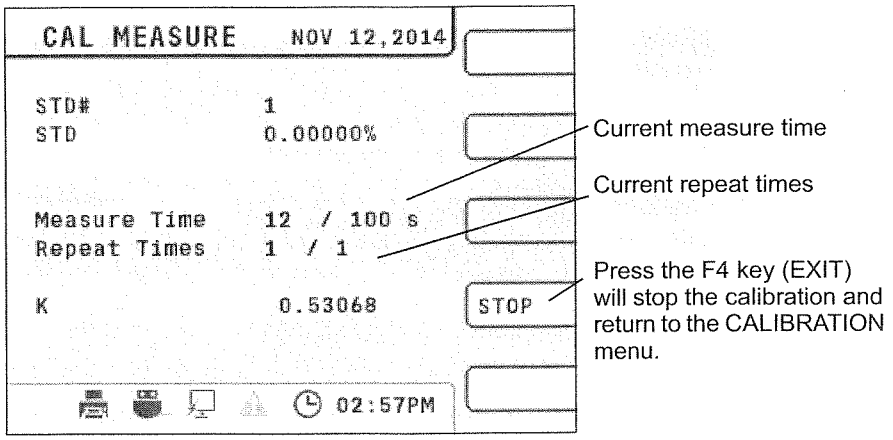


Fig. 22 CAL MEASURE menu (SLFA-6100)

- After the first measurement is completed, calibration date, measure time, number of standard samples, repeat times, calibration curve number, degree of formula, and the first measured value are printed.
- In the case of repetitive measurements for some samples, the average value (AVE) and the standard deviation (STD.DEV) are printed. The screen will return to the menu of the step 1., and the value set for the next standard sample is shown.

5. **Repeat the steps 2. to 4.**
   When all the measurements are completed, coefficients of the calibration curve (A, B, C), concentration range, and standard deviation are printed.
   Also, standard values input in order from STD#1, measured K values, average of K values (case of repetitive measurement), and calibration curve chart are printed.
   After the screen returns to the READY menu, the calibration date is updated.

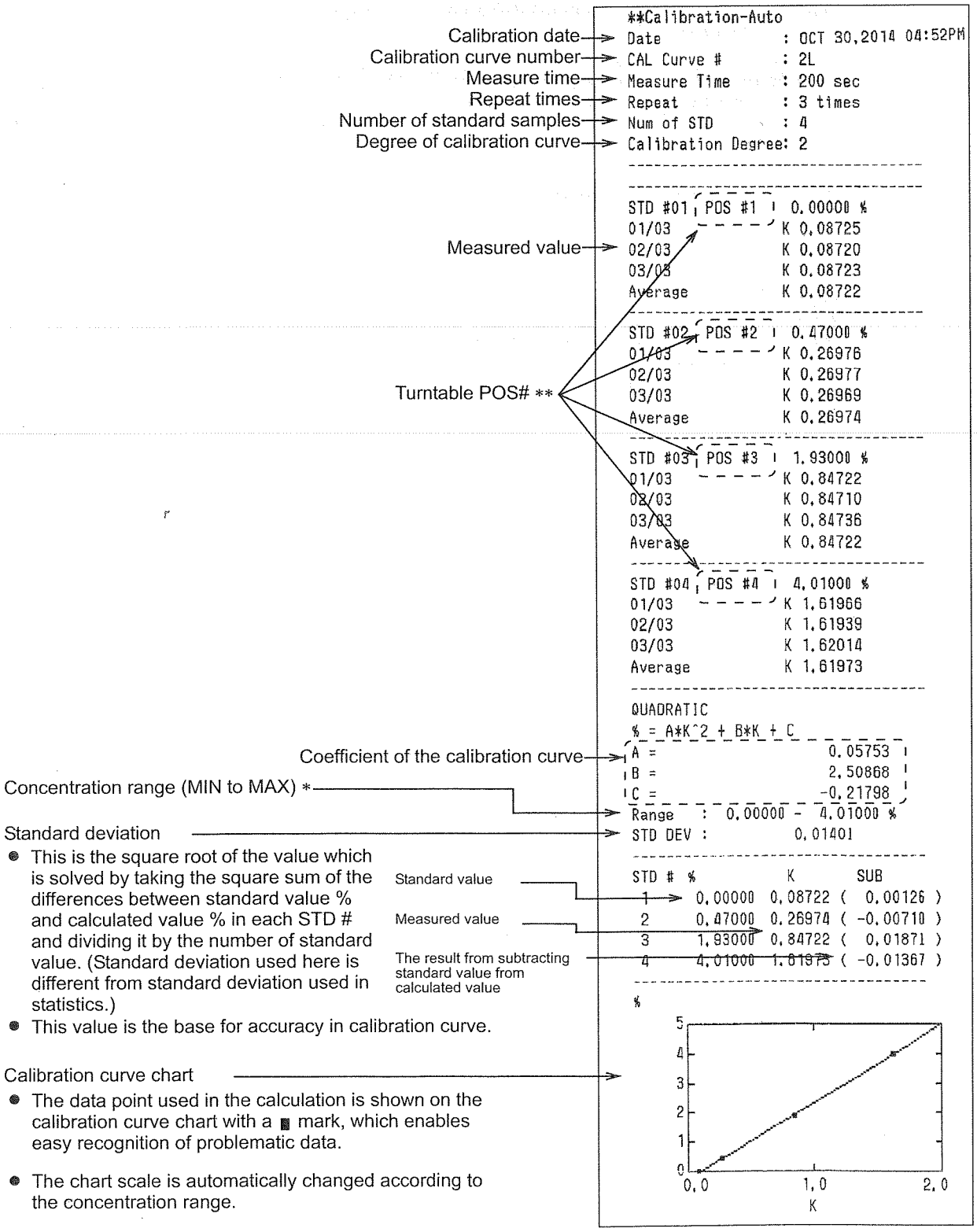
Note

- When the printer output is set to OFF, printing is disabled.
- Do not release the roller release lever at the start of printing. Or the printer does not run.
- During printing, do not pull the print paper.
- To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)
- With the USB flash drive activated, data such as measurement result of each sample, coefficients of calibration curve (A, B, C), concentration range, and standard deviation is saved in the USB flash drive.
- With the PC connection activated, data such as measurement result of each sample, coefficients of calibration curve (A, B, C), concentration range, and standard deviation is transmitted to the PC.

Reference

- For the results of printout, refer to "Printing example of automatic calibration" (page 26).
- For the concentration range, refer to "Concentration range of calibration curve" (page 17).

Printing example of automatic calibration



- This is the square root of the value which is solved by taking the square sum of the differences between standard value % and calculated value % in each STD # and dividing it by the number of standard value. (Standard deviation used here is different from standard deviation used in statistics.)
- This value is the base for accuracy in calibration curve.

- The data point used in the calculation is shown on the calibration curve chart with a ■ mark, which enables easy recognition of problematic data.
- The chart scale is automatically changed according to the concentration range.

Fig. 23 Printing example of automatic calibration

*** : For the concentration range, refer to "Internal insertion method" (page 35).**
**** : They are not displayed in SLFA-6100.**

Manual calibration (coefficient input)

Note

If you change the coefficient even one item in the following operations, the current concentration value and K value in the created calibration curve are deleted.

1. **Select the concentration unit on the CALIBRATION menu (Fig. 14).**
2. **Press the F2 key (MAN1) on the CALIBRATION menu.**
   The CAL(MAN1) menu is displayed.

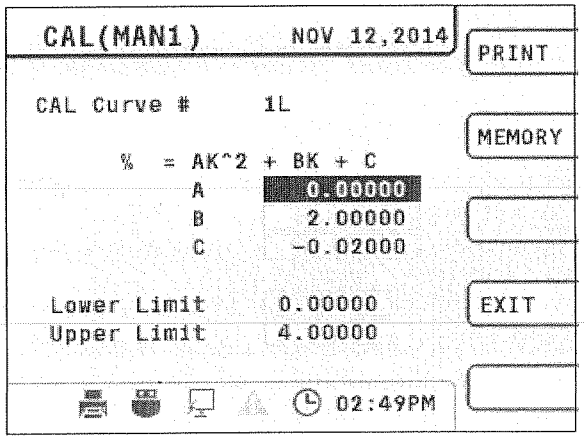


Fig. 24 CAL(MAN1) menu

When the calibration curve is already created, the current value is displayed.

Tip

When F1 key (PRINT) is pressed, the created calibration data are printed. When F2 key (MEMORY) is pressed, these data are saved in the USB flash drive.

3. **Press the cursor key and numerical key, and input the calibration coefficients (A, B, C) and the concentration range (Lower Limit and Upper Limit).**
   Press the ENT key or the down cursor key to determine the value. The cursor moves to the next coefficient.

Tip

After changing the values, when F1 key (PRINT) is pressed, the calibration data that are reflected to changed values is printed. When F2 key (MEMORY) is pressed, these data are saved in the USB flash drive.

Reference

For concentration range, refer to "Internal insertion method" (page 35).

4. **Press the F4 key (EXIT).**
   The calibration coefficients (A, B, C) and concentration range (RANGE) are printed, and the screen returns to the READY menu. Also the calibration date is updated.
   With the USB flash drive activated, the calibration coefficients (A, B, C) and concentration range is saved in the USB flash drive.

Tip

If values are not changed, printing and saving in the USB flash drive are not performed by pressing the F4 key (EXIT).

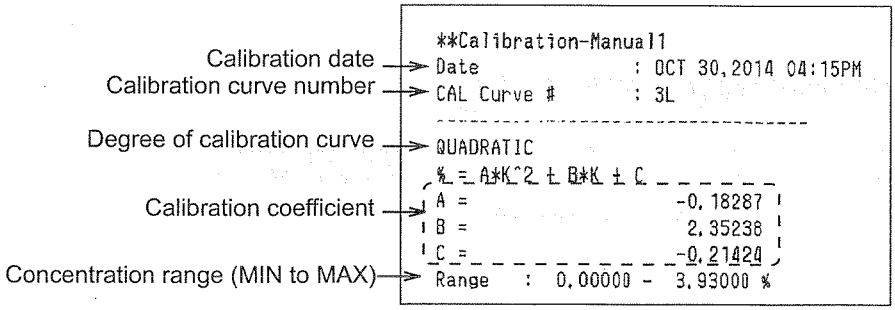


Fig. 25 Printing example of manual calibration (coefficient input)

Note

- **At printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **Do not release the roller release lever at the start of printing. Or the printer does not run.**

Manual calibration (measurement value input)

1. **Press the F3 key (MAN2) on the CALIBRATION menu (Fig. 14).**
   The MAN2(VALUE1) menu is displayed.

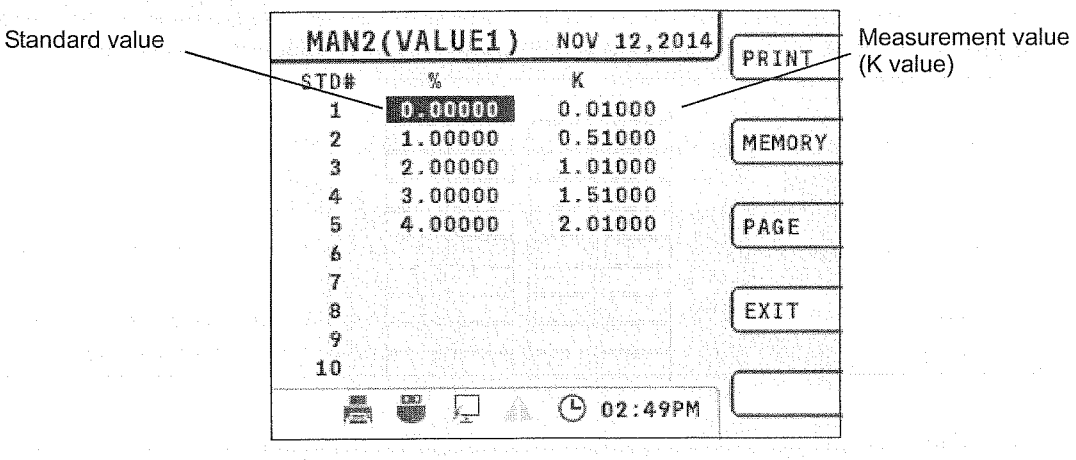


Fig. 26 MAN2(VALUE1) menu

When the calibration curve is already created by automatic calibration or manual calibration (measurement value input), the current concentration value and K value are displayed.

Tip

When F1 key (PRINT) is pressed, the created calibration data are printed. When F2 key (MEMORY) is pressed, these data are saved in the USB flash drive.

2. **Press the numerical key, and input the standard value and the measurement value (K value) from STD#1.**
   Pressing the ENT key or the down cursor key determines the value, and the cursor moves. On the MAN2(VALUE1) menu, STD#1 to STD#10 can be input.

Tip

After changing the values, when F1 key (PRINT) is pressed, the calibration data that are reflected to changed values is printed. When F2 key (MEMORY) is pressed, these data are saved in the USB flash drive.

3. **Press the F3 key (PAGE).**
   The MAN2(VALUE2) menu is displayed.

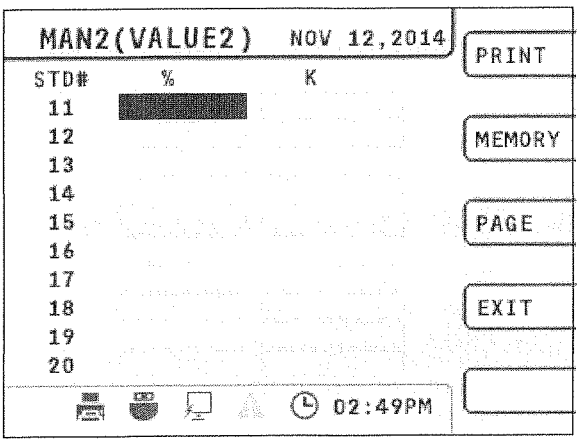


Fig. 27 MAN2(VALUE2) menu

4. **Input the values for STD#11 to STD#20 by the same operation with step 2.**

Note

To delete an entered value, press the CLEAR key with the cursor pointing to a standard value or a K value. The standard value and K value for the selected STD# are deleted together. However, when all values are deleted, an alarm sounds and the work done by manual calibration is canceled. If all values are to be deleted, refer to "Calibration clear confirm menu" (page 20).

5. **When the data input completes, press the F4 key (EXIT).**
   Following to the calibration coefficients (A, B, C), concentration range (RANGE), and standard deviation (STD DEV), the standard value used for calculation, measurement value (K value), and calibration curve graph are printed, and the screen returns to the CALIBRATION menu. And the calibration date is updated.
   With the USB flash drive activated, data such as measurement data of each sample, calibration coefficients (A, B, C), concentration range, and standard deviation are stored in the USB flash drive.

Tip

If values are not changed, the printout and saving in the USB flash drive is not performed when the F4 key (EXIT) is pressed.

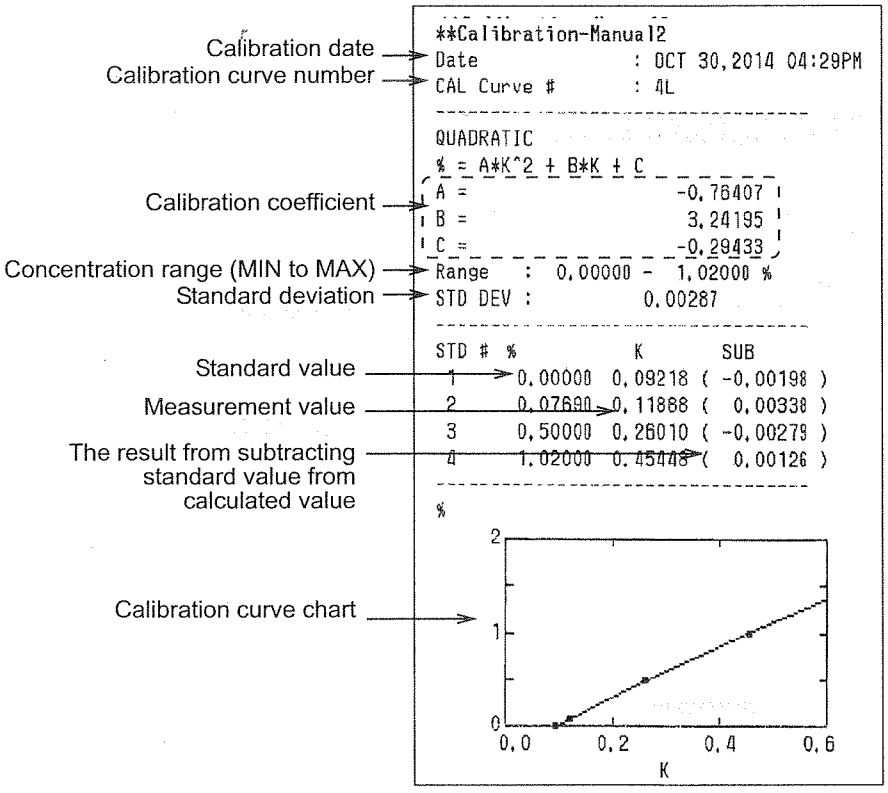


Fig. 28 Printing example of manual calibration (measurement value input)

Note

- **At printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **Do not release the roller release lever at the start of printing. Or the printer does not run.**

Confirm the contents of a calibration curve

It is possible to confirm the contents of a registered calibration curve.

1. **Select the calibration curve number (which has the registered calibration curve you want to confirm) on the CALIBRATION menu.**
2. **Press the F5 key (DETAIL) on the CALIBRATION menu.**
   The CAL(DETAIL) menu is displayed.

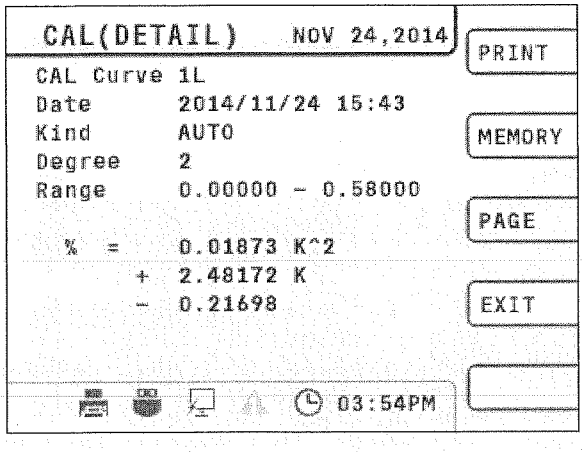


Fig. 29 CAL(DETAIL) menu

The selected calibration curve data (calibration date, kind of calibration, degree of formula, concentration range, and calibration coefficient) can be confirmed.

- Pressing F1 key (PRINT): The calibration data is printed.
- Pressing F2 key (MEMORY): The calibration data is saved in the USB flash drive.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

3. **Press the F3 key (PAGE).**
   The DETAIL(VALUE1) menu is displayed.

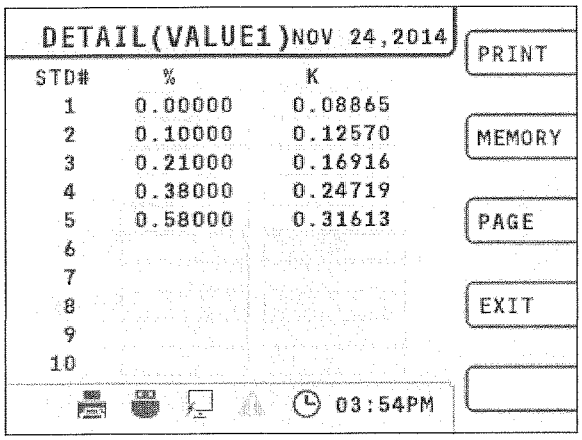


Fig. 30 DETAIL(VALUE1) menu

The entered standard values and average of measured K values can be confirmed.

- Pressing F1 key (PRINT): The calibration data is printed.
- Pressing F2 key (MEMORY): The calibration data is saved in the USB flash drive.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

4. **Press the F3 key (PAGE).**
The DETAIL(VALUE2) menu is displayed.

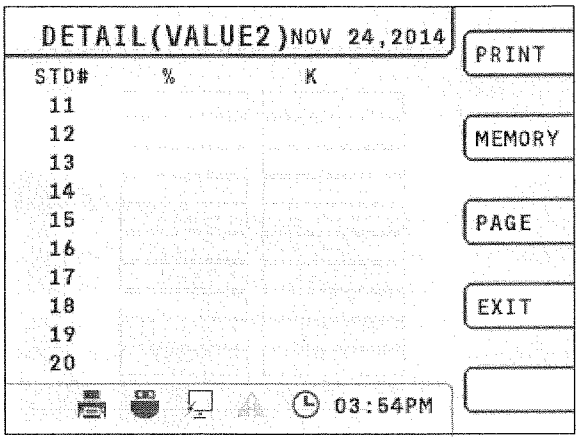


Fig. 31 DETAIL(VALUE2) menu

If the number of calibration point exceeds 10 points, the entered standard values and average of measured K values can be confirmed on this menu.

- Pressing F1 key (PRINT): The calibration data is printed.
- Pressing F2 key (MEMORY): The calibration data is saved in the USB flash drive.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

5. **Press the F3 key (PAGE).**
The DETAIL(CHART) menu is displayed.

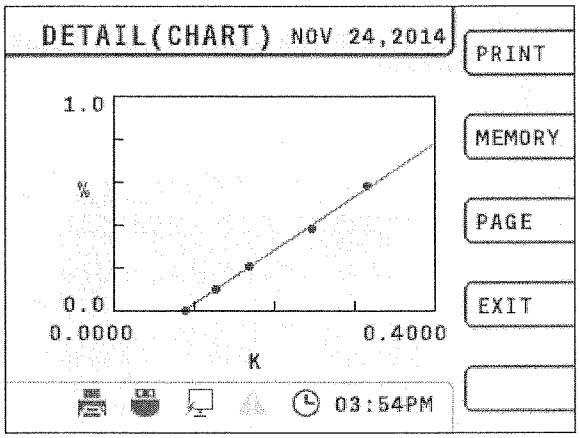


Fig. 32 DETAIL(CHART) menu

The calibration curve chart can be confirmed.

- Pressing F1 key (PRINT): The calibration data is printed.
- Pressing F2 key (MEMORY): The calibration data is saved in the USB flash drive.
- Pressing F3 key (PAGE): The screen returns to the CAL(DETAIL) menu.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

Note

The calibration curve registered with MAN1 does not have any information about a calibration point. So the DETAIL(VALUE1) menu and the DETAIL(VALUE2) menu are displayed nothing about the entered standard values and average of measured K values. Moreover, the DETAIL(CHART) menu is not displayed.

Standard sample

⚠ WARNING
Many samples are inflammable. Keep samples and unit away from fire.
DBDS has a very strong unpleasant odor. Handle in a well-ventilated hood to avoid sickness and nausea.

In general, to measure the sulfur content in fuel oil, typically two types of standard samples are available (refer to JIS K2541-1996 and JIS B7995-1994) as follows.

- Standard sample prepared by mixing Dibutyl Disulfide (DBDS), tetralin, and decalin
- Reference Material of Sulfur in Fuel Oil (Certified by the Japan Petroleum Institute)

As reference materials certified by the Japan Petroleum Institute, 8 grades of materials equivalent to 0%, 0.1%, 0.2%, 0.5%, 0.8%, 1%, 2%, 3%, and 4% are available in the market (as of August, 2013). Accurate concentration depends on the manufacturing lot of the product, and is to be confirmed as necessary. This standard sample is sold by Tokyo Kasei Kogyo Co., Ltd., and it is also available from your local service representative at which you purchased the analyzer.

Mixing DBDS, Tetralin, and Decalin

Reagents

DBDS (Dibutyl Disulfide)	Verified under MITI's reagent verification system (Verified standard No. NR7801)
Tetralin (Tetrahydronaphthalene)	Sulfur content: 0.005% maximum Water content: 0.05% maximum
Decalin (Decahydronaphthalene)	Sulfur content: 0.005% maximum Water content: 0.05% maximum

Calculation

Reagent	Base value	Molecular weight	C%	H%	S%	C/H
DBDS	$(C_4H_9S)_2$	178.36	53.87	10.17	35.95	5.30
Tetralin	$C_{10}H_{12}$	132.21	90.85	9.15	0	9.93
Decalin	$C_{10}H_{18}$	138.26	86.88	13.12	0	6.62

C_U: DBDS concentration (%)

C_D: Decalin concentration (%)

C_T: Tetralin concentration (%)

S: Sulfur concentration (%)

$C_U = 2.7816S$

$$C_D = 25.163\left(\frac{100-S}{1+C/H} - 9.1485 - 0.0285S\right)$$

$C_T = 100 - C_U - C_D$

● Mixing ratios

Shows an example of mixing ratios in preparing standard samples with a C/H of 7.0 and 8.0. If the C/H is ignored, add tetralin or decalin to the specified value of DBDS so that the total quantity is 100.

Example of ratios for mixing standard solution

	C/H	7.0		8.0	
Sulfur content concentration%	DBDS	Decalin	Tetralin	Decalin	Tetralin
0.00	0.000	84.334	15.666	49.385	50.615
0.1	0.2782	83.948	15.774	49.034	50.688
0.2	0.5563	83.561	15.882	48.683	50.761
0.3	0.8345	83.175	15.990	48.331	50.834
0.4	1.113	82.789	16.099	47.980	50.907
0.5	1.391	82.403	16.207	47.629	50.981
0.6	1.669	82.016	16.315	47.277	51.054
0.8	2.225	81.244	16.531	46.575	51.200
1.0	2.782	80.471	16.747	45.872	51.346
1.2	3.338	79.699	16.963	45.170	51.493
1.6	4.451	78.154	17.396	43.764	51.785
1.8	5.007	77.381	17.612	43.062	51.931
2.0	5.563	76.609	17.828	42.359	52.078
2.4	6.676	75.064	18.260	40.954	52.370
3.0	8.345	72.746	18.909	38.846	52.809
3.2	8.901	71.974	19.125	38.143	52.955
4.0	11.126	68.884	19.990	35.333	53.541
5.0	13.908	65.021	21.071	31.82	54.272
6.0	16.69	61.158	22.152	28.307	55.003
7.0	19.471	57.296	23.233	24.794	55.735
8.0	22.253	53.434	24.313	21.281	56.466
9.0	25.034	49.571	25.395	17.768	57.198

Caution in usage and storage of standard samples

⚠ WARNING

Many samples are inflammable.
Keep samples and unit away from fire.

⚠ CAUTION

As soon as the measurement is complete, take out the sample cell from the instrument.
The sample chamber from the inflammable vapor may catch fire.
Especially, be careful of a highly volatile sample.

Since SLFA-6100/6800 is calibrated with standard samples, changes in the concentration of these standard samples can cause a measurement error.
Be sure to pay attention to the following points when handling the standard samples.

- Before using the standard samples, stir them well and then put them in the sample cells.
- Put the standard samples in brown bottles, seal the bottles completely, and then store them in a cool, dark place.
- When carrying out calibration, keep the standard samples in sample cells, free from air bubbles.
- After preparing a standard sample, use it as soon as possible. After you have finished, dispose of all used standard samples right away; avoid storing them in sample cells for long periods.

Internal insertion method

Be sure to keep the concentration of the sample to be measured within the concentration range of the standard samples used for calibration. This is called the internal insertion method.

Example. If calibration is carried out with standard samples of 0.3%, 1%, and 2%, the concentration, Cs, of the sample to be measured must be $0.3 \leq Cs \leq 2$.

If a sample has a concentration out of range of the standard samples, the readout error might become larger. This method is called the external insertion method, and should be avoided.
The concentration range of standard samples is indicated as Upper Limit and Lower Limit of the Range. When the measured value exceeds this concentration range, it will be followed by a "*" (asterisk) mark in the print data.

Measurement

Measurement condition setting

The measurement time per sample, repeat times, and the calibration curve can be set. The concentration unit can be changed.

1. **Press the F1 key (COND) on the READY menu (7).**
The CONDITION menu is displayed.

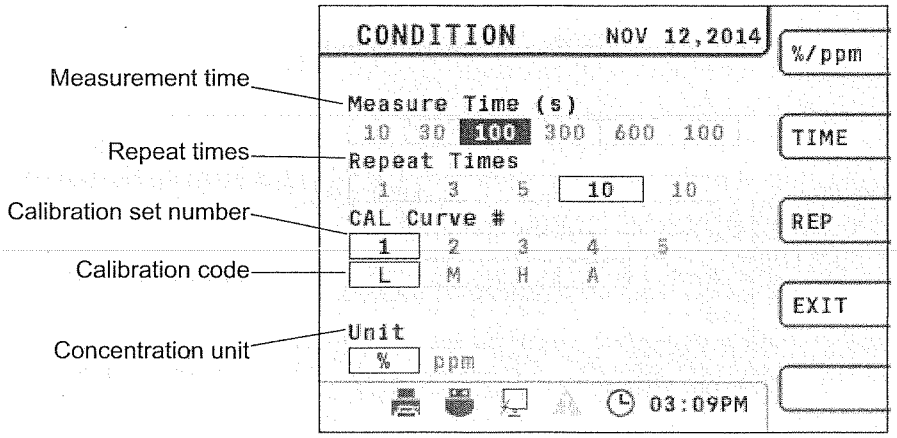


Fig. 33 CONDITION menu

2. **Press the cursor key and the ENT key to set the following parameters.**

Parameter	Description
Measurement time	• Select from preset values (10, 30, 100, 300, 600 (s)). • Move the cursor to right end or press the F2 key (TIME), and set arbitrary value in the range of 10 to 600
Repeat times	• Select from preset values (1, 3, 5, 10 (times)). • Move the cursor to right end or press the F3 key (REP), and set arbitrary value in the range of 1 to 99 times.
Calibration set number	Select from 1 to 5
Calibration code	Select from L, M, H and A
Concentration unit	Select either % or ppm

- The measurement time and repeat times can be set by two types of methods, selection from preset value and input arbitrary value.
- To input arbitrary values, input value by numerical key, and press the ENT key or the down cursor key to determine the value.
- 20 kinds of calibration curves can be set by a combination of the calibration set number (1 to 5) and the calibration code (L, M, H, A). As for the calibration code (A), refer to "Automatic selection of calibration curve" (page 15).
- The concentration unit can be changed by the F1 key (%/ppm).

Note

- **The set values remains even with the power OFF.**
- **If you input the value lower than the lower limit of input range for the measurement, the input value is set as the lowest limit. If you input the value higher than the higher limit of input range for the measurement, the input value is set as the highest limit.**

3. **Press the F4 key (EXIT).**
   The set condition is activated, and the screen returns to the READY menu.

Note

After changing the condition, if you press the MEAS key before pressing F4 key (EXIT), the measurement start on previous condition.

The set condition can be confirmed on the READY menu.

ID setting

ID can be set for each measurement.
The ID can be input up to 15 digits with any numerical and alphabetical characters.
The ID set here is displayed and printed as measurement result.

For SLFA-6800

1. **Press the F2 key (ID) on the READY menu (Fig. 5).**
   The ID menu is displayed.

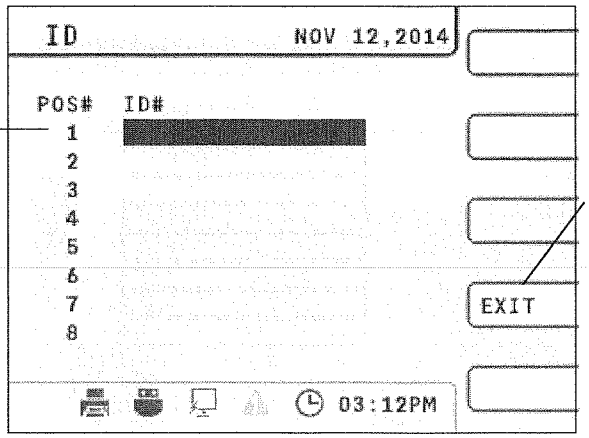


Fig. 34 ID menu (SLFA-6800)

2. **Press the numerical key and input ID corresponding to each POS# of turntable.**
   For the key with alphabetical character or symbol under the figure.
   The input value changes such as numerical value → character1 → character2 → character3 → ... → numerical value with pressing the key.
3. **Press the ENT key or the down cursor key to determine the value**
   The cursor will go to the next POS#. The next ID# can be specified.

Note

Trying to input the 16th digit will sound the buzzer.

4. **Repeat the steps 2. and 3. in case of 2 or more setting.**
5. **Press the F4 key (EXIT).**
   The screen returns to the READY menu.
   When all the measurement is completed, ID is cleared.
   When the measurement is aborted by pressing the F4 key (STOP) or when the measurement is stopped due to error, ID is not cleared.

For SLFA-6100

1. **Press the F2 key (ID) on the READY menu (Fig. 5).**
   The ID menu is displayed.

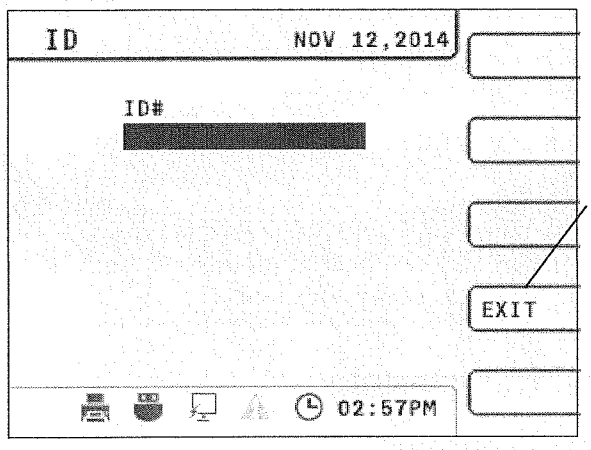


Fig. 35 ID menu (SLFA-6100)

2. **Press the numerical key and input ID.**
3. **Press the ENT key to determine the value**

Note

Trying to input the 16th digit will sound the buzzer.

4. **Press the F4 key (EXIT).**
   The screen returns to the READY menu.
   When all the measurement is completed, ID is cleared.
   When the measurement is aborted by pressing the F4 key (STOP) or when the measurement is stopped due to error, ID is not cleared.

Concentration measurement

⚠ WARNING

Many samples are inflammable.
Keep samples and unit away from fire.

⚠ CAUTION

As soon as the measurement is complete, take out the sample cell from the instrument.
The sample chamber from the inflammable vapor may catch fire.
Especially, be careful of a highly volatile sample.

Preparation for measurement

Prepare the following parameters.

Parameter	Setting is required	Reference page
Setting printer paper	When printing measurement result on paper	page 14
Setting calendar, timer	When installation and when there is a gap between actual time and timer clock	page 13
Creation of calibration curve	● When installation ● When replacing a protective membrane	page 15
Confirmation and setting of measurement condition	When the measurement condition needs adjustment for the sample to measure	page 36
ID setting	Each measurement as necessary	page 38
Sample cell preparation	Preparation of a sample cell suited for the measured sample	page 53
USB flash drive preparation	When saving measurement result to USB flash drive	page 11
Warm-up	Clear warm-up icon	page 3

Measurement

For the measurement procedure, SLFA-6100 and SLFA-6800 are separately explained.

SLFA-6800: See below
SLFA-6100: Page 42

Note

- **When ambient temperature and atmosphere during the sample measurement is greatly different from when the calibration curve was created, this could cause a big measurement error. To make accurate measurement, create a calibration curve again.**
  To check ambient temperature and atmosphere, refer to CHECK1 menu (Fig. 69). "TM" means temperature (C) and "AT" means atmosphere (hPa) on the screen opened by the key operation.
- **When the measurement value is over the upper limit, "H" is displayed at the right end of the figure.**

For SLFA-6800

1. **Plug a USB flash memory device into the USB (A) connector.**
   (There is no need to follow this step if data is not required to be saved to a USB flash memory device.)
2. **Place the sample cells to be measured on the turntable, starting from POS#1 to POS#2, POS#3 and so on.**
   Refer to "Setting a sample cell" (page 59).
3. **Close the sample chamber lid.**
4. **Press the MEAS key on the READY menu (Fig. 5).**
   The first measurement starts for POS#1 sample cell, and the displayed concentration value is updated per second.
   If the turntable is not in POS#1, the turntable rotates until that POS#1 comes in the starting position and the measurement will be started.
   When the first measurement completes and the second measurement starts, the measurement value for the first measurement is printed.

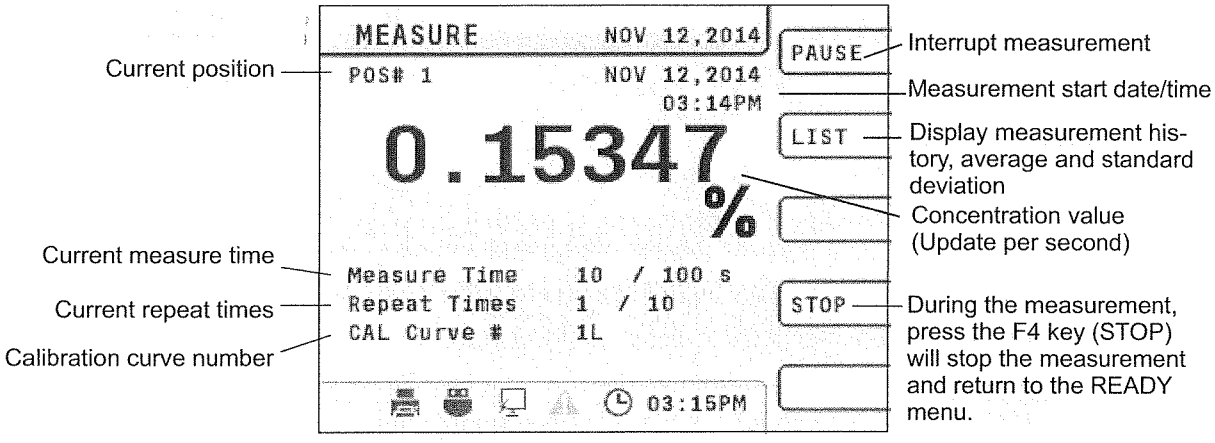


Fig. 36 MEASURE menu (SLFA-6800)

Upon completion of the measurement of POS#8 or all sample cells on the turntable, a beep sound is heard. The turntable returns to POS#1 and then stops the measurement. The measured value is printed out and the READY menu is displayed.

Note

- When the sample-chamber lid is opened during measurement, the measurement will stop and the READY menu will be displayed.
- If there is POS# without sample cell, the measurement will be finished. The turntable will go to POS#1, and the READY menu will be displayed.
- Do not pull the print paper during printing.
- To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)
- Do not release the roller release lever at the start of printing, or the printer will not work.

For SLFA-6100

1. **Plug a USB flash memory device into the USB (A) connector.**
   (There is no need to follow this step if data is not required to be saved to a USB flash memory device.)
2. **Place the sample to be measured on the sample tray.**
   Refer to "Setting a sample cell" (page 59).
3. **Close the sample chamber lid.**
4. **Press the MEAS key on the READY menu (Fig. 5).**
   The first measurement starts, and the displayed concentration value is updated per second.
   When the first measurement completes and the second measurement starts, the first measurement value is printed.

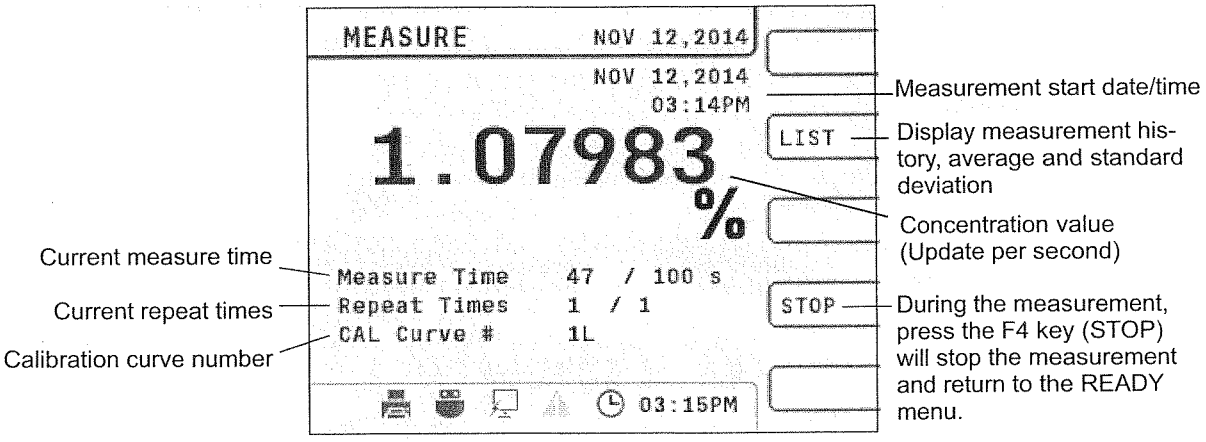


Fig. 37 MEASURE menu (SLFA-6100)

When the measurement is completed, a beep sound is heard. The measured value is printed out and the READY menu is displayed.

Note

- When the sample-chamber lid is opened during measurement, the measurement will stop and the READY menu will be displayed.
- Do not pull the print paper during printing.
- To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)
- Do not release the roller release lever at the start of printing, or the printer will not work.

Operation during measurement

To interrupt the measurement (only SLFA-6800)

The sample can be changed without stopping the measurement, when some samples are measured on the turntable.

1. **Press the F1 key (PAUSE).**
   The measurement is interrupted and the display of the remaining time for measurement will stop.
2. **Open the sample-chamber lid and change that sample at the position next to the measurement position.**
3. **After closing the lid, press the F1 key (CONT).**
   Then the measurement will start.

Note

- **If the sample placed at the measurement position, the result will be an abnormal value. Therefore, do not touch the sample placed at the measurement position.**
- **After the interrupt is released, resume the measurement immediately. A long interruption will result in an abnormal measurement. If there is any doubt in the measurement result after a long interrupt, do the measurement again.**
- **If the lid is opened or the open/close lever is stopped while moving it to the close position, the CONT display will not be indicated on the F1 key. In this case, even if the F1 key is pressed, the measurement will not start. Check the position of the lever.**
- **ID cannot be changed while the measurement is interrupted.**

To display the measurement history, average value and standard deviation (SLFA-6800)

1. **Press the F2 key (LIST) during the repeating measurement.**
   The MEASURE LIST menu is displayed.
   The current measurement history, average value and standard deviation are displayed.

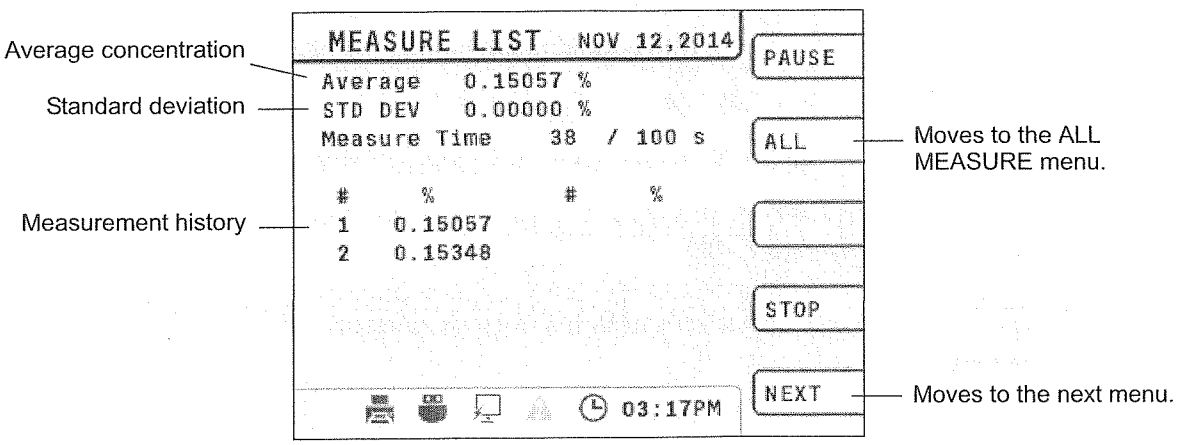
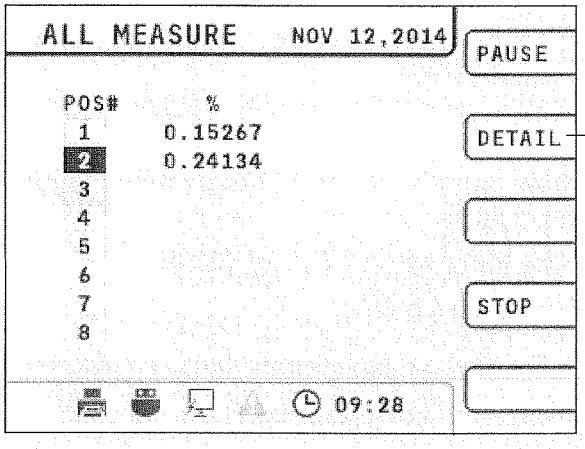


Fig. 38 MEASURE LIST menu (during measure: SLFA-6800)

- In case of 10 measurement histories or more, pressing the F5 key (NEXT) changes to the next screen.
- Pressing the F5 key (NEXT) at the last menu returns to the first menu.

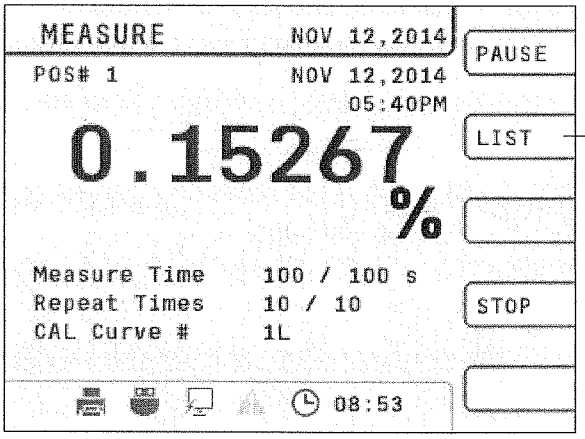
2. **Press the F2 key (ALL).**
   The ALL MEASURE menu is displayed.
   An average value for each POS # is displayed.



The current screen moves to the MEASURE menu for a selected POS#.

Fig. 39 ALL MEASURE menu

3. **Use the down cursor key to select a POS # for the measurement history to be confirmed, and then press the F2 key (DETAIL).**
   The MEASURE menu for a selected POS# is displayed.



Moves to the MEASURE LIST menu.

Fig. 40 Measure menu for selected POS#

4. **If the F2 key (LIST) is pressed, the current screen moves to the MEASURE LIST menu for a selected POS#.**
5. **To return the current measuring screen, press the F2 key (ALL) to return to the ALL MEASURE menu, and then select the current measuring POS# and press the F2 key (DETAIL).**

To display the measurement history, average value and standard deviation (SLFA-6100)

1. **Press the F2 key (LIST) during the repeated measurement.**
   The MEASURE LIST menu is displayed.
   The measurement history, average value and standard deviation are displayed.

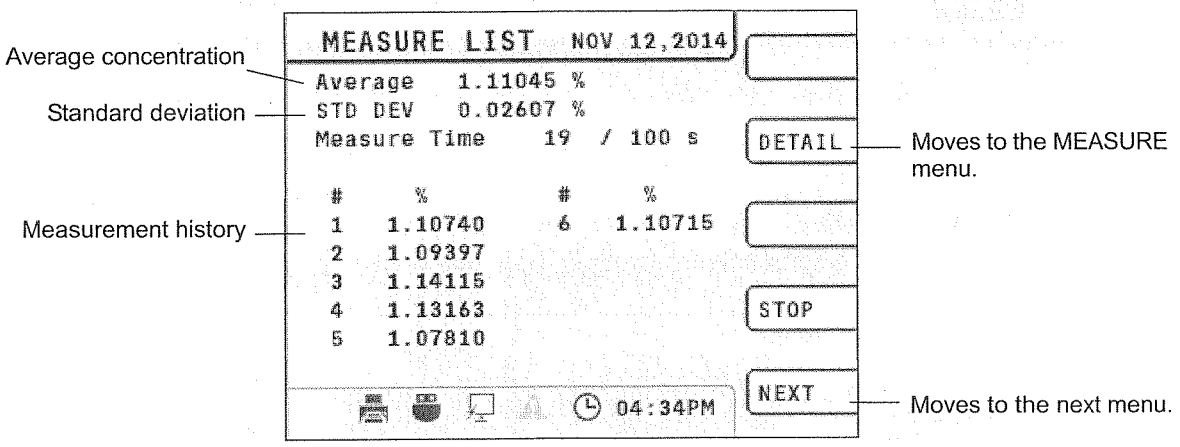


Fig. 41 MEASURE LIST menu (during measure: SLFA-6100)

- In case of 10 measurement histories or more, pressing the F5 key (NEXT) changes to the next screen.
- Pressing the F5 key (NEXT) at the last menu returns to the first menu.

For stopping the measurement

1. **Press the F4 key (STOP) during the measurement.**
   The buzzer sounds, and the measurement stops, then the display returns to the READY menu.
   When the printing sequence starts by the repeat measurement, the print paper feeds so that the last measurement result can be seen.
   In case that the printer output is off, the display returns to the ALL RESULT menu in SLFA-6800, to the RESULT menu in SLFA-6100.

For ending the measurement

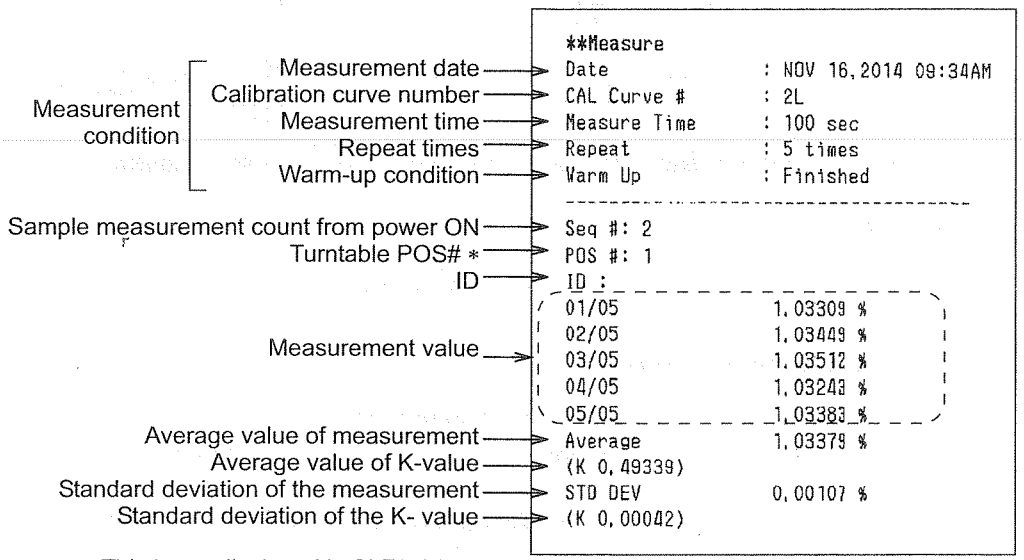
When the measurement ends with the set condition, the buzzer sounds, and the measurement result is printed.
The printed parameters are based on the set parameters in the PRINTER menu (Fig. 8).

Note

When the measurement result is out of the concentration range of calibration curve, a "*" (asterisk) mark is printed at the right of measurement value.
The "*" (asterisk) mark is also displayed at the left of measurement value on the measurement result menu.

STANDARD mode

Outputs measurement condition, measurement value, average value and standard deviation.



* : This is not displayed in SLFA-6100.

Fig. 42 STANDARD mode print example

Printing a calibration curve number

- When calibration curve selection is set to AUTO, a letter "A" is printed in the calibration code of the calibration curve number. The used calibration curve number is printed before the measurement value.
- When calibration curve selection is set to any mode other than AUTO, a calibration curve number is printed only in measurement conditions, and nothing is printed before a measured value.

ADVANCED mode

The following parameters are output for each measurement, in addition to the parameters of STANDARD mode.

- Sulfur fluorescent X-ray counting rate (S counting rate)
- Backscatter X-ray counting rate (B counting rate)
- Total counting rate
- Pile-up counting rate
- K (=S/B) measurement value
- K value after correction by temperature and atmospheric pressure
- Correction coefficient of K
- Temperature (°C)
- Atmospheric pressure (hPa)

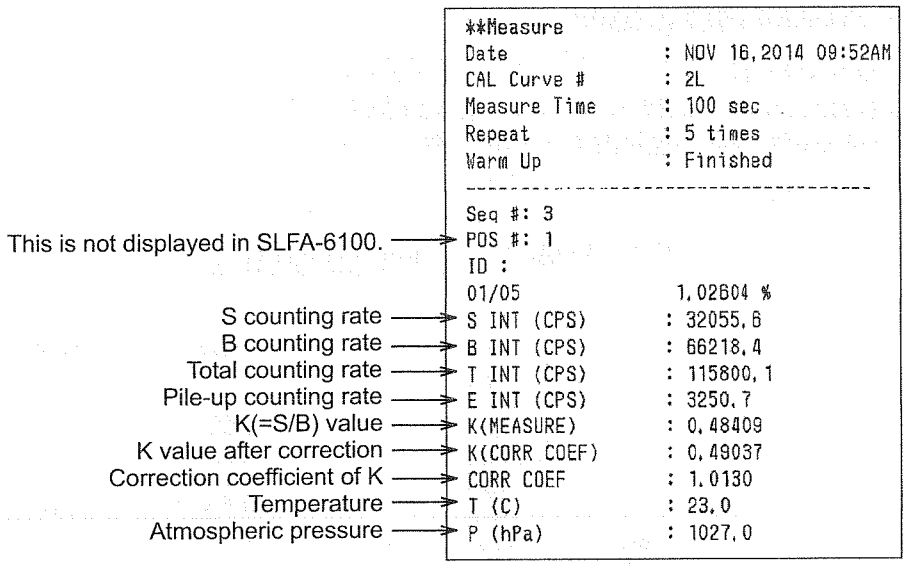


Fig. 43 ADVANCED mode print example

Tip

The temperature here is the temperature in the analyzer. It may differ from the room temperature, but it is not abnormal.

● SERVICE mode

The spectrum graph is output for each measurement, in addition to the parameters of ADVANCED mode.

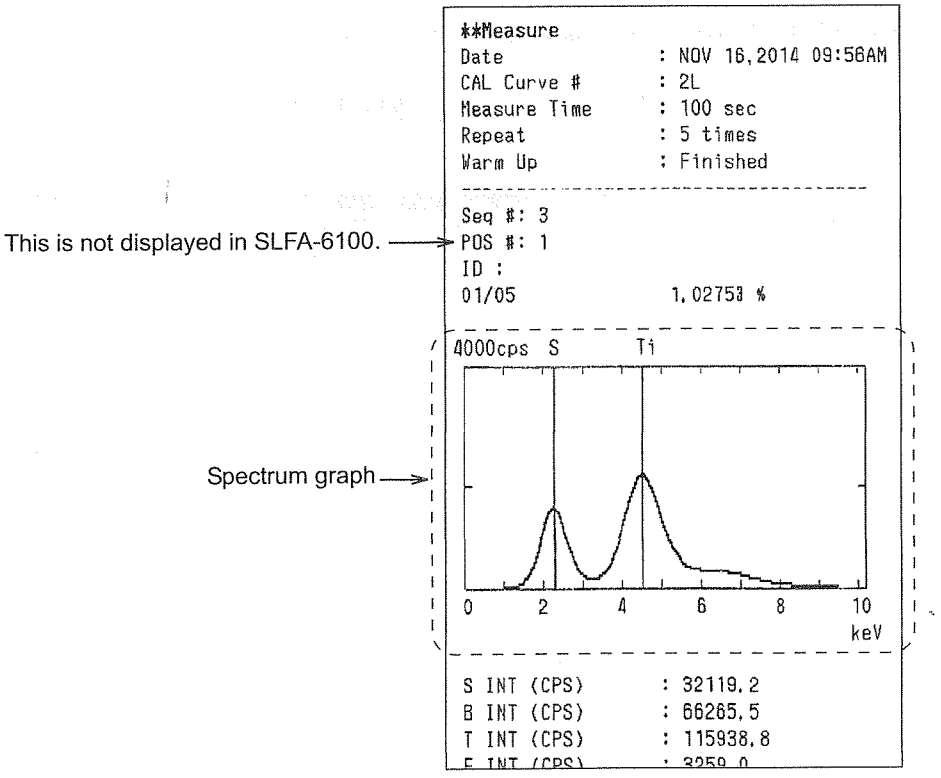


Fig. 44 SERVICE mode print example

Result display (SLFA-6800)

When the measurement is completed and the screen returns to the READY menu (Fig. 5), the measurement result can be confirmed by the following steps.

1. **Press the F5 key (RESULT) on the READY menu.**
   The ALL RESULT menu is displayed.

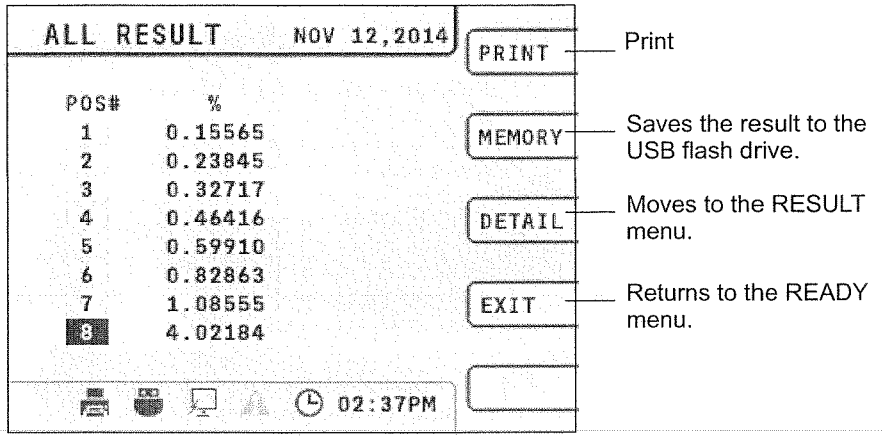


Fig. 45 ALL RESULT menu

- Pressing F1 key (PRINT): The measurement result of all POS# is printed.
- Pressing F2 key (MEMORY): The measurement result of all POS# is saved to USB flash drive.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

2. **Select a POS# for the measurement result to be confirmed with down cursor key, and then press the F3 key (DETAIL).**
   The RESULT menu for a selected POS# is displayed.

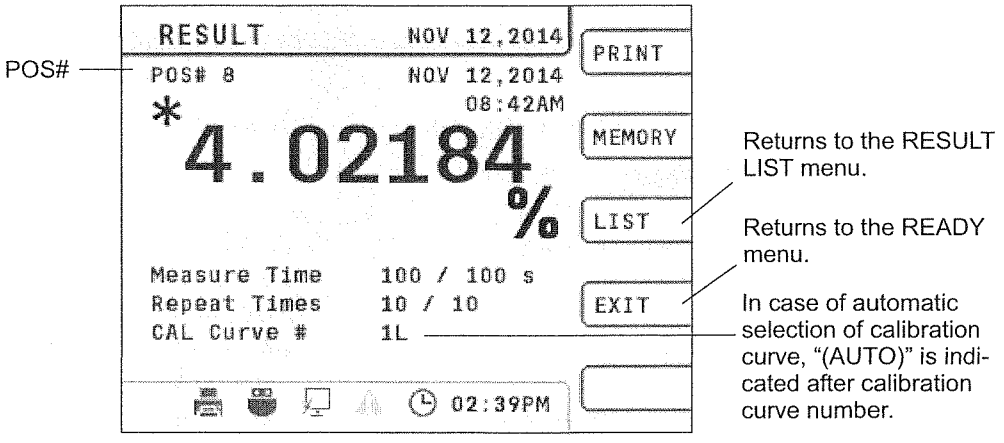


Fig. 46 RESULT menu (SLFA-6800)

- When the repeated measurement is performed, measurement value, average value, and standard deviation are displayed.
- Pressing F1 key (PRINT): The measurement result of all POS# is printed.
- Pressing F2 key (MEMORY): The measurement result of all POS# is saved to USB flash drive.
- Pressing F4 key (EXIT): The screen returns to the READY menu.

3. **Press the F3 key (LIST).**
   The RESULT LIST menu is displayed.

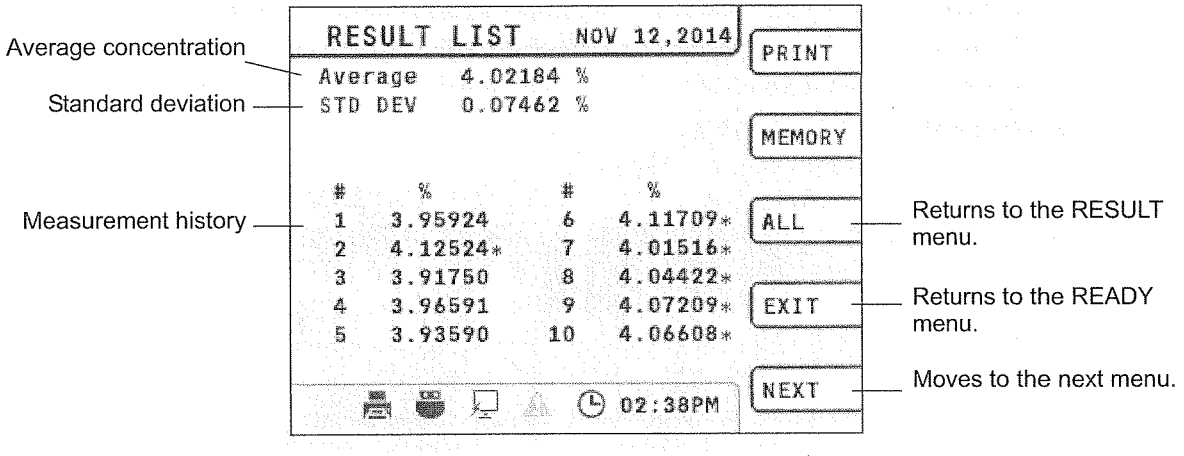


Fig. 47 RESULT LIST menu (SLFA-6800)

- When the repeat measurement is performed, the measurement value, average value, and standard deviation are displayed.
- Pressing the F1 key (PRINT): The same information that is printed by pressing the PRINT key on the RESULT menu is printed.
- Pressing the F2 key (MEMORY): The same information that is saved by pressing the MEMORY key on the RESULT menu is saved to a USB flash memory.
- Pressing F3 key (ALL): The screen returns to the ALL RESULT menu.
- Pressing F4 key (EXIT): The screen returns to the READY menu.
- In case that the measurement histories exceed 10 times, pressing the F5 key (NEXT) moves the current screen to a next menu.

Note

- **You can print, even if the output setting is off on the PRINTER menu (Fig. 8).**
- **For print items, the items set on the PRINTER menu are printed.**
- **The parameters to be saved on the USB flash drive are those set on the MEMORY menu (Fig. 9) except for the spectrum data.**

Result display (SLFA-6100)

When the measurement is completed and the screen returns to the READY menu (Fig. 5), the measurement result can be confirmed by the following steps.

1. **Press the F5 key (RESULT) on the READY menu.**
   The RESULT menu is displayed.

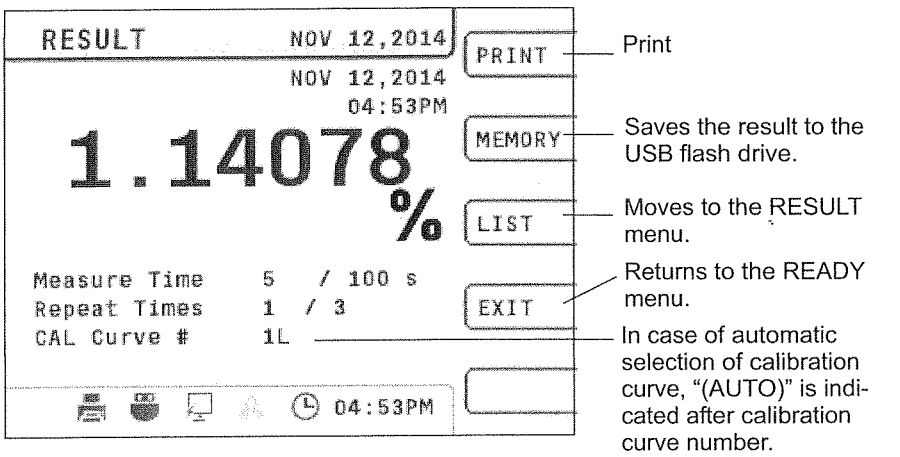


Fig. 48 RESULT menu (SLFA-6100)

- Pressing the F1 key (PRINT): The measurement result is printed.
- Pressing the F2 key (MEMORY): The measurement result is saved to USB flash drive.
- Pressing the F4 key (EXIT): The screen returns to the READY menu.

2. **Press the F3 key (DETAIL).**
   The RESULT LIST menu is displayed.

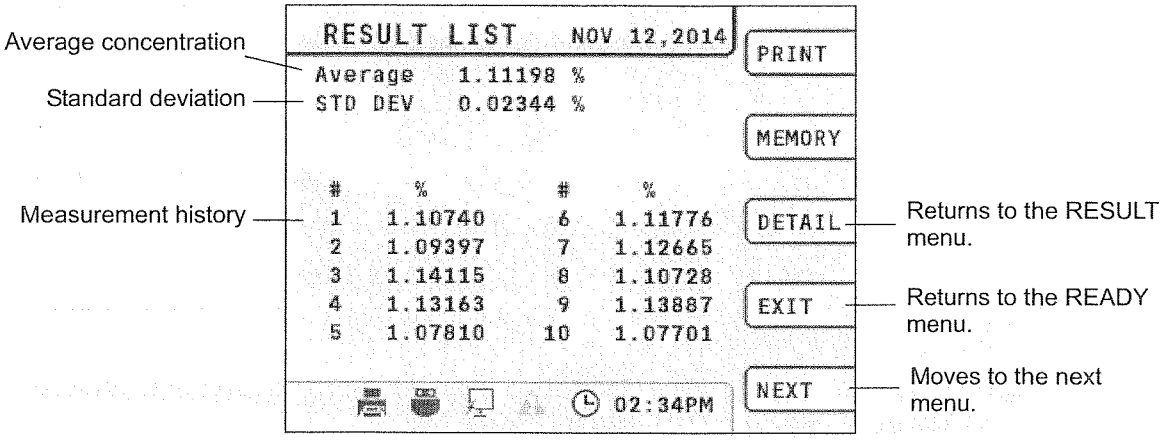


Fig. 49 RESULT LIST menu (SLFA-6100)

- When the repeated measurement is performed, the measurement value, average value, and standard deviation are displayed.
- Pressing the F1 key (PRINT): The same information that is printed by pressing the PRINT key on the RESULT menu is printed.
- Pressing the F2 key (MEMORY): The same information that is printed by pressing the MEMORY key on the RESULT menu is saved to a USB flash memory.
- Pressing F3 key (ALL): The screen returns to the ALL RESULT menu.
- Pressing F4 key (EXIT): The screen returns to the READY menu.
- In case that the measurement histories exceed 10 times, when the F5 key (NEXT) is pressed, the current screen moves to a next menu.
- Pressing the F5 key (NEXT) at the last menu returns to the first menu.

Note

- **You can print, even if the output setting is off on the PRINTER menu (Fig. 8).**
- **For print items, the items set on the PRINTER menu are printed.**
- **The parameters to be saved on the USB flash drive are those set on the MEMORY menu (Fig. 9) except for the spectrum data.**

Sample cell

Sample cell

The sample cell is designed for achieving an accurate measurement of sulfur content in fuel oils in SLFA-6100/6800 by applying the energy dispersive X-ray fluorescence spectroscopy method. Improper handling of this cell may cause measurement inaccuracy and may cause the sample cell to leak. Therefore, the sample cell must be handled very carefully. Thoroughly read the following notes of caution for the proper use of the sample cell.

Chemical resistance

The major part of the sample cell is made of plastic. If you are putting any sample other than general fuel oil in the sample cell, check to see if the sample cell melts or inflates by referring to the following table. It is recommended to actually put the sample in the sample cell and then make sure that there is no abnormality.

	Discoloration	Crack	Dissolution	Inflation	Other abnormality
20% $KMnO_4$	×	×			
Benzene		×			
Carbon tetrachloride				△	
Thermal metacreosol			×		
Orthochlorophenol			×		
Nitrobenzene			×		
Benzoic acid				△	
Salicylic acid				△	
Phenol				△	
Monochlorobenzene				△	
Paradichlorobenzene				△	
Tetrahydronaphthalene				△	
Methyl benzoate				△	
Methyl salicylate				△	
80% H_2SO_4	×	×			×
Glacial acetic acid	×	×			
60% HNO_3					×
35% HNO_3					△
10% NH_3					×
10% KOH					×
10% NaOH					×

×: inapplicable

△: requires thorough attention in handling

Caution in handling sample cell

- An outer cell frame can be recycled several times.
- Store the disposable cells and the cell windows in a place where they are free from dust, especially metallic dust.
  Make sure there are no pinholes on a sample cell window to avoid leakage.
- In particular, keep the cell windows free from dust and foreign substances. Dust or foreign matter on the cell windows will cause the measurement accuracy to deteriorate.
- Wipe off any dust or foreign substances from the cell frames to avoid swelling of the cell. Use only dry, soft cloth or paper to clean the cell frames.
- After measurement, disassemble the sample cell as soon as possible and then store it properly.
- The sample cells are only sealed temporarily, and if you leave sample liquid in a sample cell for a long period, the liquid may leak out. This is the most common cause of swelling of the sample cells.
- Do not use a sample cell which has come loose due to deformation or swelling.
- If you must store a sample cell which contains a sample, keep the cell window facing upward.
  If it is necessary to store it with the cell window downward, be sure to support it by the rim so that the cell window is not in contact with anything below it.
- Before putting the sample cell in the cell table, make sure that there is no liquid leakage or no sample liquid leaking out from the cell. If you find any dirt on the sample cell window, there may be leakage from the cell or sample liquid oozing out from the cell.
- Immediately after measurement, remove the used sample cell from the cell table. Most leakage accidents occur when the sample cell is left on the cell table. Do not leave sample cells on cell table after measurement.

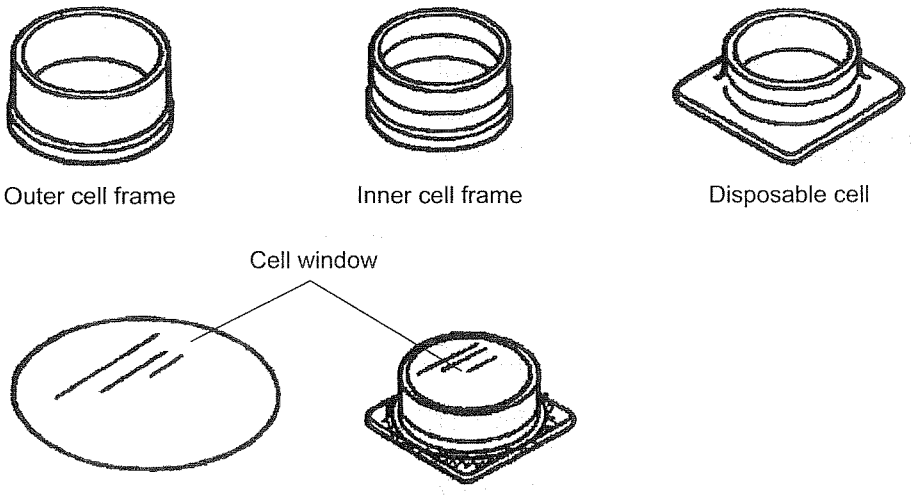


Fig. 50 Outer view of sample cell

Measurement accuracy of the sample cell

The measured value may be affected by the sample cell. This can be due to variations in the disposable cell, the inner cell frame, and the outer cell frame, or the cell window. According to JIS standard, the error is specified to be 0.04% or lower (when standard sample of 1% is to be measured). The analyzer is designed so that the tolerance will be 0.03% maximum, but if higher precision is required, follow the procedure below.

- Prepare three cells for each sample.
- Measure each cell a minimum of three times and use the average as the measured value of that cell.
- Calculate the average of the values obtained for the sample in the cells and use this as the measured value of that sample.

Preparing and disassembling sample cells

⚠ WARNING

Many samples are inflammable.
Keep samples and unit away from fire.

⚠ CAUTION

Caution against sample splash
A sample might splash when a sample cell is prepared or disassembled.
For protection, wear a mask, gloves and goggles, etc. when working.

Preparing step

1. **Clean the inside of a disposable cell**
2. **Correctly fit it into the inner cell frame.**
   At this time, gently push the disposable cell into the inner circular paper.

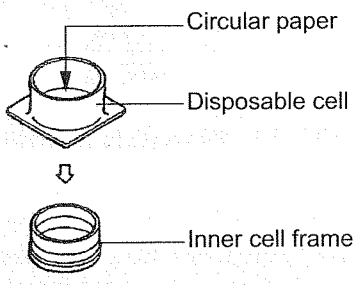


Fig. 51 Assembly of the disposable cell and the inner cell flame

3. **Gently pull the four corners of the disposable cell so that the inner circle of the square paper may not overlap the inner cell frame.**

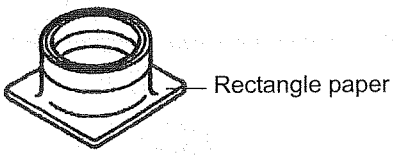


Fig. 52 Assembly completion of the disposable cell and the inner cell flame

4. **Fit the outer cell frame into holder A.**

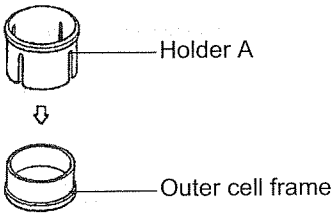


Fig. 53 Assembly of the holder A and the outer frame

5. **Pour the sample liquid to the level marked on the inside of the inner cell frame.**

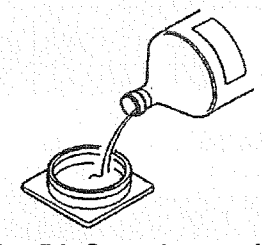


Fig. 54 Sample pouring

Note

An insufficient amount of sample can cause an error.

6. **Place a cell window on the inner frame.**
   Center the cell window near the center of the inner cell frame.

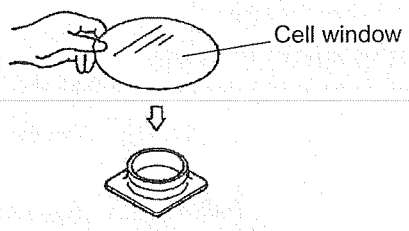


Fig. 55 Assembly the cell window

Note

In the box for cell windows, transparent films are separated by opaque ones. The opaque films are inserted for protection. Use the transparent ones for cell windows.

7. **Place the outer cell frame so that it fits into holder A on the cell window.**
8. **Press the outer cell frame into the inner cell frame by pressing the holder with the palm of your hand.**
   At this time, make sure that the outer cell frame is not tilted.

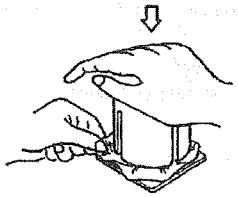


Fig. 56 Assembly the outer cell frame

9. **Remove holder A while holding the outer cell frame. Now the sample has been prepared.**

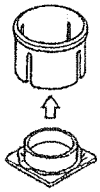


Fig. 57 Remove the holder A

When completed, check the following five points. If any defect is found, try preparing the sample cell again.

- The cell window should not be wrinkled or swollen.
- The sample should not leak out, even if the cell is shaken.
- The side of the cell should not show leakage.
- The cell frame should not be deformed into an oval shape.
- The outer frame should be fully inserted.

10. **Turn it over and then place it on the cell table.**

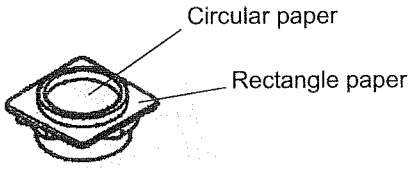


Fig. 58 Appearance of the sample cell after an assembly

Note

At this time, make sure that the corner of the square mount is not folded downward. If the corner of the square mount is not folded downward (flat or upward), correct measurements may not be obtained.

Disassembling the sample cell

1. Place the used sample on a holder A so that the cell window faces upward.

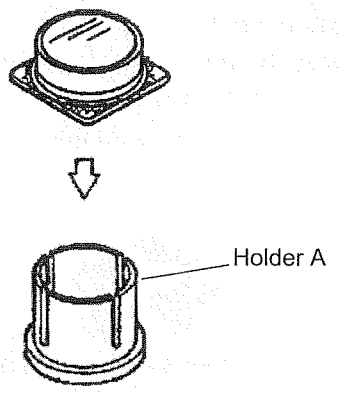


Fig. 59 Assembly of the holder A and sample cell

2. Place holder B on the sample and strongly press it with the palm of your hand.

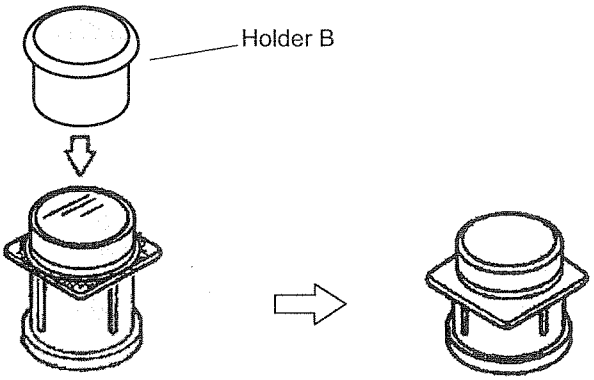


Fig. 60 Insert the holder B

3. Remove holder B and the outer cell frame, and then pull off the disposable cell from holder A.
4. Remove the disposable cell from the inner cell frame. To do this, hold one end of the disposable cell and press it on the bottom.

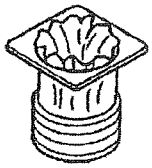


Fig. 61 Separate the disposable cell

Dispose of the sample and the disposable cell.
The inner cell frame and the outer cell frame can be recycled if they fit as tight as new parts.

Note

If the inner cell frame and the outer cell frame fit loose, they require disposal.

When measuring a sample with high vapor pressure

When a sample with high vapor pressure is placed in a cell, the cell window expands due to the vapor pressure, which results in not only measurement error, but in the case of a sample with extremely high vapor pressure such as liquefied petroleum gas, the breaking of the cell window could occur.
For these samples, perform measurement as follows.

Procedure

1. **Make a pinhole on the paper table right before measurement.**
2. **Perform measurement in a short time.**

Note

If left for a long time, concentration of the sample may vary.

3. **Take out the sample cell right after measurement is completed.**

⚠ CAUTION

The cell may be filled with flammable vapor and may cause combustion.
For highly volatile sample, be especially careful.

4. **Close the opened pin-hole with a piece of cellophane tape.**
5. **After measurement, immediately dispose of the sample cell.**
   Do not get fire near the sample or the unit, as many of the samples are flammable.

When measuring a sample that solidifies at room temperature

Some samples solidify at room temperature.
Measure these samples with the following procedure.

Procedure

1. **Heat the sample to make the sample fluidized to some extent before placing it in the sample cell.**
   Be fully careful not to heat the sample higher the 60°C.
2. **Make a hole on the paper side of the sample cell with a pin and place it on a flat glass surface so that the cell window faces down.**
   Start measurement after the sample cools down to room temperature.

Properties of samples

Depending on the properties of the samples measured, errors may occur and the following precautions are required for each error.

C/H error

Since SLFA-6100/6800 corrects for C/H, the error arising from C/H is small and negligible in normal measurement. However, if you are measuring a sample of which C/H is greatly different from that of the standard sample, you will need to control both C/H values at nearly the same level.

Interference error

If the sample under measurement contains any interfering elements other than carbon, hydrogen, and sulfur, a measurement error will occur.
When the sulfur content in fuel oil is being measured, such elements are so minute that they hardly constitute a problem. However, when you are measuring other samples as well as fuel oil, you should consider beforehand the kinds and amounts of the interfering elements. If the amounts of the interfering elements are so large that a measurement error may occur, prepare the standard sample so that it contains nearly the same amounts of the interfering elements as in the sample to be measured, or obtain in advance the corrective coefficients of the interfering elements and correct the measured value.

Precipitate error

If any precipitated substance is included in the sample under measurement, it may accumulate on the cell window over long-term measurements, causing a measurement error. Should this happen, before starting the next measurement, filter out the precipitated substance with either a filter or filter paper. Because the precipitated substance may contain large amounts of interfering elements, carry out the measurement carefully. Stir the sample well before putting it in the sample cell, and then carry out measurement quickly. If there are any air bubbles, allow the sample to stand until they disappear before you start the measurement.

Setting a sample cell

⚠ WARNING

Many samples are inflammable.
Keep samples and unit away from fire.

⚠ CAUTION

As soon as the measurement is complete, take out the sample cell from the instrument.
The sample chamber from the inflammable vapor may catch fire.
Especially, be careful of a highly volatile sample.

1. **Put the sample-chamber lid open lever in the OPEN position, then open the sample-chamber lid.**

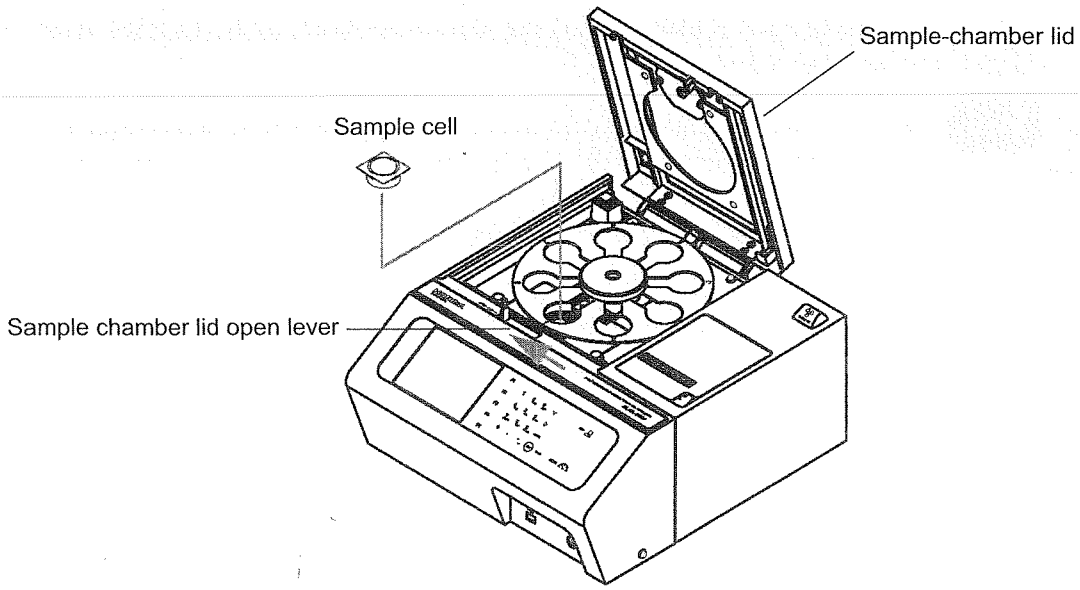


Fig. 62 Open Sample chamber lid

2. **Set a sample cell on the turntable (SLFA-6800) or the sample tray (SLFA-6100).**
   Place the sample cell so that the window surface does not float on the sample tray (only SLFA-6800).
   If the window surface does not float on the sample tray, correct measurements may not be carried out.

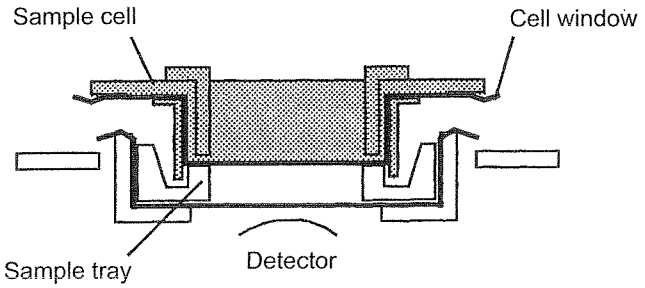


Fig. 63 Set sample cell (cross section)

3. **Completely close the sample-chamber lid**
   The lever returns to the CLOSE position along with the sample-chamber lid.

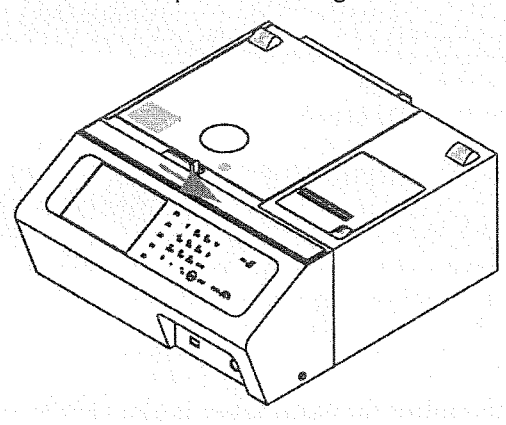


Fig. 64 Close Sample chamber lid

If the lever is positioned halfway, move the lever completely to the CLOSE position when closing the sample-chamber lid.

Note

When put the sample-chamber lid open lever in the CLOSE position, do not press the lever too strongly.

Maintenance and Inspection

Contact for maintenance

Manufacturer: HORIBA, Ltd.
2 Miyanohigashi, Kisshoin Minami-ku, Kyoto 601-8510 Japan

Analyzer check

Spectrum measurement

⚠ WARNING

Many samples are inflammable.
Keep samples and unit away from fire.

⚠ CAUTION

As soon as the measurement is complete, take out the sample cell from the instrument.
The sample chamber from the inflammable vapor may catch fire.
Especially, be careful of a highly volatile sample.

Note

Normally this operation is not necessary.
When the analyzer malfunctions, perform check according to the instruction of service personnel specified by HORIBA. The diagnosis of the result is performed by HORIBA.

1. **Place a sample cell for spectrum measurement on the POS# 1 of turntable (SLFA-6800) or the sample tray (SLFA-6100).**
   Refer to "Setting a sample cell" (page 59).
2. **Press the F4 key (MAINT) on the READY menu (Fig. 5).**
   The MAINTENANCE menu is displayed.

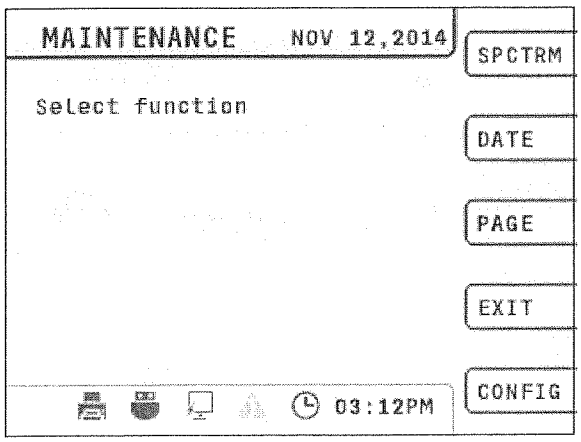


Fig. 65 MAINTENANCE menu

3. **Press the F1 key (SPECTRM) on the MEANTENANCE menu.**
   The SPECTRUM menu is displayed.

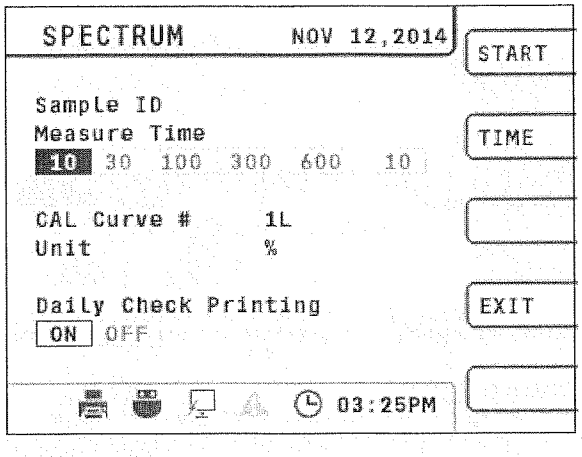


Fig. 66 SPECTRUM menu

4. **Set the measurement time.**
   The ID set in "ID setting" (page 38) is displayed on the Sample ID.
   The calibration curve number and the concentration unit set in "Measurement condition setting" (page 36) are displayed on the CAL curve # and the Unit respectively.

Tip

When the Daily Check Printing is set to ON, the calibration curve data, the internal condition, and the software versions are printed along with the spectrum (Fig. 68).

5. **Press the F1 key (START) on the SPECTRUM menu.**
   The measurement starts. The SPECTRUM MEAS menu is displayed.

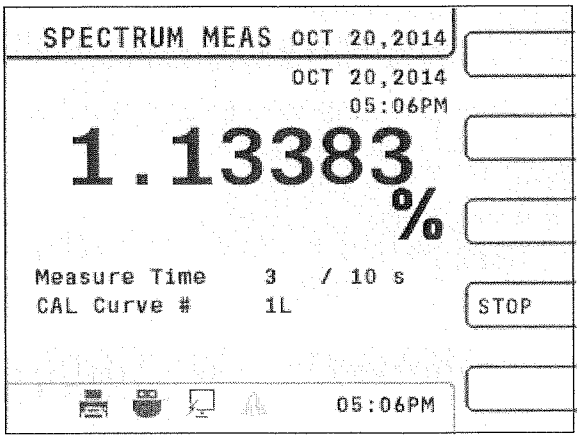


Fig. 67 SPECTRUM MEAS menu

Pressing the F4 key (STOP) during measurement triggers the buzzer sounds. After that, the measurement stops and the screen returns to the SPECTRUM menu.

When the measurement completes, the buzzer sounds. After that, the screen returns to the SPECTRUM menu and the spectrum is printed.

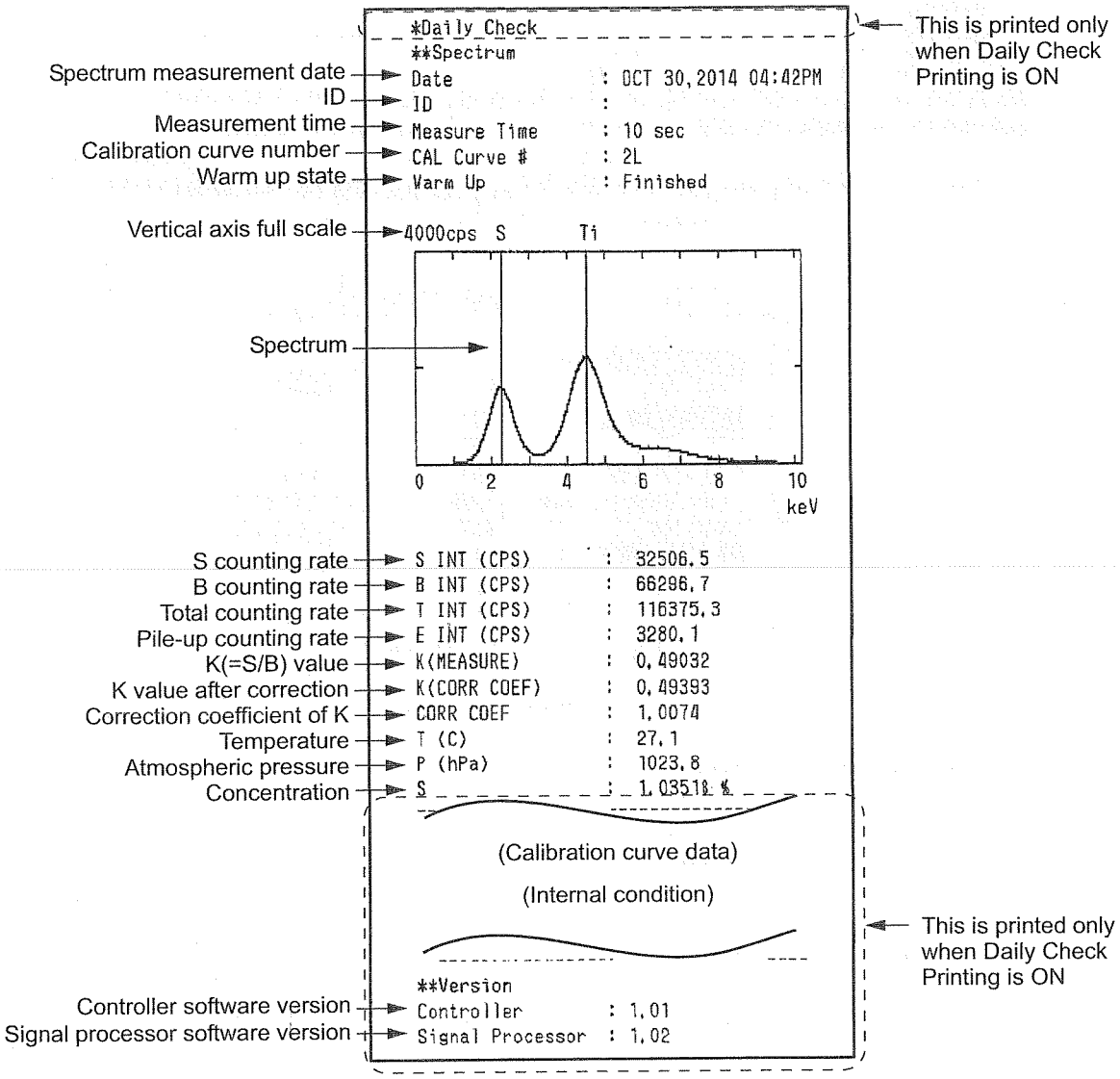


Fig. 68 Spectrum print example

Subsequently each data is printed.
These values are useful to check any abnormality of the analyzer.

Tip

- **The temperature here is the temperature in the analyzer. It may differ from the room temperature, but it is not abnormal.**
- **The vertical scale of spectrum depends on the maximum value of the spectrum.**
- **The printed items of the calibration curve data depend on the creating method (automatic/ manual).**
- **The items other than the temperature and the atmospheric pressure shown in "Internal condition print example" (page 64) are printed as the internal condition.**

Note

- **At printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **Do not release the roller release lever at the start of printing, or the printer will not work.**

Internal condition display

Note

Normally this operation is not necessary.
When the analyzer malfunctions, perform check according to the instruction of service personnel specified by HORIBA. The diagnosis of the result is performed by HORIBA.

1. **Press the F3 key (PAGE) and the F1 key (CHECK1) on the MAINTENANCE menu.**
   The CHECK1 menu is displayed, and the internal condition is displayed.

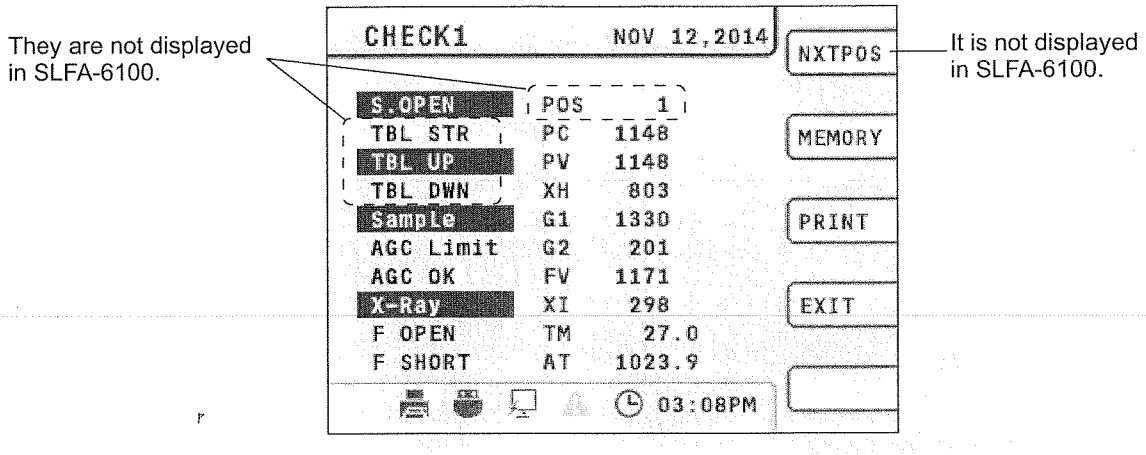


Fig. 69 CHECK1 menu

2. **Press the F3 key (PRINT).**
   The internal condition is printed.

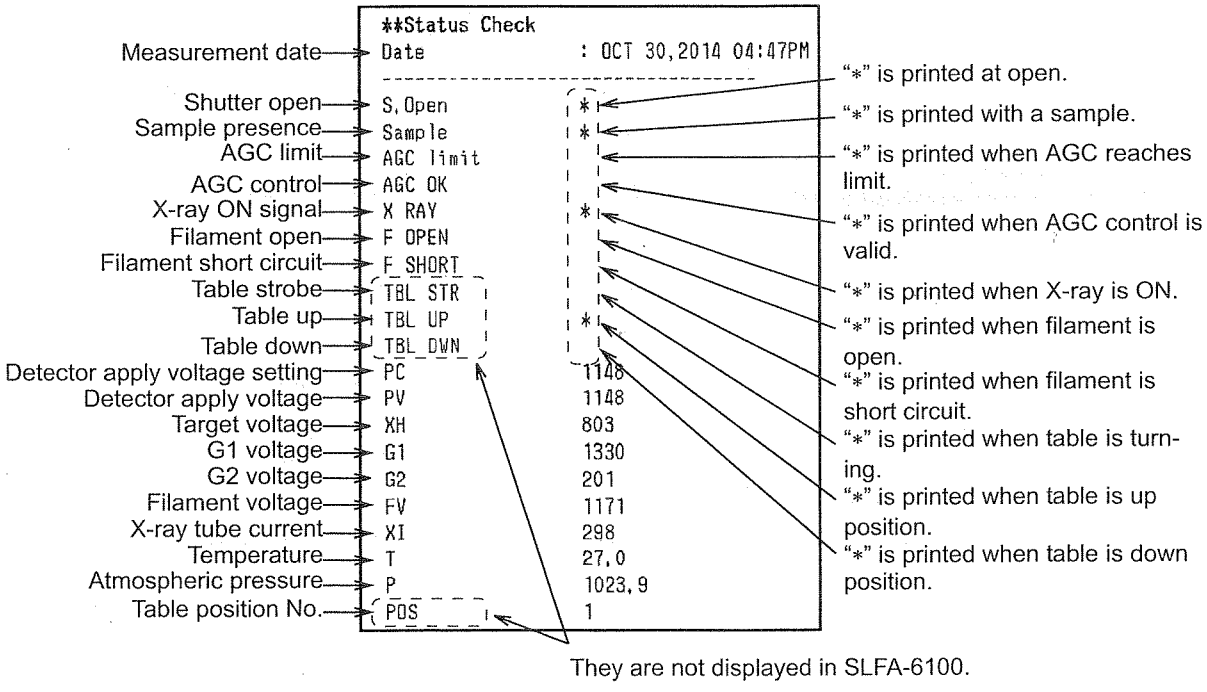


Fig. 70 Internal condition print example

Note

- **At printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **Do not release the roller release lever at the start of printing, or the printer will not work.**

- Pressing the F2 key (MEMORY) outputs the internal condition to the USB flash drive.
- Pressing the F4 key (EXIT) returns the screen to the READY menu.
- Pressing the F1 key (NEXPOS) moves up the turntable. It rotates to the next POS#, and then lowers to the original position (only SLFA-6800).

Note

In this mode, even while the sample-chamber lid is open, the turntable will rotate and move up and down. Pay attention to the movement of the turntable and be sure that there is nothing underneath it.

AGC check

Note

Normally this operation is not necessary.
When the analyzer malfunctions, perform check according to the instruction of service personnel specified by HORIBA. The diagnosis of the result is performed by HORIBA.

1. **Press the F3 key (PAGE) and the F2 key (CHECK2) on the MAINTENANCE menu (Fig. 6).**
   The CHECK2 menu is displayed.

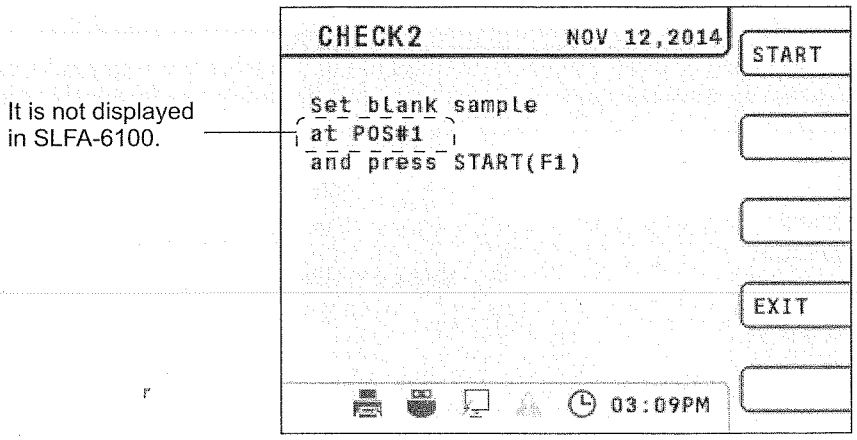


Fig. 71 CHECK2 menu

2. **Place a sample cell not containing the sulfur (Ex. water) on the turntable (SLFA-6800) or the sample tray (SLFA-6100), and press the F1 key (START) on the CHECK2 menu.**
   The five measurements start, and the voltage applied to the detector and the residual time are displayed.

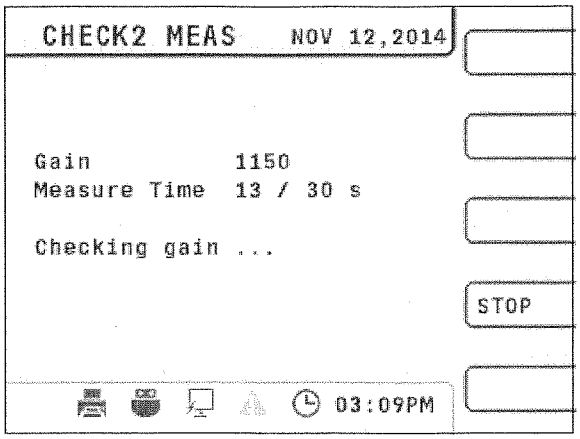


Fig. 72 CHECK2 measuring menu

The voltages applied to the detector are 1150, 1200, 1250, 1300 and 1350 (V). (Refer to "Setting a sample cell" (page 59).)

Whenever each measurement completes, the spectrum corresponding to each detector applied voltage is printed.

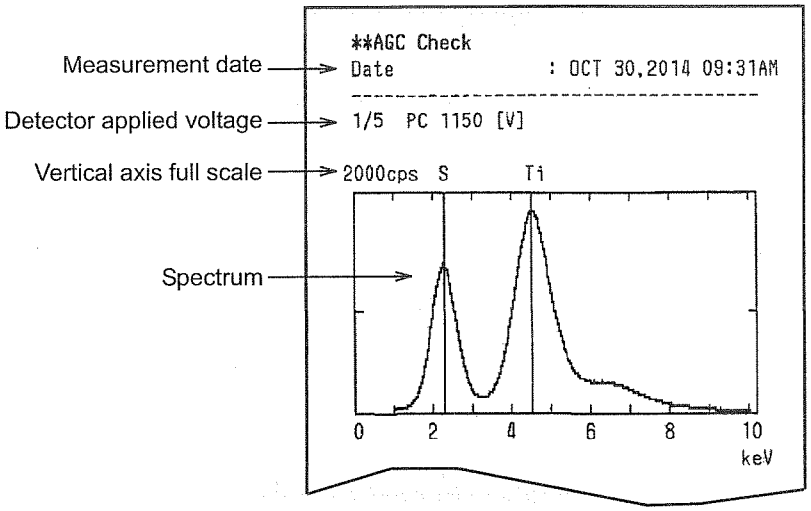


Fig. 73 AGC check print example-1

Tip

The vertical scale of spectrum depends on the maximum value of the spectrum.

Note

- **At printing, do not pull the print paper.**
- **To feed the print paper after printing, press the paper feed button. Do not pull the paper. (Refer to "Setting printer paper" (page 14).)**
- **Do not release the roller release lever at the start of printing, or the printer will not work.**

Continued from CHECK2 printout

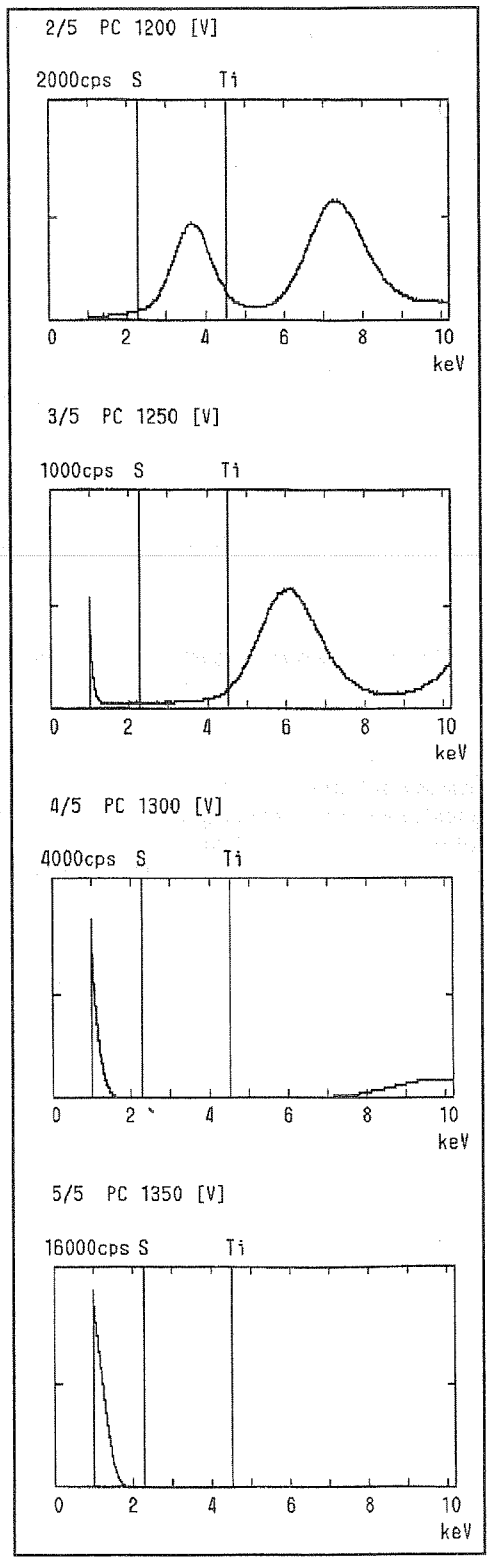


Fig. 74 AGC check print example-2

Maintenance

Replacing protective membrane

When the protective membrane is torn or dirty, replace the protective membrane according to the following procedure.

Note

Replacing the protective membrane requires creation of the calibration curve.

1. **Put the sample chamber lid open lever to the OPEN position, then open the sample chamber lid.**
2. **When the sample cell remains, take it out.**
3. **Take out turntable (only SLFA-6800).**
4. **Pull up the protective membrane holder, and take out the protective membrane unit.**

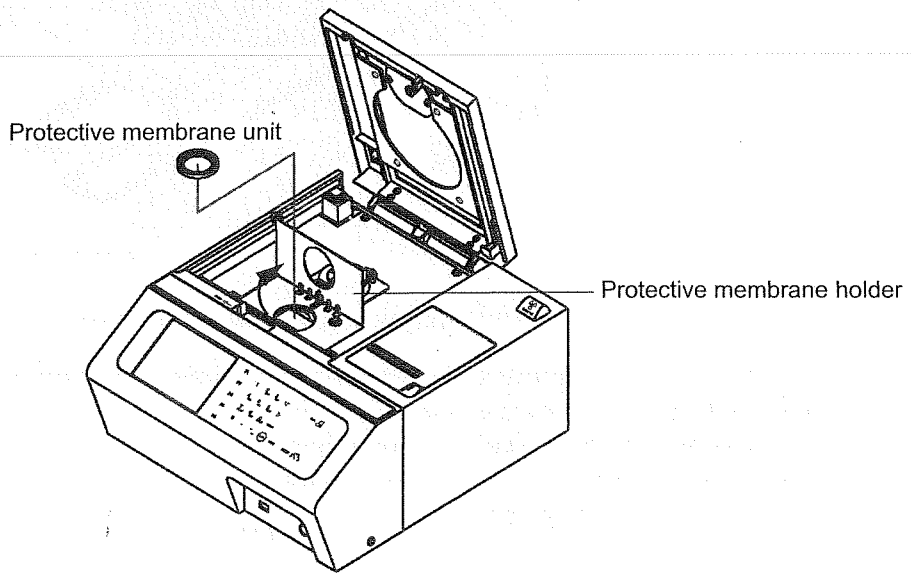


Fig. 75 Taking out protective membrane unit

5. **Remove the protective membrane from the protective membrane unit, and replace it with the new protective membrane unit.**
   The protective membrane uses the same cell window with that for the sample cell.

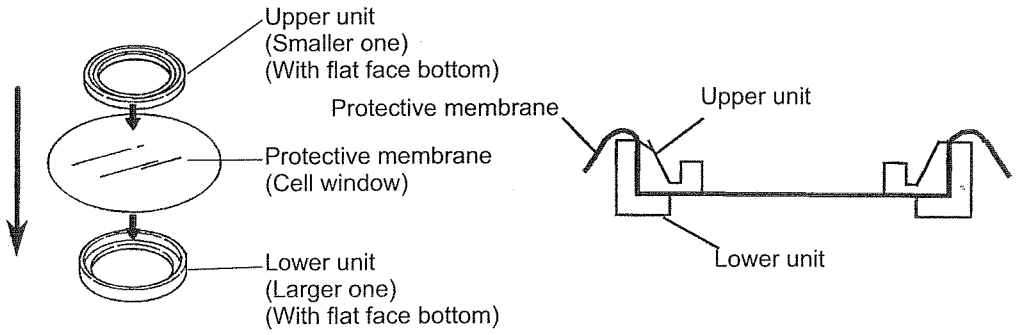


Fig. 76 Replacing protective membrane

Note

- **Remove any crease on the protective membrane. When crease is generated, lightly pull the ends of protective membrane by fingers.**
- **Ensure to press the upper unit until it tightly connects with the lower unit.**

6. Attach the protective membrane by the opposite step of replacement.

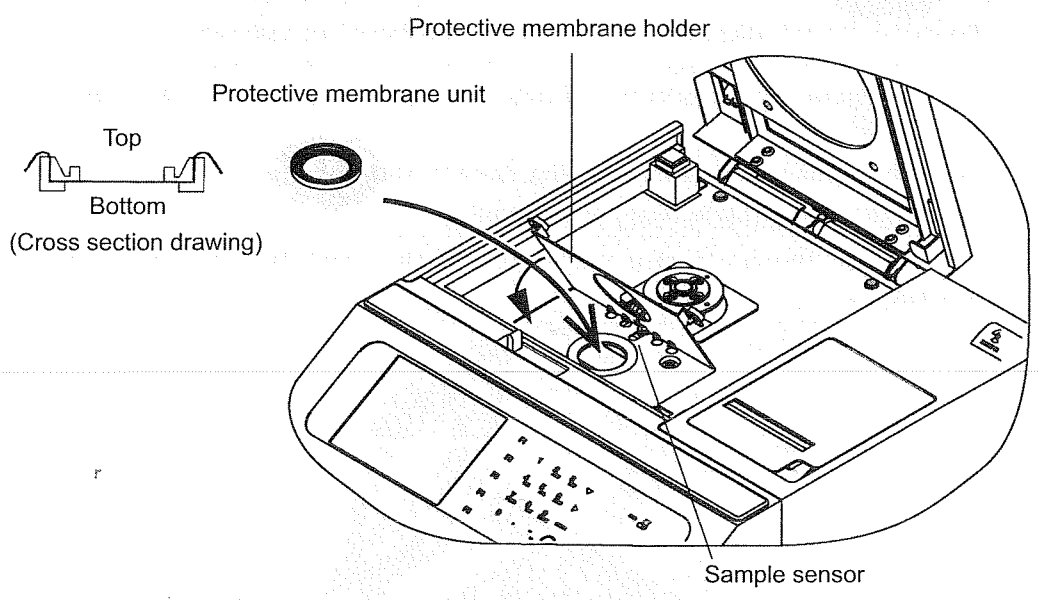


Fig. 77 Attaching protective membrane unit

- In attaching the protective membrane unit, ensure correct orientation (top and bottom).
- In closing the protective membrane holder, press down the protective membrane protruded from the protective membrane unit.
- Avoid any protective membrane protruded from the protective membrane unit from covering the sample sensor.
- After replacing the protective membrane, perform calibration and create the calibration curve again.

Cleaning filter

If the dust level is the one in offices, clean the dust on the filter by vacuum cleaner once a half year (depending on the using environment).
The filter is attached at the rear panel of the analyzer.

Note

Ensure to turn OFF the power switch at the rear panel.

1. **Pull the filter holder, and remove the filter holder and the filter from the analyzer.**
2. **Remove the dust on the filter by vacuum cleaner.**

Note

When the filter is damaged, replace it to a new one.

3. **Attach the filter by the opposite step of removal.**

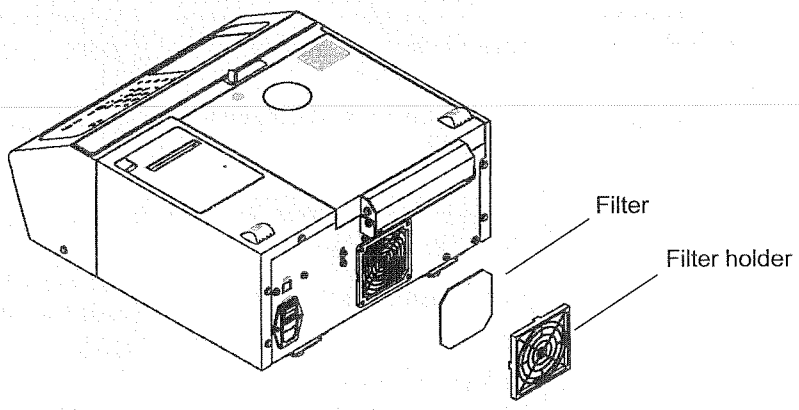


Fig. 78 Removing the filter

Troubleshooting

If something is wrong with the analyzer, check the analyzer in accordance with the following table. When the cause is unknown, contact your local service representative.

⚠ CAUTION

Do not remove any covers. This product contains X-rays and high voltages.
It may result in an electrical shock or radiation exposure.

Phenomenon	Target	Check points	Corrective action
The analyzer cannot be turned on.	Power cord	Is the correct electric power going to the analyzer?	Connect the power cord to the outlet. Make sure the outlet is live.
	Power switch	Is the power switch ON?	Turn ON the power switch.
	Analyzer cover	Is the mounting screw of the unit panel or the cover loose?	Tighten the mounting screw of the safety switch.
It is difficult to put a sample cell on the sample chamber.	Sample cell	Is the sample cell deformed or inflated?	Replace the sample cell.
The readout value does not stabilize.	Power source	Does the power voltage fall within the specified ranges?	Check the power voltage.
	Grounding	Is the analyzer grounded properly?	Make sure that the grounding is performed correctly.
	External noise	Is there any nearby source of electrical or magnetic noise?	Eliminate the noise source. Use a separate power supply from a unit that requires a motor or large electric current.
	Temperature/ humidity	Is the temperature/humidity too high? Does the temperature change suddenly?	Avoid direct sunlight. Do not use the unit where sudden and large temperature change occurs. Avoid the location such as around an entry/exit or a path where hot or cold wind blows.
The readout value is different from the expected value.	Sample	Make sure there are no air bubbles in the sample liquid. Make sure there are no precipitated substances and moisture.	Eliminate the bubbles. Remove the precipitated substances and moisture.
	Foreign matter	Is either the window surface of the sample cell or the area surrounding of the Sample chamber contaminated with foreign matter?	Replace the sample cell. Wipe off the foreign matter. If the liquid leak is found in the sample cell, contact your local service representative.
	Calibration	Was calibration carried out properly?	Carry out calibration again.
	Vapor pressure	Is the window inflated because the vapor pressure of the sample is too high?	Make a pinhole in the paper side of the sample cell.
	X-ray signal	Check the X-ray signal by spectral analysis.	For spectrum judgment, contact your local service representative.

Phenomenon	Target	Check points	Corrective action
The printer cannot print out.	Printer	The printer paper is not properly loaded.	Load the printer paper correctly. It will wait 10 seconds, and the data will be reprinted.
		The output of PRINTER is not set to ON.	Correctly set the printer output to ON by referring to "Printer setting" (page 9).

Warning and error message

Warning/error message

When an error occurs, the following operation starts.

- The error is displayed on the pop-up screen.
- An error icon is displayed on the downward of a screen.
- The buzzer sounds.
- When the printer output setting is set to ON, the error type is printed. (Refer to "Printer setting" (page 9).)

Note

When there are more than one error, pop-up screen will display an error to the first one detected. Check other errors with printing or an error list.

Error list display

The contents and the history can be displayed.

1. **Press the F4 key (MAINT) and the F5 key (CONFIG) with the READY menu (Fig. 5).**
   The CONFIG menu is displayed.

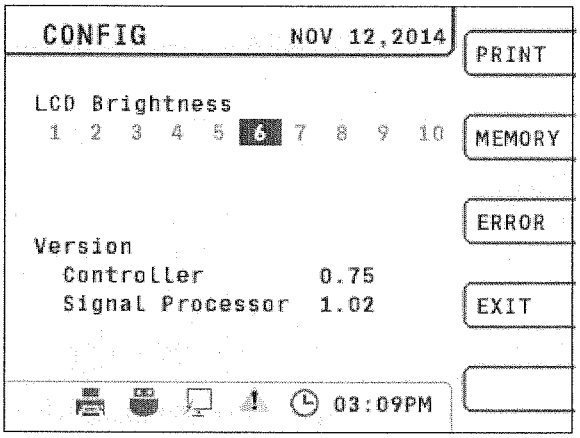


Fig. 79 CONFIG menu (error occurrence)

2. **Press the F3 key (ERROR) on the CONFIG menu.**
   The ERROR LIST menu is displayed.

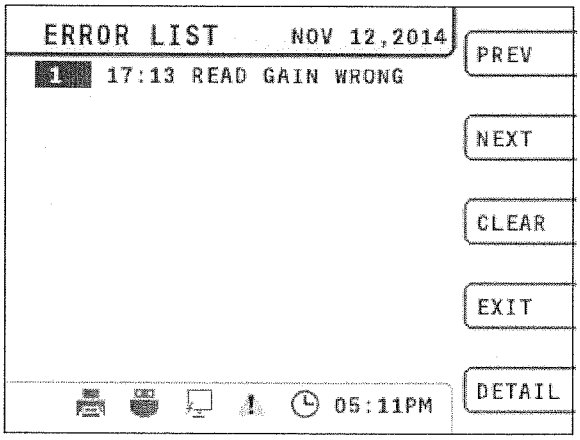


Fig. 80 ERROR LIST menu

For the errors triggered after the power ON, the list of occurrence time and the error name are displayed.
When there are more than 10 errors, the errors are displayed on several screens.

- Pressing the F1 key (PREV) returns the screen to the previous one.
- Pressing the F2 key (NEXT) advances the screen to the next one.
- Pressing the F3 key (CLEAR) clears the error list. The error icon disappears.

3. **Select an error by cursor, and press the F5 key (DETAIL) on the ERROR LIST menu.**
The screen switches to the ERROR DETAIL menu, in which the details of the selected error are displayed.

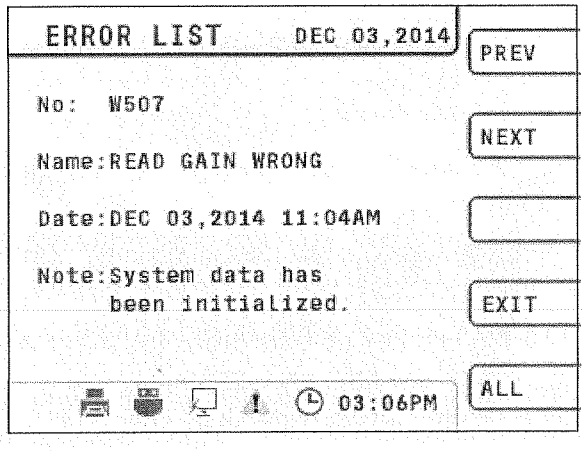


Fig. 81 Details of selected error

4. **Press the F5 key (ALL).**
The screen returns to the ERROR LIST menu.
5. **Press the F4 key (EXIT).**
The screen returns to the READY menu.

● Errors whose causes are eliminated through measurement operation.

The causes of the following errors are eliminated by performing any measuring operations. Error messages and error icons disappear.

Error message	Motions to Eliminate Errors
X-RAY OFF	Turn on a key to generate an X-ray.
NO SAMPLE	Place a sample.
COVER OPENED	Close a sample-chamber lid.

Life of X-ray tube and X-ray detector

The X-ray tube and the X-ray detector used for the analyzer gradually deteriorate during use, and they require to be replaced. The condition of these parts is checked by the analyzer itself, and warning is displayed on the Status on the READY menu when replacement time is reached.

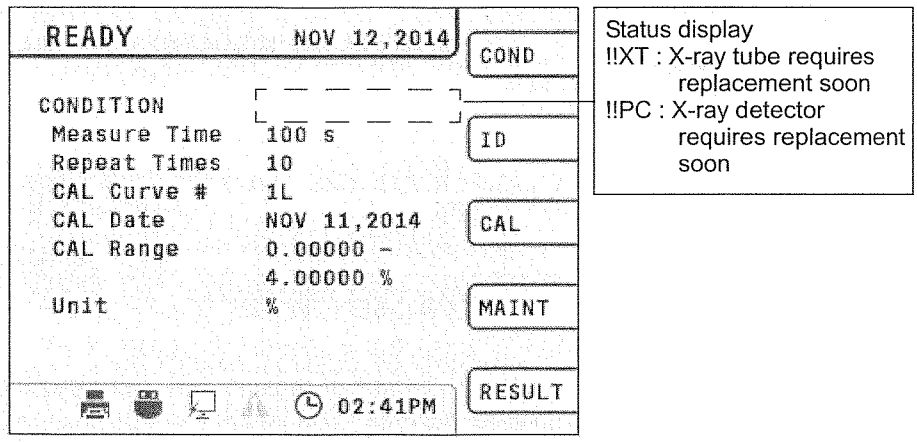


Fig. 82 Life of X-ray tube and X-ray detector

Even if warning is displayed, the analyzer keeps normal operation, and the use of analyzer is available for a while. Using the analyzer without replacing the parts, however, will disable the use of analyzer.

When "!!XT" or "!!PC" is displayed on the screen, contact your local service representative soon.

Error types and contents

The following table shows the error types and contents displayed on the pop-up, print out, and error list.

	Error display	Contents
*1	X-RAY TUBE	X-ray tube is deteriorated.
*1	X-RAY TUBE LIFETIME	X-ray tube comes to its lifetime.
*1	X-RAY CURRENT	X-ray tube is deteriorated.
	X-RAY OFF	X-ray switch is turned to OFF.
*1	X-RAY TUBE VOLTAGE	X-ray tube is deteriorated.
*1	FIL VOLTAGE	X-ray tube voltage is abnormal.
*1	FIL OPEN	X-ray tube filament is open.
*1	FIL SHORT	X-ray tube filament is short circuit
*1	X-RAY G2 VOLTAGE	X-ray tube is deteriorated.
*1	DETECTOR	Detector is deteriorated.
*1	DETECTOR LIFETIME	Detector comes to its lifetime.
*1	DETECTOR VOLTAGE	Detector is deteriorated.
*1	AGC COARSE FAIL	The board is abnormal.
*1	AGC FAIL	The process before measurement start failed.
*1	AGC CONTROL ERROR	The process before measurement start failed.
*1	BATTERY	Battery requires replacement.
*1	TEMP SENSOR	Temperature is abnormal.
*1	ATM SENSOR	Atmospheric pressure is abnormal.
	COVER OPENED	The sample chamber lid is open.
	NO SAMPLE	No sample is set.
*1	INVALID POSITION	The turntable stop position is abnormal.
	PAPER END	Printer paper has run out.
*1	ERR RTC	Clock function is initialized.
	USB MAKE DIR FAIL	Directory creation on USB flash drive is abnormal.
	USB OPEN FILE FAIL	Failing to open the file on the USB flash drive.
	USB WRITING FAIL	Data writing on USB flash drive is abnormal.
	SERIAL CONNECT FAIL	Serial communication is abnormal.
*2	READ MEAS SET WRONG	Setting data of normal measurement is initialized.
*2	READ SPCTRM SET WRONG	Setting data of spectrum measurement is initialized.
*2	READ BRIGHTNESS SET WRONG	LCD brightness is initialized.
*2	READ CALIBDATA WRONG	Calibration curve is initialized.
*2	READ OUTPUT SET WRONG	Setting on the printer and the USB flash drive is initialized.
*2	READ FPGA PARAM WRONG	System data is initialized.
*2	READ GAIN WRONG	System data is initialized.
*2	READ ALL DATA WRONG	All the data is initialized.
*2	WRITING DATA FAIL	Data storage failed.

*1: Contact your local service representative.

*2: Setting of the analyzer has been changed to the initial state. By setting the necessary settings again, the analyzer work successfully.
When error is displayed by repetition, contact your local service representative.

The following table shows the error types and contents. These errors are displayed on the pop-up only.

Error display	Contents
NO EXIST	There is no calibration curve in the calibration curve.
CAL SAMPLE NUM	Calibration concentration value is too low.
CAL FAILED	Calibration curve calculation failed.
WAN SETTING	Setting is abnormal.
RANGE WRONG	The range to set on the MAN1 menu was wrong.
DATE WRONG	The date to set on the DATE menu was wrong.
OUTPUT MODE OFF	All the output modes (Printer, USB flash drive, USB communication) are OFF.

Note

When the error which is not listed is displayed, contact your local service representative.

Reference

Measuring principle

This section describes the principle and method used by SLFA-6100/SLFA-6800 to make measurements.

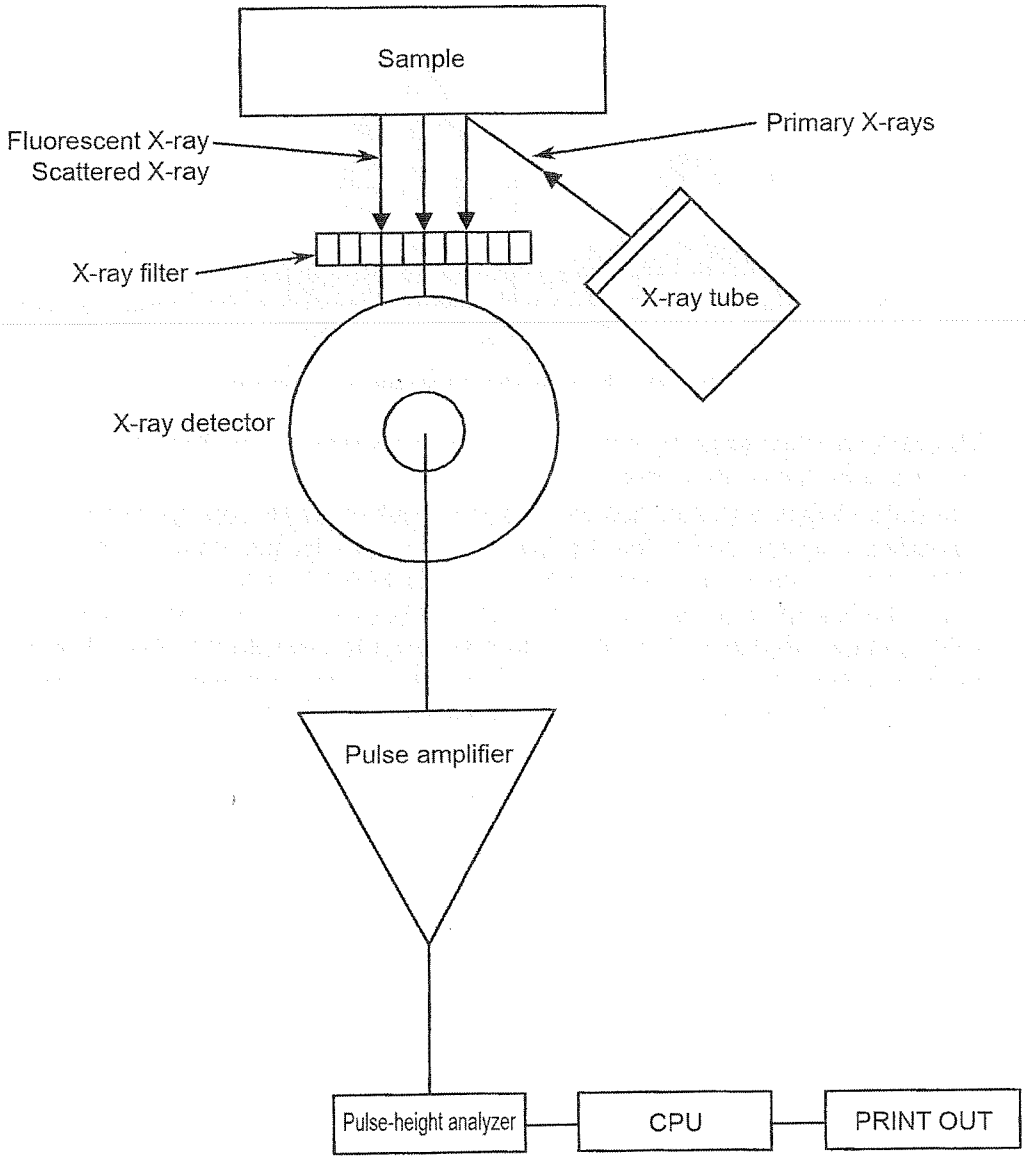


Fig. 83 Block diagram of measurement principle

When the high-voltage power is sent to the X-ray tube, X-rays (called as primary X-rays) are radiated from the X-ray tube to the sample. Some of the radiated X-rays excite certain atoms, e.g., sulfur atoms, generating fluorescent X-rays, and the partial remaining X-rays are scattered.

These fluorescent and scattered X-rays are detected by the X-ray detector. The X-ray filter is located just before the detector. This filter is used to allow the fluorescent X-rays from sulfur to pass through selectively. In the X-ray detector, electric pulses are generated in proportion to

the energy of the incoming X-rays. These electric pulses are amplified by the pulse amplifier and then sent as voltage pulses to the pulse-height analyzer.

The pulse-height values of the pulses output from the pulse amplifier are plotted on the horizontal axis, and the pulse counts detected within a given time are plotted on the vertical axis. This plotting results in a spectrum as shown in the figure below.

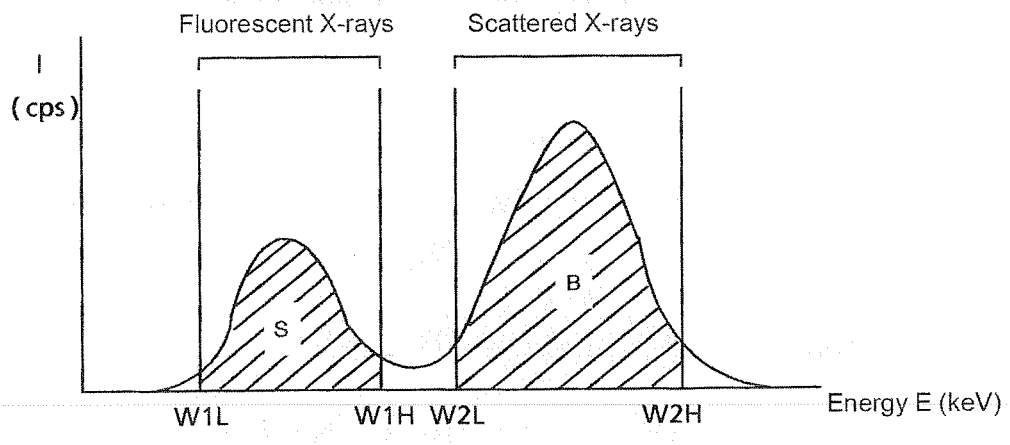


Fig. 84 Schematic diagram of spectrum

This spectrum is stored in memory in the microcomputer and then used for calculations after various corrections are added to it.
The pulse-height analyzer has the two previously-specified energy ranges (hereinafter called "windows"), which are (1) the window equivalent to the fluorescent X-rays from sulfur (W1L-W1H), and (2) the window equivalent to the scattered X-rays (W2L-W2H).
The pulse-height analyzer counts the number of electric pulses of the X-rays which come into each window, during a given time, and obtains the integrated values. The integrated values are converted into a count per second and used in the calculations. The quantities of X-rays which come into the windows are called the quantity of fluorescent X-rays from sulfur, S (cps), and the quantity of scattered X-rays, B (cps).

The analyzer calculates the K value, which is the ratio of NS to NB (K = NS/NB) and uses it as the measured value. The determined value (%) is obtained from the K value by using the coefficients for the calibration curve.
However, since X-rays are absorbed by air, the quantities of X-rays, NS and NB vary depending on the density of air, which is determined by temperature and atmospheric pressure, even when the same sample is measured. For this reason, the analyzer incorporates sensors for temperature and atmospheric pressure so that stable measurement can be made by correcting the influence of air.

USB output format

This product provides a USB (A) connector at the front panel for data writing with USB flash drive connected, and a USB (B) connector at the rear panel for communication with the PC via the USB cable.

Note

- **Note that some USB flash drives may not work with the SLFA. In this case, try with another type. If you need the USB flash drive manufactured and verified by HORIBA, contact your local service representative.**
- **The data size to be saved depends on the measurement condition and output condition.**
- **Insert the USB flash drive before starting the measurement.**

Output to USB flash drive

1. **Insert the USB flash drive formatted by the analyzer (refer to "USB flash drive setting" (page 11)) to the USB (A) connector on the front panel.**
   The USB flash drive icon is displayed on the menu.

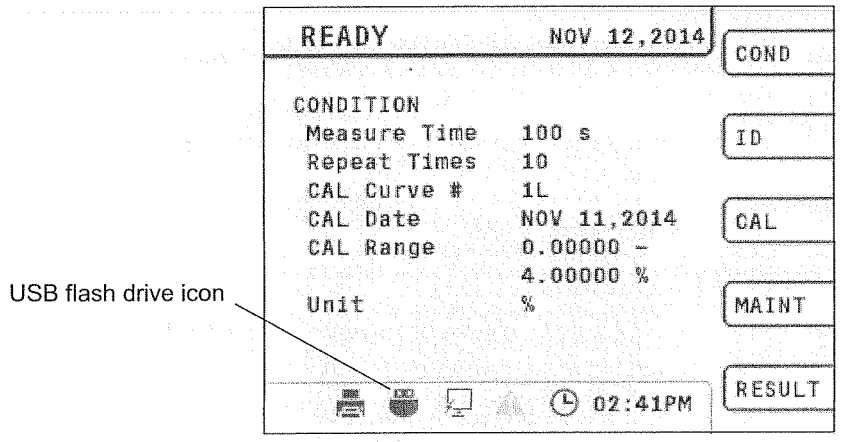
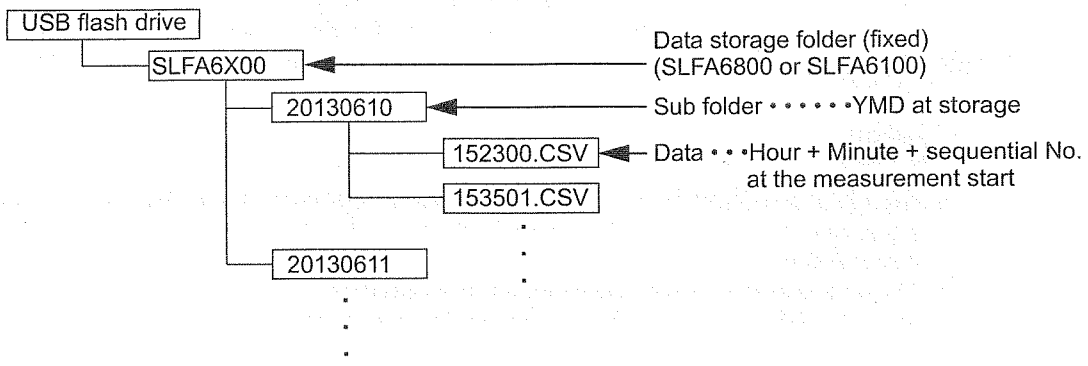


Fig. 85 USB flash drive icon

2. **The data is written to the USB flash drive in the CSV format, when the following case.**
   - Measurement
   - Spectrum measurement
   - Automatic calibration
   - Manual calibration (coefficient input)
   - Manual calibration (measurement value input)
   - CHECK1
   - CHECK2
   - DETAIL menu
   - RESULT menu
   - RESULT LIST menu
   - ALL RESULT menu (only for SLFA-6800)

Data is written to the following folders.



Tip

For the data of same time and minute in the same sub folder, a sequential number is attached to the data from 00 in the order to be saved.

Caution in handling USB flash drive

- The timing when the file for writing the data is opened is shown below.

Operation	Data write timing
Measurement	When the first measurement has been completed (repeat times: 2 times or more) When the measurement has been completed (repeat times: 1 time)
Spectrum measurement	When the measurement has been completed
Automatic calibration	When the first measurement of No.1 standard sample has been completed (repeat times: 2 times or more) When the measurement of No.1 standard sample has been completed (repeat times: 1 time)
CHECK2	When the first measurement (PC 1000 V) has been completed
Manual calibration (MAN1, MAN2)	When the MEMORY button has been pressed
RESULT output	
CHECK1	
CALIBRATION output	

- Insert the USB flash drive before starting the measurement.
  In the case of repetitive measurement, automatic calibration, or CHECK2, the data file is opened when the first measurement has been completed, and the data is appended from the second time measurement.

Writing format

Note

- An item marked with "X" is output according to each mode: STANDARD, ADVANCED or SERVICE.
- During repetitive measurements, the items between Repeat Count and P (hPa) are output up to the number of repetitions.
- For a SLFA-6800, POS# items are output. For a SLFA-6100, POS# items are not available.
- When outputting from the RESULT menu, the spectrum data (CH(X) to 255) is not output.

Measurement

			6800 Only	STANDARD	ADVANCED	SERVICE
182100.csv		File name (Name is measurement start time)		X	X	X
Measure		Function (Measurement/Calib/Spectrum)		X	X	X
ModeDipSwitch	0	Number of dip switch on PCB				X
Date	2014/10/30	Date		X	X	X
Time	16:42	Measurement start time		X	X	X
CAL Curve #	1L	Calibration curve number		X	X	X
Measure Time(sec)	10	Measurement time		X	X	X
Repeat(times)	1	Repetition count		X	X	X
Warm Up	Finished	Warm up condition		X	X	X
ID	JPI	ID		X	X	X
Seq	3	Sequence number		X	X	X
POS	1	Turntable POS#	X	X	X	X
RepeatCount	1	Number of repetition count		X	X	X
Ch(X)	Y					X
0	0	Count value on channel 0				X
1	0	Count value on channel 1				X
2	0	Count value on channel 2				X
:	:	:				
254	1	Count value on channel 254				X
255	3	Count value on channel 255				X
Result	1.03518	Measurement result		X	X	X
Unit	%	Unit		X	X	X
S INT(CPS)	32506.5	Sulfur fluorescent X-ray counting rate			X	X
B INT(CPS)	66296.7	Backscatter X-ray counting rate			X	X
T INT(CPS)	116375.3	Total counting rate			X	X
E INT(CPS)	3280.1	Pile-up counting rate			X	X
K(MEASURE)	0.49032	K (=S/B) measurement value			X	X
K(CORR COEF)	0.49393	K value after correction by temperature and humidity			X	X
CORR COEF	1.0074	Correction coefficient of K			X	X
T(°C)	27.1	Temperature (°C)			X	X
P(hPa)	1023.8	Atmospheric pressure (hPa)			X	X
AVE	1.03518	Average of measurement value		X	X	X
AVE(K)	0.49393	Average of K value		X	X	X
STD	0	Standard deviation of measured value		X	X	X
STD(K)	0	Standard deviation of K value		X	X	X

Spectrum measurement

- When the Daily Check Printing is set to ON, the calibration curve data, the internal condition, and the software versions are also printed.
- The printed items of the calibration curve data depend on the creating method (automatic /manual (MAN, MAN2)).
- The items other than the temperature and the atmospheric pressure shown in "CHECK1" (page 87) are printed as the internal condition.

182000.csv		File name (Name is measurement start time)
Daily Check		Daily Check Printing is ON ——— This is output only when Daily Check Printing is ON
Spectrum		Function (Measurement/Calib/Spectrum)
Date	2013/6/17	Date
Time	18:20	Measurement start time
CAL Curve #	1L	Calibration curve number
Measure Time(sec)	10	Measurement start time
Repeat(times)	1	Repetition count
Warm Up	Finished	Warm up condition
ID	JPI 1.02	ID
RepeatCount	1	Number of repetition count
Ch(X)	Y	
0	0	Count value on channel 0
1	0	Count value on channel 1
2	0	Count value on channel 2
:	:	:
254	3	Count value on channel 254
255	1	Count value on channel 255
Result	1.0593	Measurement result
Unit	%	Unit
S INT(CPS)	32506.5	Sulfur fluorescent X-ray counting rate
B INT(CPS)	66296.7	Backscatter X-ray counting rate
T INT(CPS)	116375.3	Total counting rate
E INT(CPS)	3280.1	Pile-up counting rate
K(MEASURE)	0.49032	K (=S/B) measurement value
K(CORR COEF)	0.49393	K value after correction by temperature and humidity
CORR COEF	1.0047	Correction coefficient of K
T(°C)	27.1	Temperature (°C)
P(hPa)	1023.8	Atmospheric pressure (hPa)
AVE	1.03518	Average of measurement value
AVE(K)	0.49393	Average of K value
STD	0	Standard deviation of measured value
STD(K)	0	Standard deviation of K value
	:	
(Calibration curve of automatic/manual (MAN1, MAN2))		This is output only when Daily Check Printing is ON
	:	
(The items of CHECK 1 other than the temperature and the atmospheric pressure)		
	:	
Version		
Controller	1.01	Controller software version
Signal Processor	1.02	Signal processor software version

Automatic calibration

- An item marked with "X" is output according to each mode.
- During repetitive measurements, the items between RepeatCount and S INT(CPS) and K(XX/XX) are output up to the number of repetitions.
- The items between STD #XX(%) and average K are output up to the number of calibration points.
- For SLFA-6800, POS# items are output. For SLFA-6100, POS# items are not available.

			6800 Only	STANDARD ADVANCED	SERVICE
190900.csv		File name (Name is measurement start time)		X	X
Calibration-Auto		Function (Measurement/Calib/Spectrum)		X	X
ModeDipSwitch	0	Number of dip switch on PCB			X
Date	2014/10/30	Date		X	X
Time	19:09	Measurement start time		X	X
CAL Curve #	3H	Calibration curve number		X	X
Measure Time(sec)	200	Measurement time		X	X
Repeat(times)	3	Repetition count		X	X
Num of STD	4	Number of standard sample		X	X
Calibration Degree	2	Calibration Degree (1 or 2 or Auto)		X	X
POS	1	Turntable POS#	X	X	X
STD #01(%)	0	No.1 standard value		X	X
S INT(CPS)		1st time sulfur fluorescent X-ray counting rate			X
B INT(CPS)		1st time backscatter X-ray counting rate			X
T INT(CPS)		1st time total counting rate			X
E INT(CPS)		1st time pile-up counting rate			X
K(01/03)	0.08720	1st time K (=S/B) measurement value		X	X
S INT(CPS)		2nd time sulfur fluorescent X-ray counting rate			X
:	:	:			
E INT(CPS)		3rd time pile-up counting rate			X
K(03/03)	0.08724	3rd time K (=S/B) measurement value		X	X
average K	0.08722	Average of No.1 measurement value (K value)		X	X
STD #02(%)	0.47	No.2 standard value		X	X
:	:	:			
average K	0.26974	Average of No.2 measurement value (K value)		X	X
:	:	:			
average K	1.61973	Average of No.4 measurement value (K value)		X	X
QUADRATIC		Degree of calibration curve (LINEAR, QUADRTIC)		X	X
Formula(%)	A*K^2 + B*K + C	Formula		X	X
A	0.05750	Coefficient A		X	X
B	2.50873	Coefficient B		X	X
C	-0.21800	Coefficient C		X	X
Minimum Range(%)	0	Minimum Range(%)		X	X
Maximum Range(%)	4.01	Maximum Range(%)		X	X
STD DEV	0.01403	Standard deviation		X	X
STD#01 (%)	0	No.1 standard value		X	X
STD#01 (K)	0.08722	Average of No.1 measurement value (K value)		X	X
STD#01 Subtraction	0.00126	Subtraction of No.1 measurement value (K value)		X	X
:	:	:			
STD#04 (%)	4.01	No.4 standard value		X	X
STD#04 (K)	1.61973	Average of No.4 measurement value (K value)		X	X
STD#04Subtraction	-0.01369	Subtraction of No.4 measurement value (K value)		X	X

MAN1

150900.csv		File name (Name is measurement start time)
Calibration-Manual1		Function (Measurement/Calib/Spectrum)
Date	2014/10/30	Date
Time	16:15	Calculation implementation time
CAL Curve #	3L	Calibration curve number
QUADRATIC		Degrees of calibration curve (LINEAR, QUADRTIC)
Formula(%)	A*K^2 + B*K + C	Formula
A	-0.18287	Coefficient A
B	2.35233	Coefficient B
C	-0.21424	Coefficient C
Minimum Range(%)	0	Minimum Range(%)
Maximum Range(%)	3.93	Maximum Range(%)

MAN2

The items between STD#XX(%) and STD#XX Subtraction are output up to the number of calibration points.

151000.csv		File name (Name is measurement start time)
Calibration-Manual2		Function (Measurement/Calib/Spectrum)
Date	2014/10/30	Date
Time	16:29	Calculation implementation time
CAL Curve #	4L	Calibration curve number
QUADRATIC		Degrees of calibration curve (LINEAR, QUADRTIC)
Formula(%)	A*K^2 + B*K + C	Formula
A	-0.76407	Coefficient A
B	3.24195	Coefficient B
C	-0.29433	Coefficient C
Minimum Range(%)	0	Minimum Range(%)
Maximum Range(%)	1.02	Maximum Range(%)
STD DEV	0	Standard deviation
STD#01 (%)	0	No.1 standard value
STD#01 (K)	0.09	Average of No.1 measurement value (K value)
STD#01 Subtraction	0	Subtraction of No.1 measurement value (K value)
STD#02 (%)	1	No.2 standard value
STD#02 (K)	0.5	Average of No.2 measurement value (K value)
STD#02 Subtraction	0	Subtraction of No.2 measurement value (K value)

CHECK1

For a SLFA-6800, the TBL STR, TBL UP, TBL DWN and POS items are output. For a SLFA-6100, these items are not available.

			6800 Only
151400.csv		File name (Name is measurement start time)	
Status Check		Function (Measurement/Calib/Spectrum)	
Date	2014/10/1	Date	
Time	15:14	Time	
S.Open	*	"*" is printed at open	
Sample	*	"*" is printed with sample	
AGC limit	-	"*" is printed when AGC reaches limit	
AGC OK	-	"*" is printed when AGC control is valid	
X RAY	*	"*" is printed when X-ray ON	
F OPEN	-	"*" is printed when filament open	
F SHORT	-	"*" is printed when filament short circuit	
TBL STR	-	"*" is printed when turntable is rotating	X
TBL UP	*	"*" is printed when turntable is up	X
TBL DWN	-	"*" is printed when turntable is down	X
PC	1148	Detector apply voltage setting value	
PV	1148	Detector apply voltage	
XH	803	Target voltage	
G1	1330	G1 voltage	
G2	201	G2 voltage	
FV	1171	Filament voltage	
XI	298	X-ray tube current	
T	27.0	Temperature (°C)	
P	1023.9	Atmospheric pressure (hPa)	
POS	1	Turntable POS#	X

CHECK2

The items between X/5 PC XXXX to 255 are output to each detector voltage; 1150 V, 1200 V, 1300 V and 1350 V.

151100.csv		File name (Name is measurement start time)
AGC-Check		Function (Measurement/Calib/Spectrum)
Date	2014/10/1	Date
Time	15:11	Time
1/5 PC 1150 [V]		Detector apply voltage 1150 V
Ch(X)	Y	
0	0	Count value on channel 0 (Detector apply voltage 1150 V)
:	:	
255	19	Count value on channel 255 (Detector apply voltage 1150 V)
2/5 PC 1200 [V]		Detector apply voltage 1200 V
:	:	:
5/5 PC 1350 [V]		Detector apply voltage 1350 V
Ch(X)	Y	
0	0	Count value on channel 0 (Detector apply voltage 1350 V)
:	:	:
255	9	Count value on channel 255 (Detector apply voltage 1350 V)

Data output to PC by USB cable connection

Installation of PC USB Driver

Supported OS: Windows 8 (64 bit), Windows 7 (32 bit or 64 bit)

Note

Use the USB cable which is within 2.5 meters in length.

1. **Select [Computer] from the start menu.**

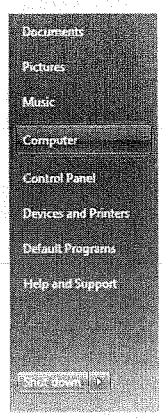


Fig. 86 Start menu

The explorer window is displayed.

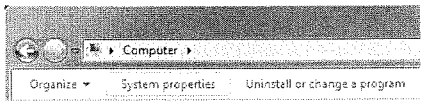


Fig. 87 Explorer window

2. **Click [System Property].**
   The control panel home window is displayed.

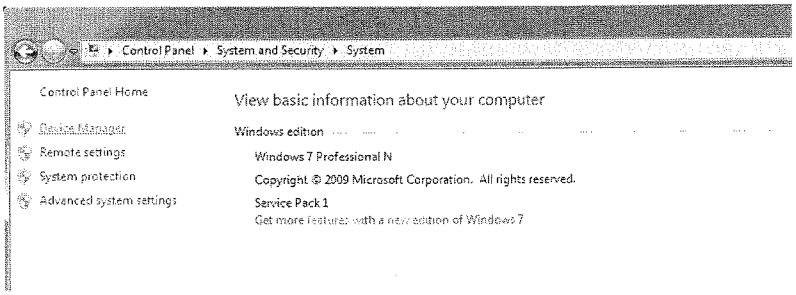


Fig. 88 control panel home window

3. **Click [Device Manager].**
   The device manager window is displayed.

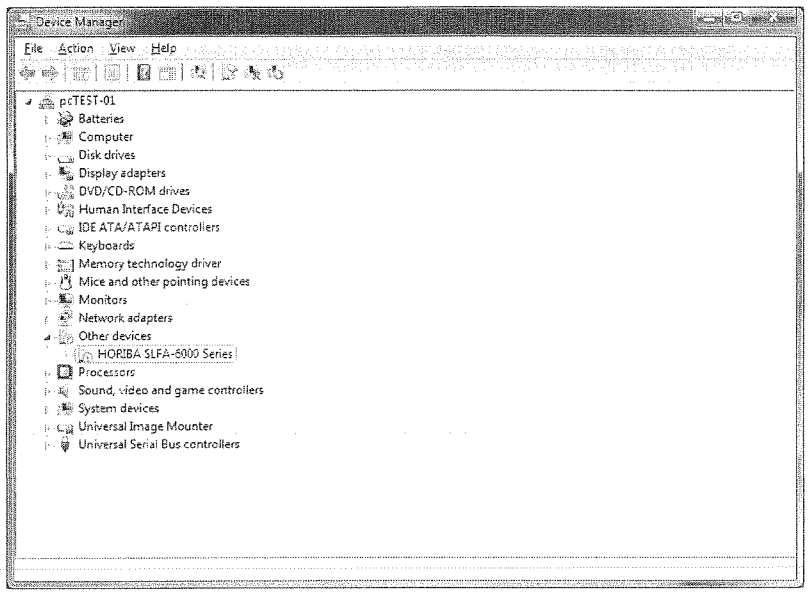


Fig. 89 Device manager window

4. **Click [Other device].**
5. **Right-click [HORIBA SLFA-6000 Series] displayed on the menu, and select [Update Driver Software] from the menu.**
   The updated window of the driver software is displayed.

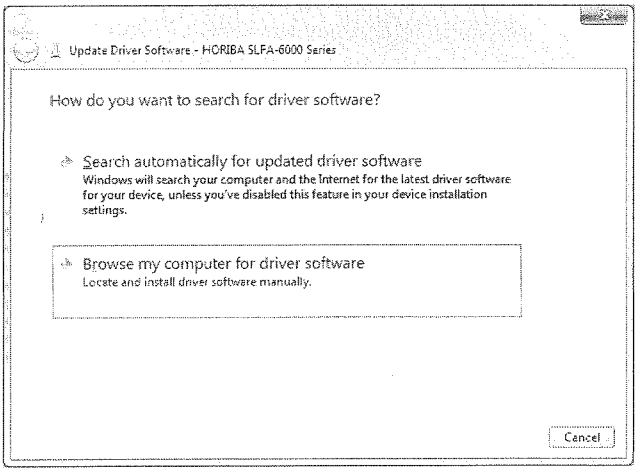


Fig. 90 Updated window

6. **Click [Browse my computer for driver software].**
   The updated window of the driver software is displayed.

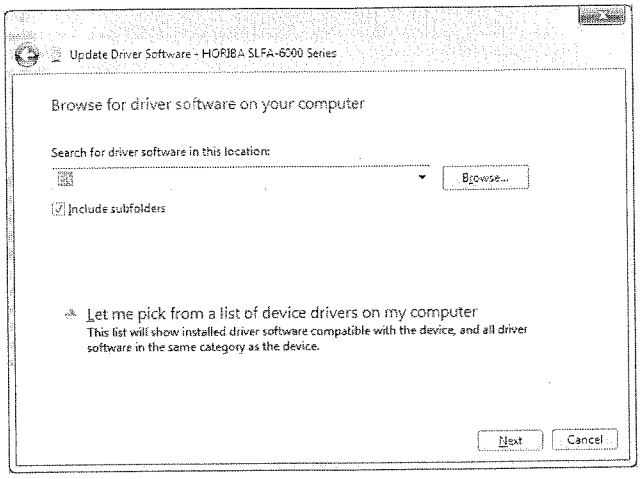


Fig. 91 Updated window of the driver software

7. **Insert the installation CD.**
8. **Click the [Browse] button, and select the drive to which the installation CD is inserted.**
9. **Place a checkmark on [Include subfolders], and click [Next].**
   The Windows Security window is displayed.

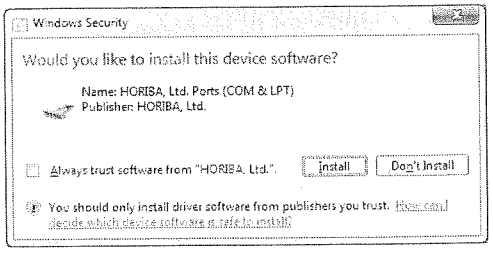
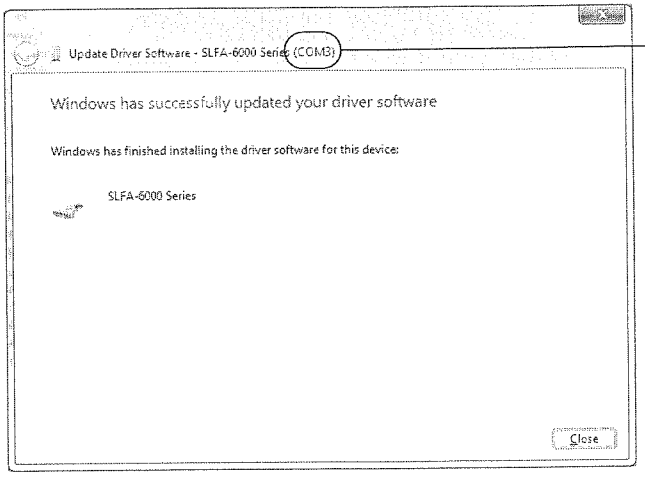


Fig. 92 Windows Security window

10. **Click the [Install] button.**
    When the installation normally completes, the following message is displayed.



COM port No.

* COM port number varies depending on the used PC and USB port. Record the port No. shown here for the port setting.

Fig. 93 Installation complete message

Now the analyzer and the PC are able to be communicated.

Uninstallation of PC USB Driver

Connect the analyzer and the PC by the USB cable. And turn ON the power switch on the rear panel.

1. **Operate same as steps 1. to 3. of "Installation of PC USB Driver" (page 88).**
   The device manager window is displayed.
2. **Click [Ports (COM & LPT)].**
3. **Right-click [SLFA-6000 Series (COM?)] displayed on the menu, and select the [Uninstall] from the menu. ("?" is the number of COM port.)**

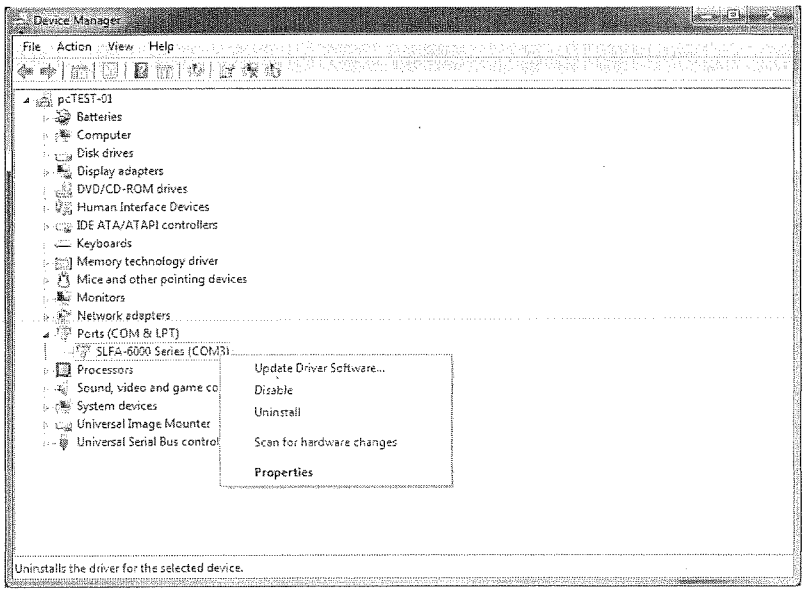


Fig. 94 device manager window

4. **Place a checkmark on [Delete the driver software for this device], and click [OK].**

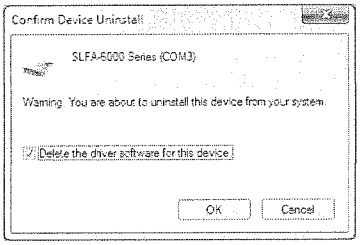


Fig. 95 Confirm Device Uninstall window

PC USB Driver is uninstalled.

Communication software

This analyzer functions as a virtual COM.
Prepare communication software using the COM port for the PC.

Data format

Basic format

STX	ID code	Data body	ETX
Number of character 1	2	Depends on data	1

STX : 02H
ETX : 03H
CR : 0DH

The data ID code (2 characters) is used to indicate the data contents to be transmitted, it also shows the status of data to be transmitted.
Each data is delimited by CR (0DH).
Each character is ASCII code of 7 bits.

Port No. setting

Item	Description
COM port No.	COM port number that you refrain from step 10. on page 90.
Bit rate	9600 bps
Date bit	8 bit
Parity	ODD
Stop bit	1 bit
Flow control	None

Note

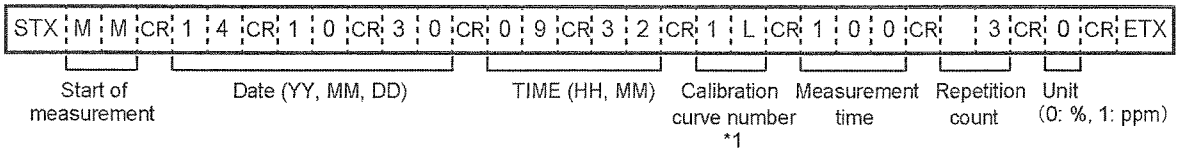
Set up the PC which receives data not to enter neither the standby mode nor hibernation mode during connection with SLFA-6100/SLFA-6800.
Since communication is impossible in standby mode or hibernation mode, "SERIAL CONNECTON FAIL" error occurs. When the PC becomes standby mode or hibernation mode, use after rebooting SLFA-6100/SLFA-6800 and the PC.

Transmission data

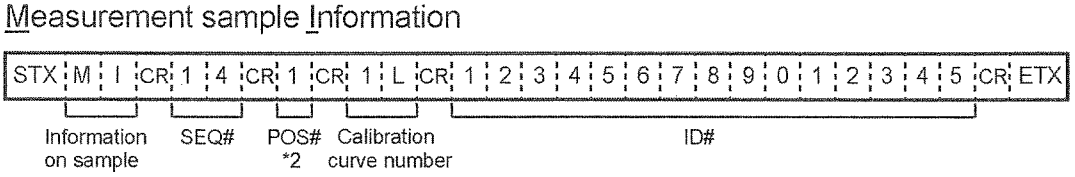
The data to be transmitted is as follows. Except for STX, ETX, and CR, all data is text data, and blank means a space.

At measurement

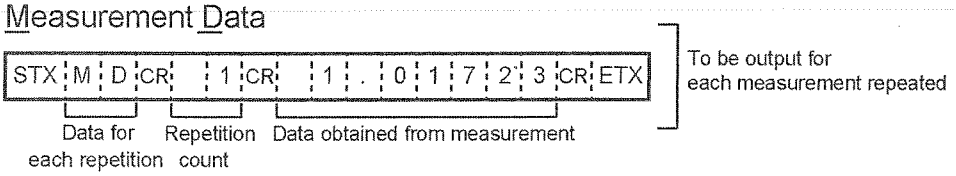
Measurement Mode



Measurement sample Information

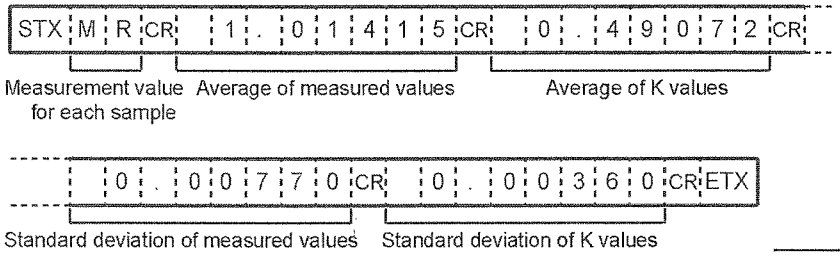


Measurement Data

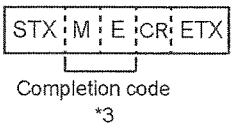


To be output for each sample

Measurement Result



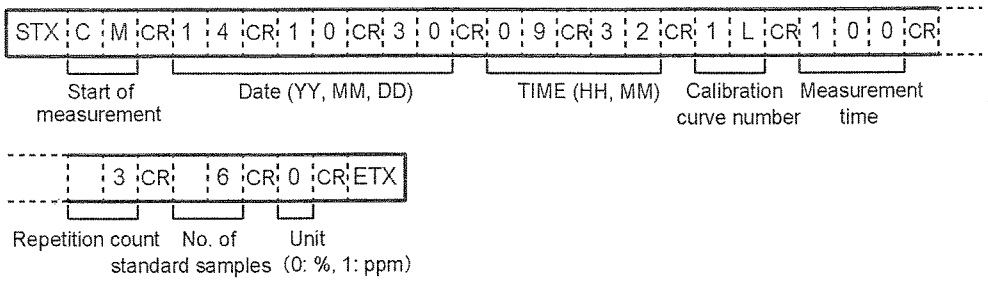
Measurement End



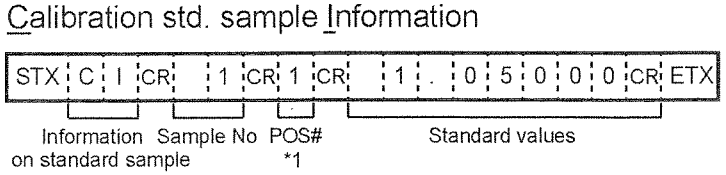
*1: In case of Auto mode, the alphabetical part become "A" .
*2: Here is a blank space for the models SLFA-6100.
*3: ME shows "normal completion" .
MA shows "abnormal completion" , e.g., that made by pressing the F4 key or that made due to an error.

At automatic calibration

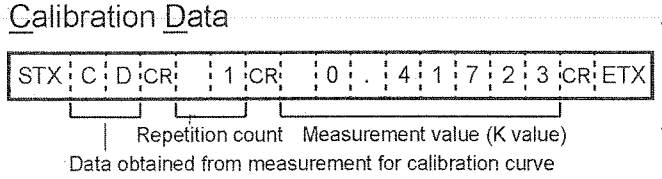
Calibration Mode



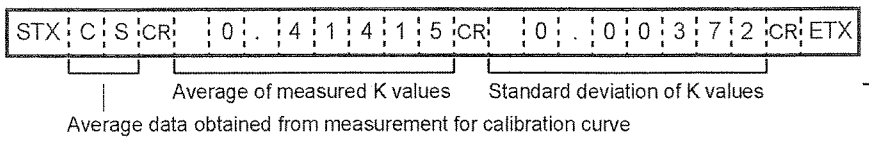
Calibration std. sample Information



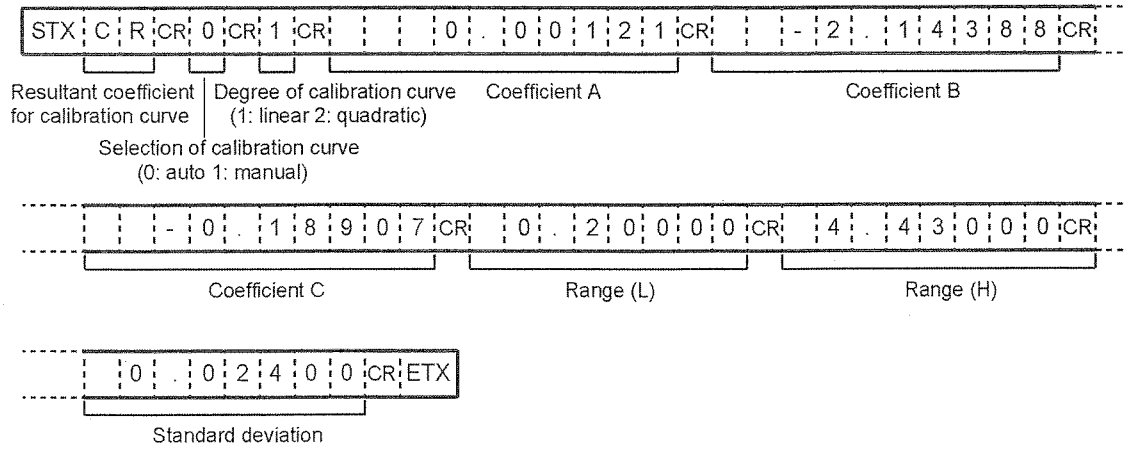
Calibration Data



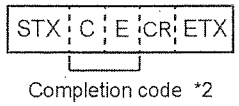
Calibration std. Sample data



Calibration Result



Calibration End

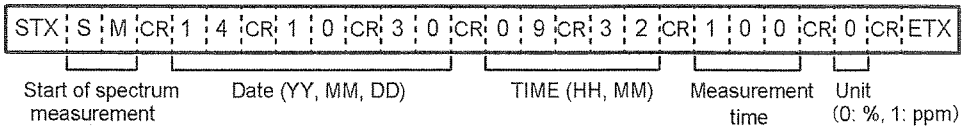


*1: Here is a blank space for the models SLFA-6100.

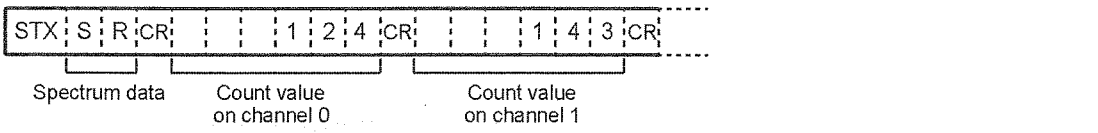
*2: CE shows "normal completion" .
CA shows "abnormal completion" , e.g., that made by pressing the F4 key or that made due to an error.

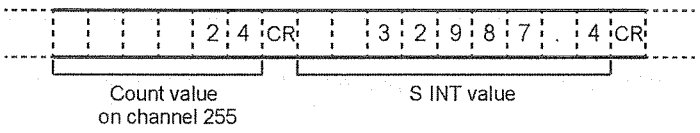
At spectrum measurement

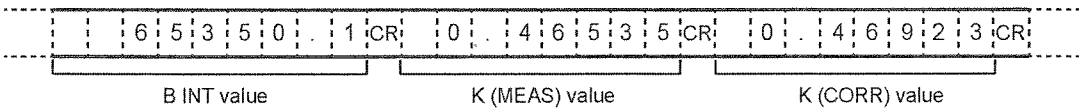
Spectrum measurement Mode

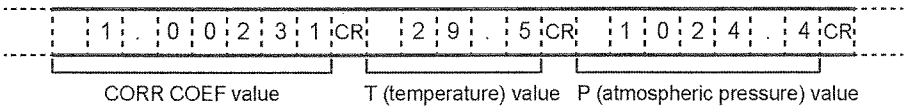


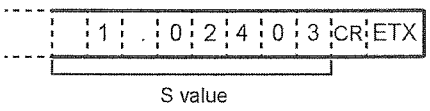
Spectrum measurement Result



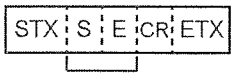








Spectrum measurement End

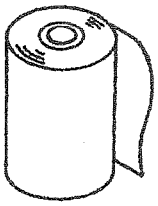
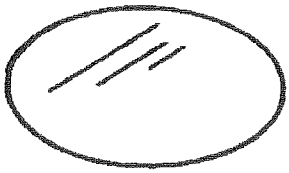
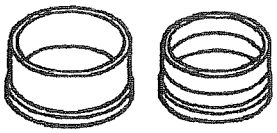
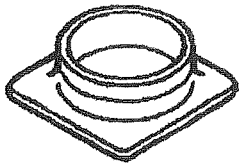
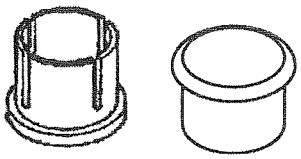
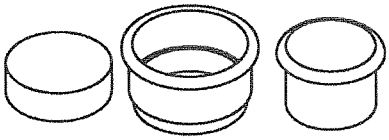
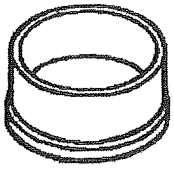
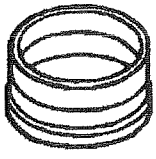


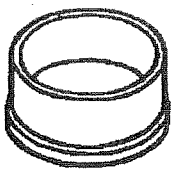
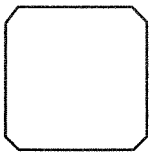
*1: SE shows "normal completion" .
SA shows "abnormal completion" , e.g., that made by pressing the F4 key or that made due to an error.

Specification

Model	SLFA-6100	SLFA-6800
Measuring principle	Fluorescent X-ray analysis	
X-ray generator	Maximum rating: 8 kV, 300 μA	
Measuring object	Sulfur content in sample of petroleum products such as heavy oil, naphtha, crude oil, etc.	
Range	0% to 9.9999%	
Repeatability	Less than 5 ppm (standard deviation with sample containing 1% sulfur)	
	Less than 1.6 ppm (standard deviation with sample containing 0% sulfur)	
C/H ratio error	Within ±50 ppm/(1 C/H), with sample containing 1% sulfur	
Detection limit	Less than 5 ppm (3 times of standard deviation)	
Number of calibration curve	15 (Automatic selection of 3 × 5 sets, manual setting available)	
Degree of calibration curve	Linear or quadratic (automatic setting or manual setting available)	
Calibration	By optional standard sample (2 to 20 calibration points)	
Sample cell	Exclusive liquid sample cell	
Amount of sample	4 mL to 10 mL	
Measurement time r	Selectable in the preset range of 10, 30, 100, 300, 600 or set arbitrary value in the range of 10 to 600	
Maximum number of samples	1	8
Operating temperature	5°C to 40°C	
Relative humidity	80% at maximum at the temperature from 5°C to 31°C, Linearly decreasing to 50% at the temperature from 31°C to 40°C	
Spectrum measurement	With spectrum measurement function Energy axis: 0 keV to 10 keV Intensity-value axis: automatically set	
External output	Output destination: PC (connected by USB cable) Output timing: ●Measurement ●Automatic calibration ●Spectrum measurement	
	Output destination: USB flash drive Output timing: ●Measurement ●Automatic calibration ●Spectrum measurement ●Output from the CHECK1 or CHECK2 menu ●Output from the Detail menu ●Output from the Result List menu	
Power source	100 V to 240 V AC ±10%, 50 Hz/60 Hz	
Power consumption	Approx. 150 VA	
External dimensions	403 mm (W) × 468 mm (D) × 210 mm (H)	
Mass	Approx. 21 kg	Approx. 23 kg

Consumable parts

Part name	Part No.	Appearance	Specification (unit)
Print paper	3200044058		5 rolls (1 box)
Cell window	3014065886		100 pcs (1 box)
Cell frame	3014050342		30 pcs (1 box)
Disposable cell	3014050343		100 pcs (2 boxes)
Holder for disposable cell (Holder A, B)	3014050344		1 set
Holder for PET cell	3014061196		1 set
PET cell	3200044230		100 pcs (1 box)
Inner frame for PET cell (PTFE)	3012217135		1 pc

Part name	Part No.	Appearance	Specification (unit)
Outer frame for PET cell (PTFE)	3012217134		1 pc
Filter	3200620514		5 sheets

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http://www.horiba.com

【Design Concept】

HORIBAグループのアプリケーション・イメージを全体的にコラージュ。
ナノサイズから地球レベルへと変化するスケールを水の流れるようなイメージでストーリー展開しています。

The HORIBA Group application images are collected in a collage of the following design:
Beginning from a nano-sized element, the scale of our story enlarges all the way up to the earth, incorporating a sinuous flow of water.