



EMC-11S-V/UV

Spectrophotomètre

Manuel de l'utilisateur

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1 Informations générales

1.1 Informations sur la sécurité

Déballez et lisez l'intégralité de ce manuel avant d'installer ou d'utiliser cet appareil. Faites attention à toutes les instructions de danger et d'avertissement. Le non-respect de ces consignes peut entraîner des blessures graves pour l'opérateur ou endommager l'appareil.

Pour garantir que la protection fournie par cet équipement n'est pas compromise, n'utilisez pas ou n'installez pas cet équipement d'une manière autre que celle spécifiée dans ce manuel.

En plus de suivre les instructions de ce manuel, l'utilisateur doit également se conformer aux réglementations nationales de base en matière de sécurité et de prévention des accidents dans le pays ou la région où l'instrument est utilisé.

1.1.1 Informations sur les dangers et les avertissements

Danger : Indique une situation potentiellement ou urgemment dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.

Avertissement : Indique une situation potentiellement dangereuse pouvant entraîner des blessures mineures ou modérées.

Important : Information sur laquelle il convient d'insister.

Note : Complément d'information au texte principal.

1.1.2 Label de prévention

Lisez toutes les étiquettes et tous les autocollants apposés sur l'instrument. Le non-respect de ces instructions peut entraîner des blessures ou endommager l'instrument. Si un symbole figure sur l'instrument, il sera inclus dans le manuel avec les instructions de danger ou d'avertissement.

	Attention Danger !
	Attention Haute tension !
	Attention !
	Recyclage Cet instrument sera rappelé par le service de traitement électrique désigné ou par le fabricant d'origine en cas de perte.

Tab. 1-1 Étiquette de prévention

1.2 Informations sur le produit

1.2.1 Aspect du produit



Fig. 1-1 Apparence

1 - Ecran TFT	2 - Bouton
3 - Clavier à membrane	4 - Salle d'échantillons
5 - Tige	

Tab. 1-2 Aspect de l'instrument

1.2.2 Description du produit

Ce modèle de spectrophotomètre peut être utilisé pour des analyses en laboratoire et sur le terrain. L'instrument peut effectuer des mesures photométriques et de concentration de base.

1.2.3 Fonctions

Ce modèle de spectrophotomètre contient les modes d'application suivants :

- **Mesure de l'absorbance**
Mesurer la valeur d'absorbance d'un échantillon.
- **Mesure de la transmissivité**
Mesurer la transmittance d'un échantillon.
- **Mesurer les échantillons standard pour mesurer la concentration de l'échantillon**
En mesurant la valeur d'absorbance d'un échantillon standard et en entrant la concentration correspondante, une courbe standard est établie à partir de l'origine, et la concentration de l'échantillon inconnu est mesurée à l'aide de la courbe standard.
- **Entrer le coefficient de l'équation pour mesurer la concentration**
Une courbe standard est établie en introduisant les coefficients K et B de l'équation de la courbe standard $C=K*A+B$, et utilisée pour mesurer la concentration de l'échantillon inconnu.
- **Mesure de l'énergie**
Mesurer la valeur de l'énergie lumineuse de l'échantillon et régler le gain d'énergie en fonction des besoins.

2 Spécifications

Modèle	EMC-11S-V	EMC-11S-UV
Gamme de longueurs d'onde	325-1000 nm	200-1000 nm
Largeur de bande spectrale	4 nm	4 nm
Système optique	Poutre unique, caillebotis 1200 lignes/mm	
Précision de la longueur d'onde	±2 nm	
Répétabilité de la longueur d'onde	1 nm	
Précision photométrique	≤±0,5 % T ou ±0,004A@1A	
Gamme photométrique	0-200 % T, -0,3 - 3A 0-19999 conc.	
Répétabilité photométrique	≤0.2 % T	
Mode photométrique	T, A, C, F	
Lumière parasite	0.2 % T	
Stabilité	±0,004A/h@500 nm	
Planéité de base	±0,001A (200-1000 nm)	
Bruit	0,003A@500 nm	
Détecteur	Photodiode en silicone	
Affichage	Écran couleur TFT	
Hauteur de la poutre centrale	15 mm	
Support de cellule standard	Porte-cellules à 4 positions 10x10 mm	
Source lumineuse	Lampe au tungstène	Lampe au tungstène et au deutérium
Sortie	Port USB et port parallèle pour l'imprimante	
Puissance requise	AC 85V~265V 50/60 Hz	
Dimensions (LxLxH)	440 x 350 x 200 mm	
Poids	8 kg	9 kg

3 Installation

3.1 Déballer l'instrument

Ce modèle de spectrophotomètre contient les éléments suivants :

- Spectrophotomètre 1 pc
- Guide d'installation rapide 1 pc
- Cuvette en verre 10 x 10 mm 4 pcs
- Cuvette en verre de quartz 10 x 10 mm 2 pcs (modèle UV uniquement)
- Cordon d'alimentation 1 pc
- Housse de protection 1 pc
- QR-Code (manuel de l'utilisateur et du logiciel), EMC-λ Lambda BASIC software), câble USB 1 set
- Certificat d'étalonnage 1 pc
- Chiffon en microfibre 1 pièce

Si l'un de ces éléments est manquant ou endommagé, contactez immédiatement le fabricant ou le revendeur.

Note : Conservez correctement le matériel d'emballage d'origine. Lorsque l'instrument est récupéré ou réparé, l'emballage d'origine doit être utilisé pour l'emballage et le transport afin d'éviter tout dommage pendant le transport.

3.2 Environnement opérationnel

Pour garantir les meilleures performances, les conditions suivantes doivent être remplies :

- **Éviter les environnements à température et humidité élevées**
Les meilleures conditions de travail sont une température de 16 ~ 35°C et une humidité inférieure à 80%.
- **Éviter les champs magnétiques externes puissants**
Tenez l'instrument aussi éloigné que possible des champs magnétiques ou électriques puissants ou de tout appareil électrique susceptible de générer des champs à haute fréquence.
- **Tenir à l'écart des gaz corrosifs**
Installer l'appareil dans un endroit exempt de poussière, de gaz corrosifs et de fortes vibrations.

L'instrument doit être placé sur une table de travail stable.

Éliminez tout obstacle ou matériau susceptible d'entraver la circulation de l'air sous et autour de l'instrument.

- **Exigences en matière d'alimentation**
La puissance requise est de 85~265V/50~60Hz. Si la tension locale n'est pas stable, un régulateur de tension est nécessaire.
- **L'alimentation doit avoir une bonne mise à la terre**
Utiliser le cordon d'alimentation approprié et le brancher sur une prise de terre.
- **Tenir à l'écart de la lumière directe du soleil**
- **Éviter les environnements poussiéreux**

3.3 Connexion

3.3.1 Raccordement électrique

Vérifiez que l'interrupteur d'alimentation de l'instrument est éteint. Insérez l'extrémité femelle du cordon d'alimentation dans le connecteur d'alimentation de l'instrument (1) et l'extrémité mâle dans la prise d'alimentation (3), comme illustré à la figure 3-1.

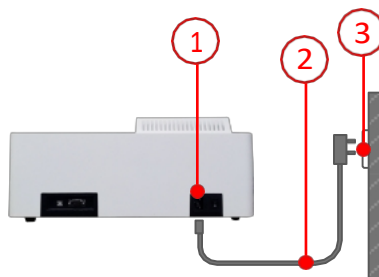


Fig. 3-1 Raccordement électrique

1 - Prise de courant	2 - Cordon d'alimentation
3 - Prise de courant	

Tab. 3-1 Instructions pour le branchement électrique

3.3.2 Connexion d'une imprimante série

Vérifiez que l'instrument et l'imprimante série sont tous deux hors tension. Insérez la sortie de l'adaptateur d'alimentation de l'imprimante (4) dans l'imprimante et branchez l'adaptateur sur une prise de courant (3), comme illustré à la figure 3-2. Connectez l'extrémité femelle du câble de données (5) au port série de l'instrument

(1) et l'extrémité mâle au port série de l'imprimante (2). Avant de mettre les deux appareils sous tension, assurez-vous que l'instrument est également connecté à une prise de courant (non illustrée).

Note : L'imprimante série est un accessoire optionnel et doit être achetée séparément.

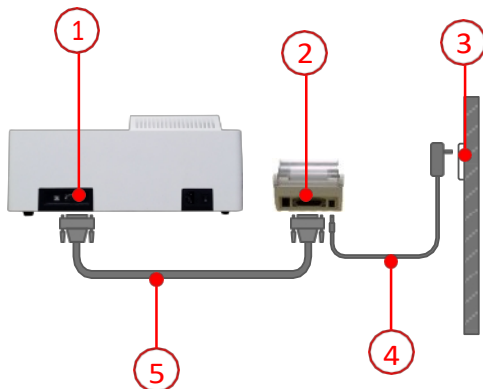


Fig. 3-2 Connexion de l'imprimante série

1 - Port d'imprimante série de l'instrument	2 - Port série de l'imprimante
3 - Prise de courant	4 - Adaptateur d'alimentation
5 - Ligne de communication série	

Tab. 3-2 Instructions de connexion de l'imprimante sérielle

3.3.3 Connexion à l'ordinateur

Comme le montre la figure 3-3, branchez une extrémité (1) du câble de communication USB (2) sur le port USB de l'instrument (type B, carré) et l'autre extrémité sur le port USB de l'ordinateur (type A, plat).

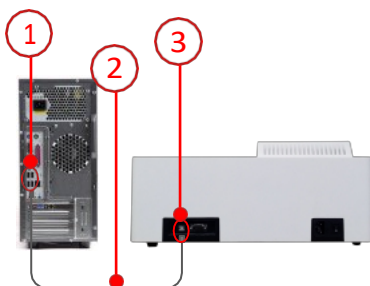


Fig. 3-3 Connexion de l'ordinateur

1 - Interface USB de l'ordinateur (Type A)	2 - Câble de communication USB
3 - Interface USB de l'instrument (type B)	

Tab. 3-3 Instructions de connexion à l'ordinateur

4 Démarrage

4.1 Allumer et éteindre l'instrument

- **Allumer l'instrument**

Branchez le cordon d'alimentation sur une prise de courant. Mettez l'appareil sous tension en appuyant sur l'interrupteur.

- **Éteindre l'instrument**

Mettez l'appareil hors tension en appuyant sur l'interrupteur et éteignez-le.

Remarque : Ne mettez pas l'instrument sous tension et hors tension en succession rapide. Attendez au moins 30 secondes avant de rallumer l'instrument, sous peine d'endommager les systèmes électroniques et mécaniques.

4.2 Initialisation et étalonnage du système

Retirez tout ce qui se trouve dans le canal de mesure, fermez le couvercle de la salle d'échantillonnage, puis mettez l'instrument sous tension pour accéder à l'interface de préchauffage (figure 4-1). L'utilisateur peut décider de sauter le processus de préchauffage en fonction de l'environnement d'utilisation et des exigences de mesure. Après le préchauffage, appuyez sur "**ENTER**" pour passer à l'initialisation du système (figure 4-2) et effectuez les procédures suivantes dans l'ordre : vérifiez le disque filtrant, le dispositif de commutation de la source lumineuse, étalonnez la longueur d'onde, étalonnez le courant d'obscurité et vérifiez l'énergie, puis entrez dans l'interface principale après avoir terminé.



Fig. 4-1 Échauffement

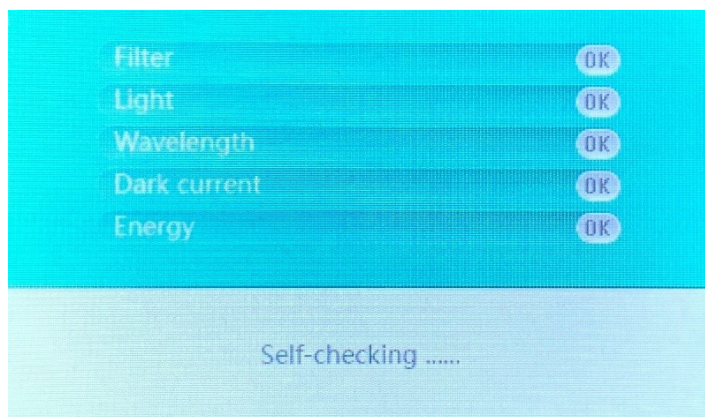


Fig. 4-2 Initialisation et étalonnage du système

5 Fonctionnement général

5.1 Pour commencer



Fig. 5-1 Panneau de commande





5.1.1 Utiliser le bouton

Le bouton de l'instrument a deux modes de fonctionnement.

- **Rotation**
Tourner le bouton pour passer en mode test dans l'interface principale. Tourner le bouton pour modifier la valeur du paramètre dans l'interface de paramétrage.
- **Appuyer sur**
Appuyer sur le bouton pour accéder à l'interface de réglage des paramètres dans l'interface de mesure. Appuyer sur le bouton pour changer la taille du pas de la modification du paramètre dans l'interface de réglage du paramètre.

5.1.2 Utiliser le clavier

L'instrument est doté d'un clavier à membrane pour un fonctionnement interactif.

	Quitter ou revenir à l'écran précédent
	Faire le vide
	Imprimer les données
	Confirmer l'opération ou les paramètres d'entrée







Tab. 5-1 Instructions relatives au clavier

5.1.3 Interface principale

Tournez le bouton pour sélectionner l'icône à l'écran. Appuyez sur "ENTER" pour accéder à l'application correspondante (figure 5-2).



Fig. 5-2 Interface principale

	<p>Mesure de l'absorbance Mesurer la valeur de l'absorbance de l'échantillon.</p>
	<p>Mesure de la transmissivité Mesure de la transmissivité de l'échantillon.</p>
	<p>Mesure de la concentration par rapport à un échantillon standard En mesurant la valeur d'absorbance d'un échantillon standard et en entrant la concentration correspondante, une courbe standard est établie avec l'origine. La concentration de l'échantillon inconnu est calculée à l'aide de la courbe standard.</p>
	<p>Mesure de la concentration à l'aide de l'équation des coefficients Une courbe standard est établie en introduisant les coefficients K et B de l'équation de la courbe standard $C=K \cdot A+B$, et la courbe standard est utilisée pour mesurer la concentration de l'échantillon inconnu.</p>
	<p>Mesure de l'énergie Mesurer la valeur de l'énergie lumineuse de l'échantillon et régler le gain d'énergie en fonction des besoins.</p>
	<p>Système Informations générales sur le système</p>

Tab. 5-2 Description de la fonction d'application

5.1.4 Opérations courantes

- **Paramètres de réglage**
Dans le module de mesure, appuyez sur le bouton pour faire apparaître l'interface de réglage. Tourner le bouton dans le sens des aiguilles d'une montre/antihoraire (+/-) pour régler le paramètre. Appuyer sur le bouton dans l'interface de réglage pour passer à l'étape du paramètre. Appuyer sur "**ENTER**" pour confirmer la saisie.
- **Faire le vide**
Dans le module de mesure (à l'exception du mode énergie), placez la référence dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur "**ZERO**" pour étalonner le blanc.
- **Échantillon de mesure**
Placer l'échantillon dans le canal de mesure et fermer la salle des échantillons. La valeur mesurée de l'échantillon s'affiche automatiquement. Attendez que la valeur se stabilise à l'écran.

6 Mesures

6.1 Lignes directrices importantes

- Les réactifs et les tampons de dilution peuvent provoquer des cautérisations et d'autres dommages pour la santé.
- Les échantillons (acides nucléiques, protéines, cultures bactériennes) peuvent être infectieux et causer de graves dommages à la santé.
- Lors de la préparation des échantillons, des procédures de mesure, des travaux d'entretien et de nettoyage, il convient de respecter toutes les mesures de sécurité locales du laboratoire (par exemple, porter des vêtements et des gants de protection, utiliser un désinfectant) en ce qui concerne la manipulation du matériel d'échantillonnage.
- Les solutions de mesure et les produits de nettoyage et de désinfection doivent être éliminés conformément aux réglementations locales en vigueur dans les laboratoires.

6.2 Préparer et vérifier

- Afin de garantir la précision des résultats de la mesure, l'instrument doit être complètement réchauffé avant la mesure.
- Si la plage de mesure se situe dans le domaine de l'ultraviolet, il faut utiliser des cuvettes en quartz.

Important : Des cuves en verre de quartz doivent être utilisées lorsque la longueur d'onde est inférieure à 320 nm.

6.3 Mesure de l'absorbance

Sur l'écran principal, tournez le bouton jusqu'à l'icône "Absorbance" et appuyez sur "**ENTER**" pour lancer le programme de mesure de l'absorbance (Figure 6-1).

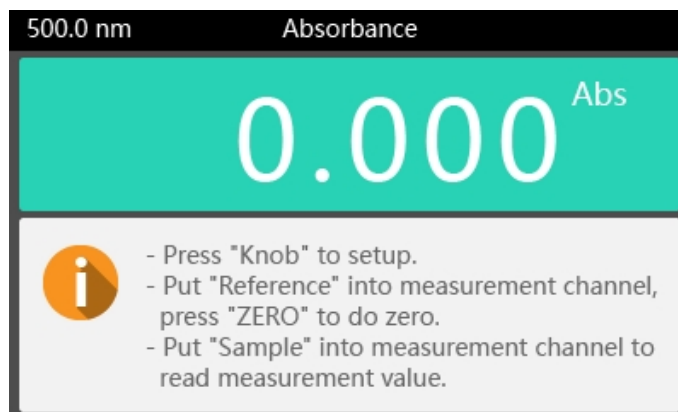


Fig. 6-1 Mesure de l'absorbance

- 1 Appuyer sur le bouton pour ouvrir l'interface de réglage (figure 6-2), tourner le bouton pour modifier la longueur d'onde de mesure et appuyer sur "**ENTER**" pour confirmer.

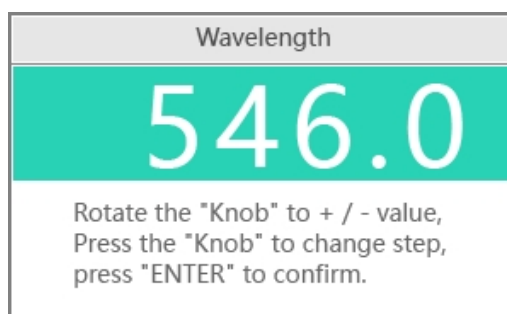


Fig. 6-2 Réglage de la longueur d'onde de mesure

- 2 Placez la "référence" dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur "**ZERO**" pour faire le vide.
- 3 Placer l'échantillon à mesurer dans le canal de mesure, fermer la salle des échantillons et attendre que la valeur mesurée se stabilise à l'écran.

6.4 Mesure de la transmissivité

Sur l'écran principal, tournez le bouton jusqu'à l'icône "Transmissivité" et appuyez sur "**ENTER**" pour lancer le programme de mesure de la transmission (figure 6-3).



Fig. 6-3 Mesure de la transmissivité

- 1 Appuyer sur le bouton pour ouvrir l'interface de réglage (figure 6-4), tourner le bouton pour modifier la longueur d'onde de mesure et appuyer sur "**ENTER**" pour confirmer.

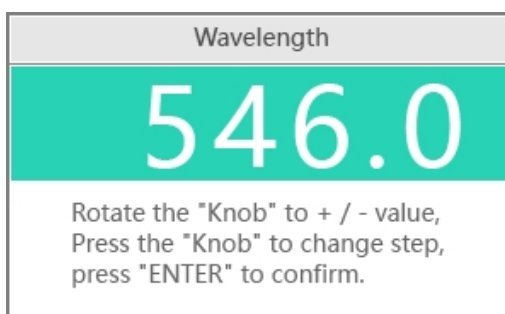


Fig. 6-4 Réglage de la longueur d'onde de mesure

- 2 Placez la "référence" dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur "**ZERO**" pour faire le vide.
- 3 Placer l'échantillon à mesurer dans le canal de mesure, fermer la salle des échantillons et attendre que la valeur mesurée se stabilise à l'écran.

6.5 Mesure de la concentration par rapport à un échantillon standard

Sur l'écran principal, tournez le bouton jusqu'à l'icône "Concentration" et appuyez sur "**ENTER**" pour lancer le programme de mesure de la concentration à l'aide d'un échantillon standard (figure 6-5).

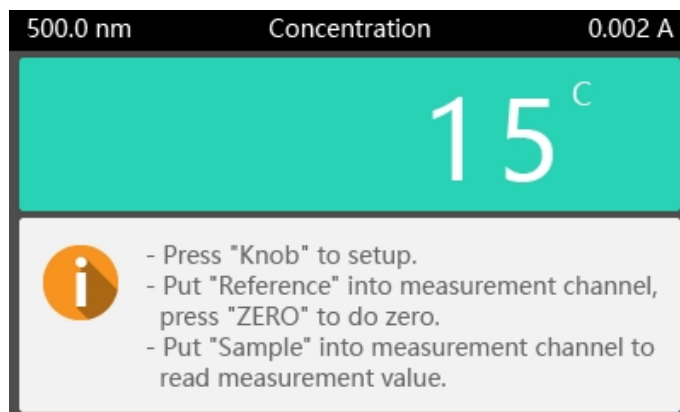


Fig. 6-5 Mesure de la concentration par rapport à l'échantillon standard

- 1 Appuyer sur le bouton pour ouvrir l'interface de réglage (figure 6-6), tourner le bouton pour modifier la longueur d'onde de mesure et appuyer sur **"ENTER"** pour confirmer.

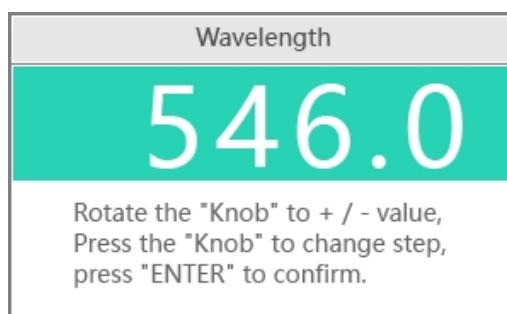


Fig. 6-6 Réglage de la longueur d'onde de mesure

- 2 Conformément à l'invite (figure 6-7), placez la "référence" dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur **"ENTER"** pour effectuer la mise à blanc.

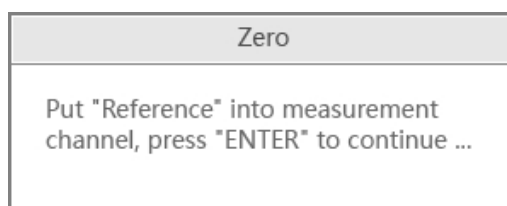


Fig. 6-7 Faire le vide

- 3 Placez l'"échantillon standard" dans le canal de mesure, fermez la salle des échantillons et tournez le bouton pour entrer la concentration de l'échantillon standard (figure 6-8). Appuyez sur **"ENTER"** pour terminer la mesure de l'échantillon standard.

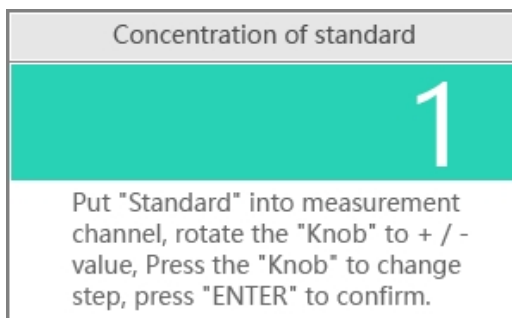


Fig. 6-8 Mesure de l'échantillon standard

- 4 Placez la "référence" dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur "**ZERO**" pour faire le vide.
- 5 Placer l'échantillon à mesurer dans le canal de mesure, fermer la salle des échantillons et attendre que la valeur mesurée se stabilise à l'écran.

6.6 Mesure de la concentration à l'aide des coefficients d'équation

Sur l'écran principal, tournez le bouton jusqu'à l'icône "Factor" et appuyez sur "ENTER" pour lancer le programme de mesure de la concentration à l'aide de coefficients (figure 6-9).

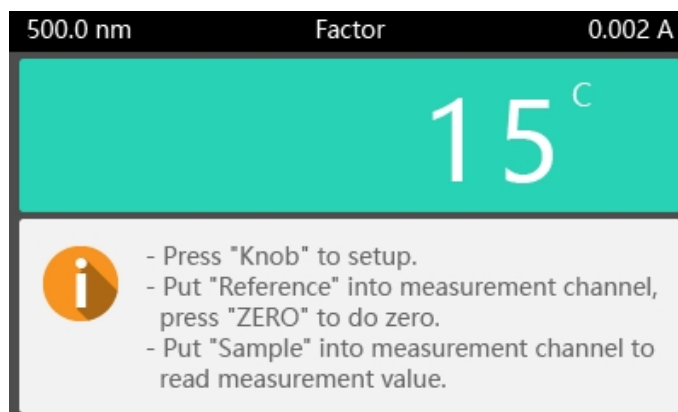


Fig. 6-9 Introduire le coefficient d'équation pour mesurer la concentration

- 1 Appuyez sur le bouton pour ouvrir l'interface de réglage (figure 6-10), tournez le bouton pour modifier la longueur d'onde de mesure et appuyez sur "ENTER" pour confirmer.

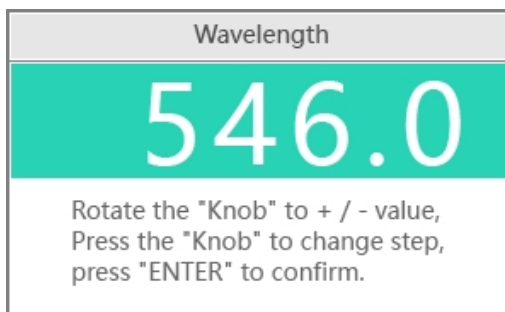


Fig. 6-10 Réglage de la longueur d'onde de mesure

- 2 En fonction de l'invite (Figure 6-11), entrez les valeurs de la pente K et de l'ordonnée à l'origine B de l'équation $C=K*A+B$, et appuyez sur "ENTER" pour terminer.

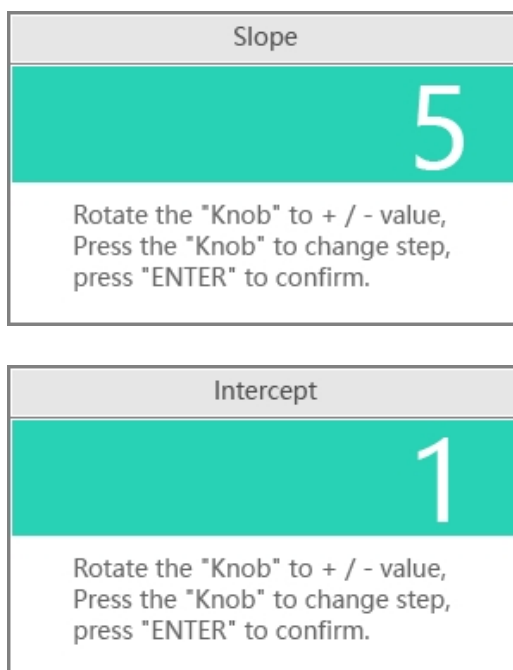


Fig. 6-11 Pente et ordonnée à l'origine

- 3 Placez la "référence" dans le canal de mesure, fermez la salle d'échantillonnage et appuyez sur "ENTER" pour faire le vide.
- 4 Placer l'échantillon à mesurer dans le canal de mesure, fermer la salle des échantillons et attendre que la valeur mesurée se stabilise à l'écran.

6.7 Mesure de l'énergie

Sur l'écran principal, tournez le bouton jusqu'à l'icône "Energy" et appuyez sur "ENTER" pour entrer (figure 6-12).

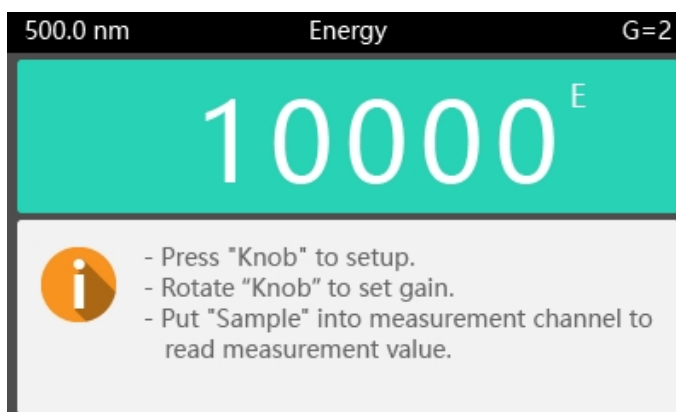


Fig. 6-12 Mesure de l'énergie

- 1 Appuyer sur le bouton pour ouvrir l'interface de réglage (figure 6-13), tourner le bouton pour modifier la longueur d'onde de mesure et appuyer sur "**ENTER**" pour confirmer ;

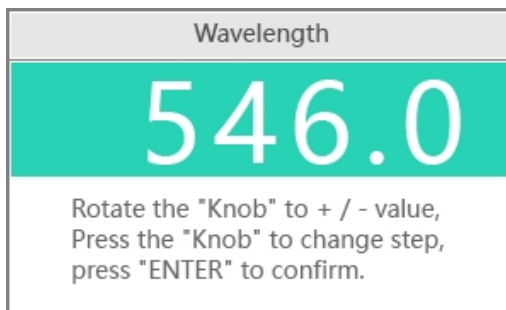


Fig. 6-13 Réglage de la longueur d'onde de mesure

- 2 Tournez le bouton pour régler le gain de l'amplificateur (1, 2, 4 ou 8 fois).
- 3 Attendre que la valeur mesurée se stabilise à l'écran. Cette méthode est réalisée sans échantillon ni référence.

7 Réparation et entretien

Afin de maintenir l'instrument dans les meilleures conditions de fonctionnement, il convient d'en assurer l'entretien quotidien. Ce chapitre présente certains éléments auxquels vous devez prêter une attention particulière afin de pouvoir résoudre facilement certains problèmes mineurs.

7.1 Entretien quotidien

- **Vérifier la salle d'échantillonnage**
Après la mesure, les cuves contenant les solutions d'échantillon doivent être retirées à temps du compartiment. La volatilisation de la solution pourrait faire moisir le miroir. Il convient d'accorder une attention particulière aux échantillons corrosifs et aux liquides faciles à volatiliser. Toute solution restant dans le compartiment doit être essuyée immédiatement.
- **Surface propre**
Le couvercle de l'instrument est verni. Veuillez utiliser une serviette humide pour essuyer immédiatement les gouttes sur la surface. N'utilisez pas de solution organique pour nettoyer le couvercle. Veuillez essuyer la saleté sur le couvercle à temps.
- **Nettoyer les cuves**
Après chaque test ou après un changement de solution, les cuves doivent être soigneusement nettoyées. Dans le cas contraire, les résidus présents sur la surface peuvent entraîner des erreurs de mesure.

7.2 Dépannage

- **Mise sous tension, pas de réponse**

Causes possibles	Solution
L'alimentation électrique de l'instrument n'est pas activée	Mettre l'alimentation électrique sous tension
La connexion du cordon d'alimentation n'est pas fiable	Améliorer la connexion
Fusible détruit	Remplacer le fusible (voir 7.3.1)

- **Boot, erreur de positionnement de la source lumineuse lors de l'autocontrôle**

Causes possibles	Solution
Chemin lumineux bloqué	Vérifier le trajet de la lumière et éliminer les obstacles
Source lumineuse endommagée	Remplacer la lampe (voir 7.3.2)

- **Boot, erreur de positionnement du filtre lors de l'autocontrôle**

Causes possibles	Solution
Le moteur d'entraînement de la roue filtrante est endommagé	Contactez nous

- **Erreur d'amorçage, de courant d'obscurité pendant l'autocontrôle**

Causes possibles	Solution
La salle d'échantillonnage est ouverte pendant l'autotest	Fermez la salle d'échantillons et redémarrez

Boot, erreur d'étalonnage de la longueur d'onde lors de l'autocontrôle

Causes possibles	Solution
Le trajet de la lumière est bloqué dans le canal de mesure	Effacer le canal de mesure, fermer le salle d'échantillonnage, et redémarrer
La salle d'échantillonnage est ouverte pendant l'autotest	Fermez la salle d'échantillons et redémarrez
Le moteur d'entraînement de la longueur d'onde est endommagé	Contactez nous
La longueur d'onde du capteur de positionnement initial est endommagé	Contactez nous

L'imprimante ne fonctionne pas, erreur d'impression

Causes possibles	Solution
L'alimentation électrique de l'imprimante n'est pas sous tension	Mettre l'alimentation électrique sous tension
La connexion du cordon d'alimentation n'est pas fiable	Améliorer la connexion
La connexion du câble de communication série est pas fiable	Améliorer la connexion

Relevés instables ou imprécis

Causes possibles	Solution
L'échauffement ne suffit pas	S'échauffer plus longtemps
L'échantillon n'est pas stable	Améliorer l'échantillon
Concentration de l'échantillon trop élevée	Diluer l'échantillon
Tension d'alimentation faible ou instable	Améliorer l'alimentation électrique
Endommagement de la lampe ou durée de vie de la lampe	Remplacer la lampe (voir 7.3.2)
Mauvaise adaptation des cuvettes	Améliorer la concordance des cuvettes
Erreur de longueur d'onde	Redémarrage, longueur d'onde d'étalonnage
Utilisation d'une cuvette en verre standard dans l'UV gamme	Utiliser une cuvette en verre de quartz

Mauvaise répétabilité des mesures

Causes possibles	Solution
La cuvette est contaminée	Nettoyer la cuvette
L'échantillon a été contaminé	Améliorer l'échantillon
Alimentation électrique instable	Améliorer l'alimentation électrique

7.3 Remplacement des pièces détachées

7.3.1 Remplacer le fusible



Danger ! Veillez à éteindre l'appareil et à débrancher la prise avant de le remplacer !

- 1 Préparez un tournevis à lame plate 3×75 ;
- 2 Mettez l'alimentation électrique hors tension et débranchez le cordon d'alimentation ;
- 3 Retirer le siège du fusible à l'aide d'un tournevis. Figure 7-1) ;



Fig. 7-1 Position des fusibles

- 4 Prendre le fusible de rechange (marque 1, 3,15A/250V) et le replacer en position de travail (marque 2). Figure 7-2) ;

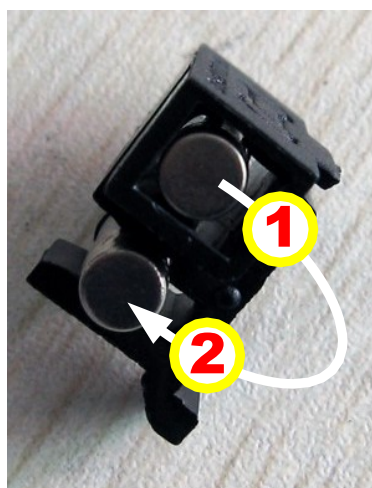


Fig. 7-2 Fusible

- 5 Installer le siège du fusible dans la prise de courant ; .
- 6 Branchez le cordon d'alimentation dans la prise de courant et mettez l'instrument sous tension.

7.3.2 Remplacer la source lumineuse



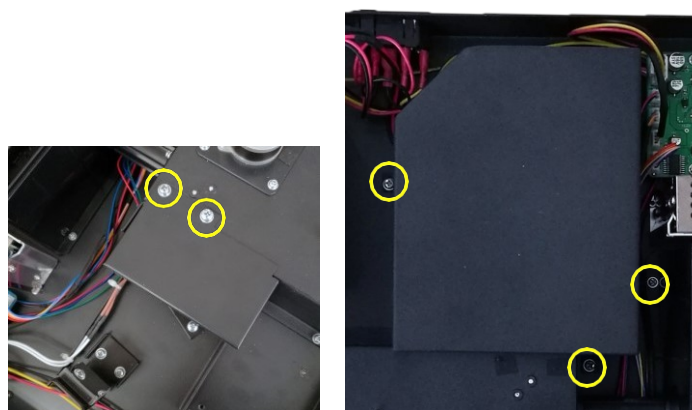
Chaud ! Attendez au moins 20 minutes avant d'ouvrir le logement de la lampe après la mise hors tension afin d'éviter les brûlures dues aux hautes températures !

- 1 Préparez un tournevis 6×150, un tournevis Phillips 6×150 et une paire de gants en coton.
- 2 Mettez l'instrument hors tension, débranchez le cordon d'alimentation de l'instrument et attendez 20 minutes pour refroidir la source lumineuse.
- 3 Tournez la tige dans le sens inverse des aiguilles d'une montre et retirez-la. Utilisez un tournevis pour desserrer les 4 vis (figure 7-3) qui maintiennent le boîtier de l'instrument et soulevez lentement le couvercle vers le côté droit.



Fig. 7-3 Vis de fixation du boîtier de l'instrument

- 4 Dévissez la vis de fixation du couvercle du boîtier de la lampe (figure 7-4) et retirez le couvercle du boîtier de la lampe.



Modèles visibles

Modèles UV/Visible

Fig. 7-4 Ouvrir le couvercle du boîtier de la lampe

- 5 ***Si votre spectrophotomètre est un modèle visible, passez directement à l'étape 6.*** Remplacez la lampe à deutérium (figure 7-5). Dévissez les deux vis de la lampe à deutérium (indiquées par le repère 1) dans le sens inverse des aiguilles d'une montre, puis retirez la fiche de la lampe à deutérium (indiquée par le repère 2),

porter des gants de coton, retirer l'ancienne lampe à deutérium et remplacer la nouvelle lampe à deutérium. Après l'installation, fixez-la avec des vis et branchez la lampe.

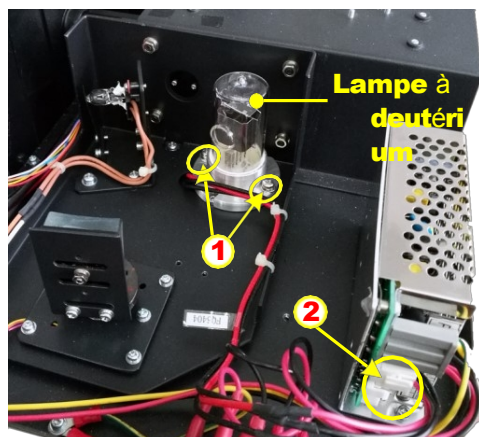
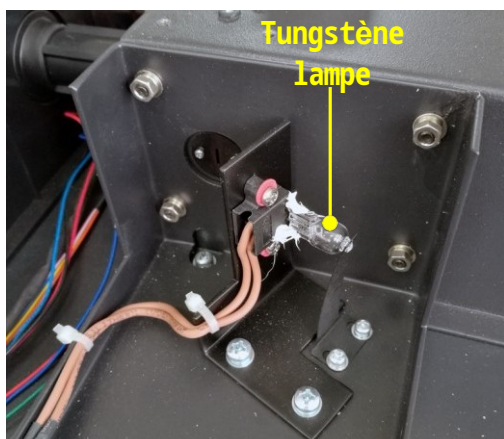
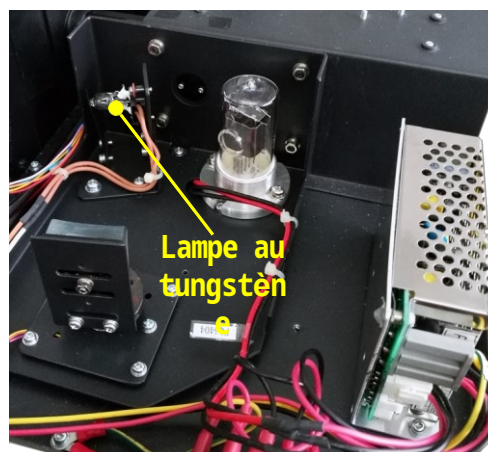


Fig. 7-5 Remplacement de la lampe à deutérium

- 6 Remplacez la lampe de tungstène (figure 7-6). Portez des gants en coton, retirez la lampe au tungstène pour fixer la tablette, retirez l'ancienne lampe au tungstène et insérez la nouvelle lampe au tungstène dans le support de lampe au tungstène.



Modèles
visibles



Modèles UV/Visible

Fig. 7-6 Remplacer la lampe tungstène

- 7 Mettez l'instrument sous tension (figure 7-7). Vous devez tourner le miroir de commutation de la source lumineuse. Tant que le spot passe par la fente d'entrée, la direction haut-bas est au centre de la fente, et le spot est à gauche ou décalé. À droite, desserrez les deux vis qui maintiennent le support de la lampe au tungstène, réglez avec précision le support de la lampe au tungstène et observez la tache lumineuse, ajustez-la à une position appropriée et fixez-la.

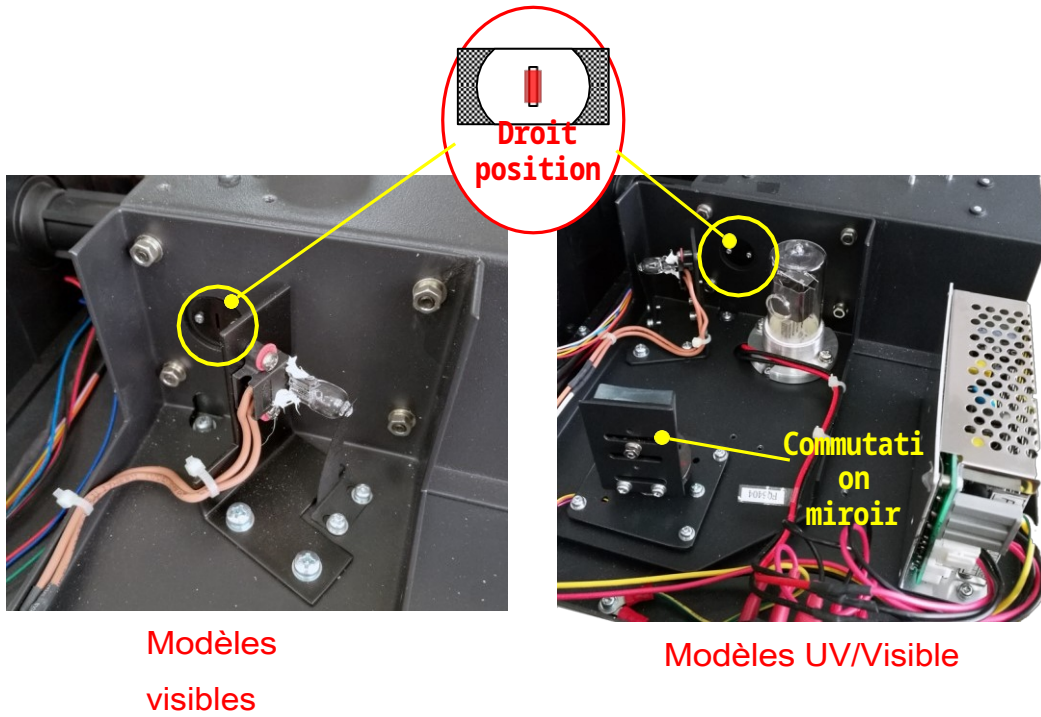


Fig. 7-7 Tache de tungstène

- 8 Installez le boîtier de la lampe de retour, le boîtier de l'instrument et la tige pour terminer le remplacement.

Liste des pièces détachées

Partie	Numéro de commande
Lampe à deutérium	EMC-00138
Lampe au tungstène	EMC-00011
Cuvette en verre 10 x 10 mm (1 pc)	EMC-100OS
Cuvette en verre quartz 10 x 10 mm (1 pc)	EMC-100QS



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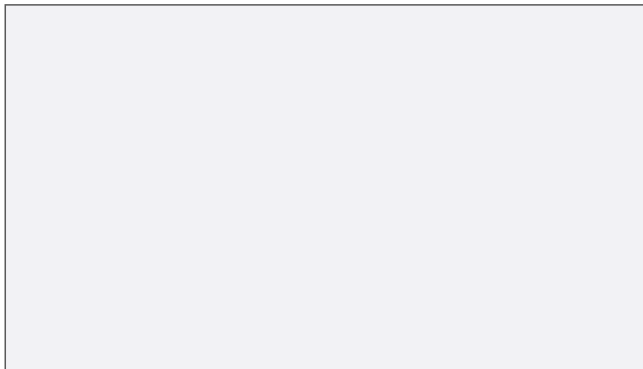
UV/VIS Spectrophotometer

Quick Installation Guide



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For further information, please contact your local partner:



Technical changes reserved. Version 022022_E



Installation

Environment Required

- Check "Important Information"
- **Scan QR Code** on "Important Information" to download User Manual and software
- To ensure the best performance, the following conditions are required:
The best working temperature range is 16-35°C and the humidity 30-65%.
 - Keep the instrument as far away as possible from strong magnetic or electrical fields or any electrical device that may generate high-frequency fields.
- Set up the unit in an area that is free of dust, corrosive gases and strong vibrations.
 - Remove all objects or materials that could hinder the flow of air under and around the instrument.
 - The power requirement is 85~265V/50/60Hz, depending on instrument model and switch position! Check before plug in!
- Use the appropriate power cable and plug into a grounded power socket.
- If the local voltage is not stable, a voltage regulator is required.
 - Take care that the instrument is free from direct sunlight irradiation.

Install Spectrophotometer

Placement

Place the instrument carefully on a stable table.

Install optional printer

Check to confirm the instrument's power switch is turned off and connect the thermal printer's data cable to the instrument's parallel port.

Install software

Scan the QR code on "Important Information" to directly install the software on a PC based on the current WINDOWS® version or use the QR code on the right to request the download link.

Plug in the power cable

Check to confirm the instrument's power switch is turned off. Before plugging the power cable into a power socket and the instrument, check the voltage requirements of the instrument!

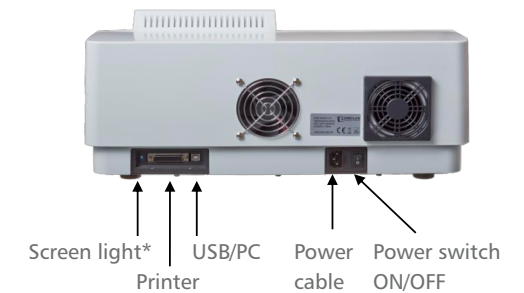
Follow instruction of the instrument

Warm-up time is at least 20 minutes for all UV/VIS Spectrophotometers. The instrument will automatically start a "self check" routine after warm-up time.

Front view



Back view



*not for EMC-11D-V, EMC-11S series and EMC-18S-UV

Download user's manual via QR Code before starting the instrument!



USB cable**



USB dongle for WINDOWS® PC Software**

Request for manual

QR code for e-mail to request download link

**not for EMC-11D-V

Calibration

Please make sure to regularly control the photometric accuracy and the wavelength accuracy using reference filters (optionally available calibration filter set EMC-SET-100 with calibration certificate).



Spectrophotomètres UV/VIS

Guide de calibrage



Kit de calibrage EMC-SET-100

L'ensemble de filtres en verre EMC-SET-100 contient :

Précision de la longueur d'onde :

H1 Filtre à oxyde d'holmium

Précision photométrique :

N2 Filtre en verre de densité neutre 0,25 Abs

N3 Filtre en verre de densité neutre 0,5 Abs

N4 Filtre en verre de densité neutre 1,0 Abs N0 Filtre vierge

Certificat d'étalonnage Chiffon en microfibres
Étiquette d'étalonnage (2 pièces)



de calibration générales

Directives générales d'utilisation des filtres en verre

Les filtres en verre sont constitués de verre dopé aux ions métalliques/métaux des terres rares, qui sont assemblés sans contrainte dans des cadres en plastique. Ils sont conçus pour s'adapter à tous les spectrophotomètres équipés d'un support pour cuvettes standard d'une longueur de trajet optique de 10 mm. Afin de faciliter l'identification des filtres, le type de filtre et le numéro de série sont gravés sur chaque cadre. Les détails des valeurs d'absorbance et de position des pics mesurées pour chaque filtre figurent sur le certificat d'étalonnage correspondant. Veillez à ne pas toucher les surfaces en verre du filtre. La saleté, la poussière et les dommages peuvent nuire considérablement à la précision des résultats des mesures. Les cadres en plastique ne doivent pas entrer en contact avec des acides ou des alcalis. Lors de l'insertion du filtre dans le spectrophotomètre, aucune traction, pression ou levier ne doit agir sur le support.

Stockage

Après utilisation, nous recommandons vivement de conserver les filtres à température ambiante, dans leur emballage, et dans un endroit sec et exempt de poussière.

Nettoyage

La saleté s'accumule souvent sur les surfaces optiques à la suite d'une utilisation régulière. La meilleure façon de les éliminer est d'utiliser un chiffon non pelucheux et de l'alcool (Attention : Ne jamais nettoyer le cadre en plastique avec une solution concentrée alcaline).

Influence de la température et de l'humidité sur les mesures

La température n'a qu'une très faible influence sur les valeurs de mesure certifiées, et les températures comprises entre 20°C et 24°C sont comprises dans l'incertitude de mesure indiquée sur le certificat d'étalonnage. Les mesures doivent donc être effectuées dans cette plage afin de réduire au minimum l'influence potentielle de la température sur les résultats. Veillez à ce que l'humidité relative soit comprise entre 30 % et 65 %, en particulier lorsque vous effectuez des mesures dans la gamme UV.

Autres facteurs pouvant influencer les mesures

La saleté (par exemple, les empreintes digitales) et la poussière sur les surfaces optiques polies, ou les dommages (rayures, corrosion) causés à ces dernières, peuvent nuire considérablement à la précision des résultats de mesure. Conservez toujours les filtres dans leur emballage d'origine et protégez les fenêtres optiques de toute contamination. Ne manipulez les filtres que par leur cadre.

Mesures à prendre avant de procéder à l'étalonnage

- Allumer et préchauffer l'instrument pendant au moins 20 minutes.
- N'utilisez qu'un support stable pour les cellules standard de 10 mm. Veiller à ce que le support soit bien fixé et stable dans le compartiment à échantillons.
- Effectuer une remise à zéro de la longueur d'onde et du courant d'obscurité.
- Effectuer une correction de la ligne de base avec un compartiment à échantillon vide.
- Veillez à ce que tous les filtres soient toujours propres avant de les utiliser. Sinon, utilisez le chiffon en microfibrilles fourni pour la purification.
- Vérifier que le filtre est correctement positionné dans le trajet optique en plaçant d'abord le filtre vierge N0 dans le porte-cuve. Le marquage N0 doit être visible d'en haut. Veillez à ce que tous les cadres de filtre soient toujours positionnés de la même manière, c'est-à-dire avec les numéros de série tournés vers le détecteur.
- Choisissez la largeur de fente à laquelle les filtres sont calibrés (4 nm pour EMC-SET-100) ou la largeur de fente la plus proche. Si vous ne pouvez pas régler la largeur de fente de l'instrument, notez que de légers écarts par rapport aux valeurs enregistrées lors de l'étalonnage peuvent apparaître. (guide approximatif recommandé : double incertitude si la largeur de fente diffère de la largeur de fente certifiée)
- Effectuez la mesure des filtres avec autant de soin que vous le feriez pour une mesure d'échantillon dans un compartiment d'échantillon fermé (l'ouverture du compartiment d'échantillon entraîne des résultats erronés).

Filtre en verre à densité neutre pour vérifier la précision photométrique

Pour mesurer la précision photométrique (absorbance), le filtre réduit le faisceau lumineux du spectrophotomètre. Une valeur d'absorbance (Abs) peut être déduite de l'extinction de la lumière causée par le filtre. Les présents filtres en verre à densité neutre sont fabriqués à partir de matériaux filtrants spécialement sélectionnés. Ils présentent une transmittance relativement constante dans la gamme de longueurs d'onde de 405 nm à 800 nm, et constituent donc un excellent choix pour vérifier la précision photométrique dans la gamme de longueurs d'onde visibles (> 405 nm).

Type	N2, N3, N4, filtre en verre à densité neutre
Application	Test de la précision photométrique dans la gamme
Contenu	VIS N2 : filtre en verre à densité neutre (0,25 Abs), N3 : filtre en verre à densité neutre (0,5 Abs), N4 : filtre en verre à densité neutre (1,0 Abs),
Certification standard	Longueurs d'onde : 440, 465, 546,1, 590, 635 nm Largeur de la fente : 1 nm

Préparation de calibrage

Filtre en verre holmium pour vérifier la précision de la longueur d'onde

Pour mesurer la précision de la longueur d'onde, le filtre absorbe le faisceau lumineux du spectrophotomètre dans une plus grande mesure à certaines longueurs d'onde, créant ainsi des pics d'absorption. Le filtre en verre Holmium est un excellent choix pour vérifier l'échelle des longueurs d'onde d'un spectrophotomètre, car il présente une gamme de pics étroits et bien définis dans les domaines UV et visible.

Type de filtre	H1, filtre en verre oxyde d'holmium
Application et VIS	Test de la précision de la longueur d'onde dans les domaines UV
Certification	standard Précision de la longueur d'onde entre 279 nm et 638 nm Largeur de la fente : 1 nm

EMCLAB Instruments GmbH

Kalibrationsgegenstand: Spectrophotometer
 Calibration object: Kalibrationsverfahren: Messung der photometrischen Genauigkeit
 Calibration method: Measurement of photometric accuracy
 Messtechnische Bedingungen: Die in diesem Kalibrationszertifikat angegebenen Werte wurden mit dem verwendeten Spektrophotometer und den nachstehenden Einstellungen ermittelt:
 Modus der Ordinateurskala: Optische Dichte (Abs.)
 Spaltbreite: 4 nm
 Strahlmodus: Fix
 Conditions of Calibration: The following settings were used on the spectrophotometer employed to obtain the data quoted on this calibration certificate:
 Ordinate mode: Optical density (Abs.)
 Slit mode: Fix

Für die Kalibrierung dieses Kalibrationsgegenstandes wurden nachstehende Filter, kalibriert vom DAAS-Kalibrationslabor D-618752-01-00 eingesetzt:
 Holmiumoxid-Quarzfilter F1, Serien-Nr. 5440, Kalibrationschein 15292
 Neodymiumfilter F2, F3, F4, Serien-Nr. 5440, Kalibrationschein Nr. 15293
 Fluoridfilter UV00, Serien-Nr. 0940, Kalibrationschein Nr. 15288
 Fluoridfilter UV05, Serien-Nr. 0905, Kalibrationschein Nr. 15288
 Referenzfilter UV14, Serien-Nr. 1196, Kalibrationschein Nr. 15288
 Die Filter werden regelmäßig auf die Einhaltung ihrer Spezifikationen überprüft. Datum der letzten Kalibrierung: 2013-12-12


This calibration object was calibrated with the following filters calibrated from DAAS calibration laboratory D-618752-01-00:
 Holmium Oxide Glass Filter F1, serial no. 5440, calibration certificate 15292
 Neodymium Glass Filter F2, F3, F4, serial no. 5440, calibration certificate 15293
 Liquid Filter UV00, serial no. 0940, calibration certificate 15288
 Liquid Filter UV05, serial no. 0905, calibration certificate 15288
 Reference Filter UV14, serial no. 1196, calibration certificate 15288
 The filters are regularly checked for their compliance with their specifications. Most recent calibration date: 2013-12-12

Umgebungsbedingungen: 22 °C ± 2 °C, relative Luftfeuchte 30 % bis 65 %
 Environmental conditions: 22 °C ± 2 °C, relative humidity of 30 % to 65 %
 Messergebnisse: Während der Messung wurden die folgenden Werte ermittelt.
 Measurement results: During the measurements, the following data were obtained:

Filter	Serial No.	235 nm	257 nm	313 nm	350 nm	438 nm
UV00 (KClO ₂) (90 mg/l)	0848 Solvent	0.7502	0.8891	0.2041	0.5450	-
	Nominal value	-	-	-	-	-
	Compassioner Wert	-	-	-	-	-
UV00 (KClO ₂) (900 mg/l)	0848 Solvent	-	-	-	-	0.9539
	Nominal value	-	-	-	-	-
	Compassioner Wert	-	-	-	-	-

Filter	Serial No.	448 nm	485 nm	546.1 nm	589 nm	638 nm
F2 (D.25 Abs.)	0548 Solvent	0.2628	0.2370	0.2488	0.2870	0.2910
	Nominal value	1.18124	1.11024	1.11024	1.11024	1.11024
	Compassioner Wert	-	-	-	-	-
F3 (D.5 Abs.)	0548 Solvent	0.5353	0.4857	0.4975	0.5477	0.5355
	Nominal value	1.18124	1.11024	1.11024	1.11024	1.11024
	Compassioner Wert	-	-	-	-	-
F4 (1 Abs.)	0548 Solvent	1.0745	0.9988	1.0038	1.0726	1.0087
	Nominal value	1.18124	1.11024	1.11024	1.11024	1.11024
	Compassioner Wert	-	-	-	-	-

Photometrische Genauigkeit: 0.1, 0.2 oder 0.5 %
 Photometric Accuracy: 0.1, 0.2 oder 0.5 %



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Fig. 1 Certificat d'étalonnage (échantillon) - Précision photométrique

1. Vérification de la précision photométrique

Filtres: densité neutre N2, N3, N4 Modde test: 0,25 Abs, 0,5 Abs, 1,0 Abs filtres en verre à

Réglage de référence : Test des longueurs d'onde 440, 465, 546,1, 590, 635 nm Mode d'affichage: **A**

1. Tout d'abord, suivez les étapes à suivre avant de procéder à l'étalonnage (page 4)
2. Régler le mode d'affichage sur l'absorbance (Abs).
3. Exécutez le programme de sélection des longueurs d'onde sur votre spectrophotomètre, en respectant les directives du manuel d'utilisation. Sélectionnez les longueurs d'onde indiquées sur le certificat d'étalonnage (voir le paramètre de référence ci-dessus).
4. Insérer le filtre vierge N0 comme référence et réaliser le blanc (100%T/0Abs).
5. Insérez les filtres à densité neutre N2, N3, N4. Veillez à ce que les filtres soient insérés dans le support le plus loin possible. Le marquage N2, N3, N4 doit être visible par le haut (numéro de série face au détecteur).
6. Lancer le programme de mesure des valeurs d'absorbance aux longueurs d'onde mentionnées sur le certificat d'étalonnage. Enregistrez les valeurs. Effectuez plusieurs mesures (nous recommandons au moins 3) et faites la moyenne des valeurs mesurées pour éviter les erreurs.
7. Comparez les valeurs mesurées aux valeurs standard figurant dans le certificat d'étalonnage.
8. Répéter les étapes 1 à 7 pour chaque longueur d'onde donnée dans le certificat d'étalonnage.

Si vous utilisez le logiciel PC EMC- λ Lambda ou ANALYST, vous pouvez effectuer les opérations suivantes et enregistrer les résultats automatiquement en exécutant l'application "Multi Wavelength Scan".

Préparation de calibrage

2. Vérification de la précision de la longueur d'onde

Filtres: Filtre à oxyde d'holmium H1 (Fig. 2)

Mode de test : balayage du spectre

Réglage de référence : Longueurs d'onde

maximales* voir certificat d'étalonnage Intervalle de

balayage : 0,5 nm Mode d'affichage : A



Fig. 2

1. Tout d'abord, suivez les **étapes à suivre avant de procéder à l'étalonnage**.
2. Régler le mode d'affichage sur l'absorbance (Abs).
3. Exécutez le programme de balayage de votre spectrophotomètre en suivant les instructions du manuel d'utilisation. Sélectionnez une plage de balayage qui couvre tous les pics figurant sur le certificat d'étalonnage (voir le paramètre de référence ci-dessus). Si vous ne parvenez pas à définir une plage, suivez les étapes ci-dessous pour effectuer une mesure manuelle.
4. Ajustez votre spectrophotomètre aux paramètres de mesure figurant sur le certificat d'étalonnage. Sélectionnez une vitesse de balayage lente et un petit intervalle de données.
5. Les mesures sont effectuées à l'aide d'un blanc d'air, ce qui signifie que la mesure de référence est effectuée à l'aide du filtre vierge N0.
6. Insérer le filtre à oxyde d'holmium H1. Veillez à ce que le filtre soit inséré dans le support jusqu'à la butée. Le marquage H1 doit être visible d'en haut (numéro de série face au détecteur).
7. Lancez la mesure.
8. Prenez plusieurs mesures (nous recommandons au moins 3) et faites la moyenne des valeurs mesurées pour éviter les erreurs.
9. Comparer les positions des pics aux longueurs d'onde indiquées sur le certificat d'étalonnage.

Si le programme d'analyse n'est pas applicable, vous pouvez le faire manuellement : par exemple, le pic 360,90 :

1. Régler la longueur d'onde à 355 nm, insérer le filtre vierge N0 comme référence et effectuer le blanc (100%T/0Abs).
2. Insérer le filtre à oxyde d'holmium H1. Veillez à ce que le filtre soit inséré dans le support jusqu'à la butée. Le marquage H1 doit être visible d'en haut (numéro de série face au détecteur). Enregistrez la valeur.
3. Régler la longueur d'onde sur la valeur supérieure suivante (+0,5 nm), répéter les étapes 1 et 2 pour obtenir une valeur comprise entre 355 nm et 366 nm.
4. Comparez les valeurs mesurées avec les valeurs certifiées.
5. Répéter les étapes 1 à 4 pour chaque position de pic donnée du certificat d'étalonnage.

Option 1 : balayage en longueur d'onde avec le logiciel embarqué (pas applicable à tous les instruments) Option 2 : balayage en longueur d'onde avec le logiciel PC EMC-λ Lambda ou ANALYST

*La longueur d'onde de 279 nm se situe dans la gamme des UV et ne fonctionne pas dans la gamme des VIS.

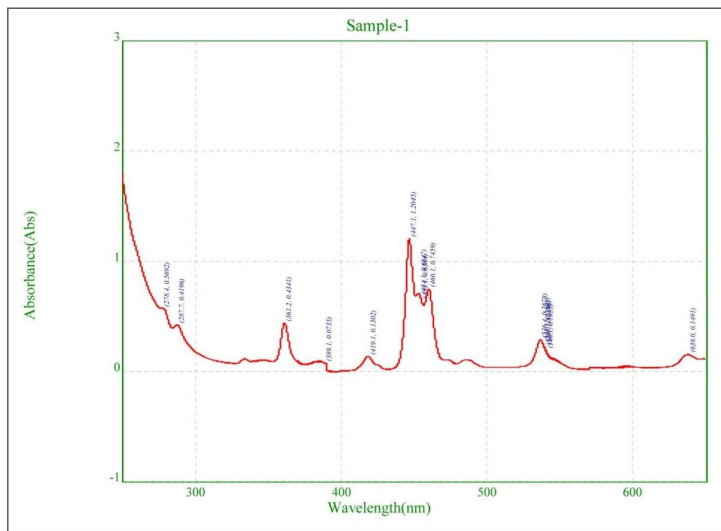


Fig. 3 Balayage de la longueur d'onde avec le filtre H1 à l'oxyde d'holmium (logiciel PC ANALYST)

3. Contrôle des lumières parasites (filtre disponible en option**)

Uniquement pour les spectrophotomètres qui peuvent mesurer dans la gamme UV !

Filtres : UV1, UV12 (filtre de référence)
(Fig.) Mode d'essai: Spectrum Scan

Réglage: 250 nm à 200 nm

Mode d'affichage: A

1. Tout d'abord, suivez les étapes à suivre avant de procéder à l'étalonnage.
2. Régler le mode d'affichage sur l'absorbance (Abs).
3. Exécutez le programme de balayage de votre spectrophotomètre en respectant les instructions du manuel d'utilisation. Sélectionnez la plage de balayage en fonction du réglage ci-dessus (250 nm à 200 nm).
4. Sélectionnez une vitesse de numérisation lente et un petit intervalle de données.

Préparation de calibrage

5. Les mesures sont effectuées à l'aide d'un blanc d'eau pure, ce qui signifie que la mesure de référence est effectuée à l'aide du filtre UV12. Veillez à ce que le filtre soit inséré dans le support aussi loin que possible. Effectuez un balayage à blanc pour mettre l'instrument à zéro.
6. Insérez le filtre UV1 pour le chlorure de potassium. Veillez à ce que le filtre soit inséré dans le support jusqu'à la butée.
7. Lancez la mesure.
8. Prenez plusieurs mesures (nous recommandons d'en prendre au moins 3) pour éviter les erreurs.
9. Comparer la forme de la courbe à la courbe caractéristique (Fig. 5).

**Filtres de référence certifiés DAkkS et NIST disponibles en option :

UV1 (chlorure de potassium dans l'eau pure) + UV12 (filtre de référence de l'eau pure (H₂O))



Fig. 4 UV1 (KCl) UV12 (H₂O)

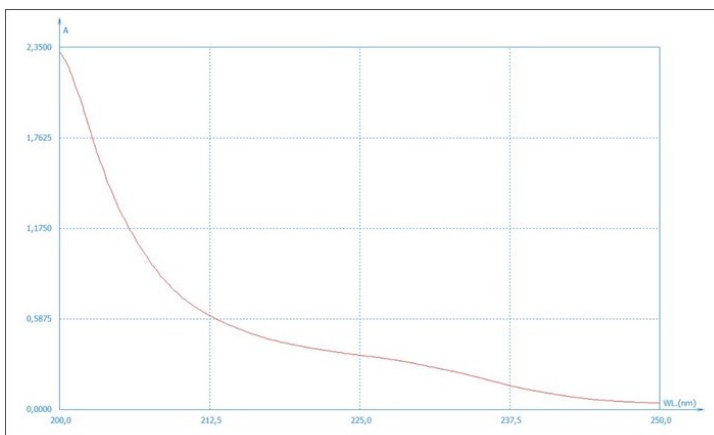


Fig. 5 Forme de la courbe caractéristique

4. Recertification

Comme pour tous les appareils de mesure, les matériaux de référence utilisés pour vérifier les spectrophotomètres doivent également être contrôlés et recertifiés à intervalles réguliers (voir par exemple ISO 9001:2015 "Maîtrise des équipements de surveillance et de mesure"). Cela vous permet de vous assurer que vous répondez de manière cohérente à vos exigences de qualité internes et garantit des niveaux élevés de précision et de fiabilité dans vos mesures

La durée des intervalles entre les recertifications des matériaux de référence dépend de la fréquence d'utilisation des matériaux, de l'usure associée, des exigences de précision, ainsi que des exigences d'audit interne de l'entreprise. Par conséquent, seuls les utilisateurs eux-mêmes peuvent déterminer ces intervalles.

Préparation de calibrage

5. Formulaire d'étalonnage des travaux

Avec le EMC-SET-100, EMCLAB Instruments fournit un formulaire d'étalonnage vierge pour permettre à l'utilisateur d'émettre un certificat d'étalonnage de travail. Pour dupliquer le formulaire d'étalonnage ou pour émettre un certificat d'étalonnage avec des valeurs imprimées au lieu de valeurs manuscrites, vous pouvez nous contacter pour obtenir le formulaire sous forme de fichier par Email.

Calibration object: Spectrophotometer
Photometric Accuracy of the object: \pm _____ % T or \pm _____ A@1A

Calibration method
Measurement of Absorbance (N2 – N4)

Conditions of Calibration
The following settings were used on the Spectrophotometer employed to obtain the calibration data quoted on this certificate:

Ordinate mode:	Absorbance
Slit UV/VIS:	1 nm
Slit mode UV/VIS:	Fix
Integration time:	3 s

Measurement of Wavelength (H1)

Conditions of Calibration
The following settings were used on the Spectrophotometer employed to obtain the calibration data quoted on this certificate:

Ordinate mode:	Absorbance
Slit UV/VIS:	1 nm
Slit mode UV/VIS:	Fix
Integration time:	0.2 s
Scan speed:	15 nm/min
Data interval:	0.05 nm

This calibration object was calibrated with the following filters from the Secondary Spectrometric Calibration Standards Certificate of Calibration No. H12022N3942:
Neutral Density Glass Filter N2
Neutral Density Glass Filter N3
Neutral Density Glass Filter N4
Holmium Oxide Glass Filter H1

This calibration standard was measured using air as reference. The Spectrometric Standards were calibrated on the following Spectrophotometer:
Varian Cary 5000 serial number UV1101M202.
The Spectrophotometer is yearly checked for quality control using the quality control procedure of the manufacturer. The instrument is used solely for calibration purposes.
Sets of NIST standard reference materials – SRM 930e and SRM 1930 – are used to regularly check the photometric accuracy of the spectrophotometer.
The intrinsic standard reference material Helima UV5 (proved by PTB/Germany) is used to regularly check the wavelength accuracy. Measurements were performed at an ambient temperature of 22°C \pm 2°C and a relative humidity of 30% to 65%.
During the measurements the following absorbance values were obtained:

Filter Type Neutral Density Glass	Photometric Accuracy Optical Density (Abs) \pm MU(*)				
	440 nm	465 nm	546.1 nm	590 nm	635 nm
N2 (0.25 Abs)	0.266 \pm 0.02	0.241 \pm 0.02	0.252 \pm 0.02	0.291 \pm 0.02	0.294 \pm 0.02
N3 (0.5 Abs)	0.541 \pm 0.02	0.491 \pm 0.02	0.503 \pm 0.02	0.552 \pm 0.02	0.538 \pm 0.02
N4 (1 Abs)	1.092 \pm 0.02	1.005 \pm 0.02	1.003 \pm 0.02	1.067 \pm 0.02	1.026 \pm 0.02

(*) MU: Measurement Uncertainty

Filter Type Holmium	Wavelength Accuracy Peak Position (nm) \pm MU(*)				
	279.32 \pm 0.50	360.85 \pm 0.50	453.56 \pm 0.50	536.42 \pm 0.50	637.67 \pm 0.50
H1					

(*) MU: Measurement Uncertainty

Fig. 6 Formulaire d'étalonnage vierge



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EMC- λ Lambda

Application software for
EMC-Spectrophotometers

User's Manual

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Change Log

Version	Section	Change
1.0.5	First Run of EMC-λ Lambda	Replaced “wait for the console window to appear” by “wait for the tray icon to appear”
	Connecting and Using a Device	Added Caution to not (physically or by pressing <i>ESC</i> on the Device) disconnect a Device
	Change Log	Added Change Log
	Method: Wavelength Measurement/ Execute a Measurement	Replaced Screenshot with the correct version
1.0.4	Entire document	Initial issue of document

Purpose and Audience

This User’s Manual describes the features and use of the EMCLAB-λ Lambda software. It does not explain the fundamentals of spectrophotometric measurements or how to apply the software to a specific analysis question.

This software is intended for individuals and laboratories that own compatible EMCLAB spectrophotometers as listed below.

Supported Devices

These device types are supported:

- EMC-11-UV
- EMC-11S-UV
- EMC-11S-V
- EMC-18S-UV
- EMC-NANO 2

Further model variants will be available over time. For more information about device types, features and pricing, please visit www.emc-lab.de or contact your reseller or info@emc-lab.de

Overview and Basic Concepts

The following table lists some of the basic concepts used by the software:

<i>Connection</i>	established electronic communication link between a physical device and a software device instance
<i>Calibration</i>	Process of gathering sensor data to which measurement values are later set into relation

<i>System Baseline</i>	Calibration of the sensor with no sample in the light path
<i>Dark Current</i>	Calibration with light source turned <i>off</i>
<i>Zero</i>	Reference measurement and first measurement of any <i>task</i> . A “reference sample” / “clean sample” is in the light path. The effects of the cuvette and any solvent are taken into account.
<i>Analysis Method</i>	Specific procedure to gather absorption / transmission data to answer a specific question with respect to the sample(s)
<i>Task</i>	Similar measurements are organized in <i>tasks</i> to prepare the steps in a single place
<i>Measurement</i>	One execution of an analysis method with one sample
<i>Scan</i>	Synonym of “Measurement”, but explicitly used for spectrum scan operations, where no specific wavelength is selected, but a range of wavelengths with fixed intervals.
<i>Data</i>	Results of measurement executions of tasks that can be used to generate reports
<i>Absorption</i>	Fraction of light intensity that is “removed” by the sample in the light path at a specific wavelength
<i>Transmission</i>	Fraction of light intensity that is unaffected by the sample in the light path at a specific wavelength
<i>Solvent</i>	Substance that dissolved another substance
<i>Solute</i>	Substance that is dissolved by another substance
<i>Solution</i>	Solute and Solvent
<i>Sample</i>	Solution of a specific composition that is to be analyzed, in the context of measurement, a sample is the solution in a cuvette

Device and Task Specific Keywords:

<i>Sampling times</i>	Device-internal measurements at sensor level, number of which the sensor is read, the values are accumulated, and the average value is supplied to the software
<i>Measurements per wavelength</i>	Number of individual measurements for each wavelength that are requested from the device. Predefined as “fast” (one measurement) and “fine” (three measurements)
<i>Tungsten lamp</i>	Lamp for measuring visible range light

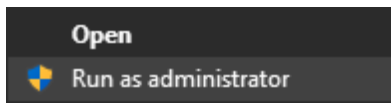
<i>Deuterium lamp</i>	Lamp for measuring UV-range light
<i>Measurement range</i>	Physical device specific range (from / to) of wavelengths in nanometers
<i>Cuvette</i>	Container for solutions (e.g., quartz glass, special optical glass, PMMA, depending on the purpose); EMCLAB cuvettes / cells are recommended.
<i>Pathway</i>	Path in millimeters that the light has to pass through the cuvette
<i>System baseline</i>	Software-side calibration measurement, in which the maximum amplification gain is determined in order to map the largest possible value range and at the same time to avoid overloading
<i>Dark current</i>	Device-internal calibration measurement, in which the sensor energy level is measured without an active light source
<i>Lid</i>	The light-tight device cover, which closes the chamber
<i>Light path</i>	The area between the lamp and the sensor where a sample must be located for measurement
<i>Cell holder</i>	Device specific: holds up to 8 samples and can move a sample into the <i>light path</i> by pulling a lever. Motorized automatic cell holder is also available.

EMC-λ Lambda - Quick Start

Caution: Do **not** connect any EMCLAB Device before finishing all installation steps!

Installation of EMC-λ Lambda Software

Caution: If you already used previous Software “EasyUV 1.0” please follow the steps for uninstalling EasyUV and device drivers first (see below).



Right click EMC Lambda Setup.msi, select **Run as administrator** and follow the steps of the installation process.

Please read the *End-User License Agreement* carefully and accept the terms. Choose your destination folder (predefined path is recommended).

Installation of Device Drivers

Caution: If you already used previous Software “EasyUV 1.0” please follow the steps for uninstalling EasyUV and device drivers first. (see below)

Caution: Unplug any EMCLAB Device before running driver installation steps!

- Unzip *CP210x_Windows_Drivers.zip* and run file *CP210xVCPInstaller_x86.exe*
- Follow the instructions to install the device drivers
- Physically connect your EMCLAB device with a cable to a USB port of your computer, if you own multiple devices, please connect only *one single* device in this step!
- Open Windows *Device Manager*
- Under *Ports (COM & LPT)* search for **Silicon Labs CP210x USB to UART Bridge (COMX)**
or
CP2102 USB to UART Bridge Controller (COMX)
- If your device is not listed as above, search for *other devices*:
 1. Right click entry and select *Update driver*
 2. Select *Browse my computer for drivers*
 3. Select the path where you unzipped the driver installation files (e.g., *C:\Users\User\Downloads\CP210x_Windows_Drivers*)
 4. Select *Include subfolders* and click *Next*
 5. Your device should be listed under *Ports (COM & LPT)* now

Now you can connect EMCLAB devices.

Connecting EMCLAB Spectrophotometer Devices

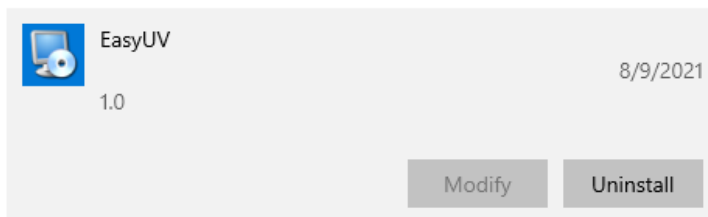
Caution: Do not use a passive USB Hub, only use powered hubs or directly connect the device to your computer (recommended).

To connect further EMCLAB Spectrophotometer Devices to your computer, plug in the USB cable of your device to an unused USB port on your computer. It is recommended to avoid using powered USB hubs. Passive USB hubs are not supported.

(Optional) Uninstallation of EasyUV and Device Drivers

Uninstall EasyUV

Open Windows Settings for *Apps & Features*, search for *EasyUV* and click on *Uninstall*



Follow the instructions to uninstall the software. Please uninstall all instances of the *EasyUV* Software.

Uninstall old Device Drivers

- Connect a EMCLAB device to your computer and make sure it's powered on
- Open Windows *Device Manager*
- Under *Ports (COM & LPT)* search for **Silicon Labs CP210x USB to UART Bridge**
or
CP2102 USB to UART Bridge Controller
- Right click and choose *Uninstall device*
- If available, check *delete driver software*
- Unplug EMCLAB device

Now follow instructions for **Installation of Device Drivers**

First Run of EMC-λ Lambda


From the Windows *Start* menu select *EMC-λ Lambda* and wait for the console window to appear.

Open your internet browser (*Google Chrome, Chromium* or newest *Microsoft Edge* preferred).

First Login

Navigate to <http://localhost:5000>

You will see the login screen of *EMC-λ Lambda*

The logo for EMCLAB instruments - Germany, featuring a stylized blue 'E' icon followed by the text 'EMCLAB' in a large, bold, blue font, and 'instruments - Germany' in a smaller, blue font below it.

Login to EMC-λ Lambda


First start credentials are:

Username: *admin*


Password: *admin*

You will be prompted to change the password on first login. Please remember well the password you chose, as restoring this password is not possible without losing all your measured data!

Important: Always choose a secure and unique password that is hard to guess. Include special characters, digits, and choose a sufficient length. Minimum length is 3 characters.

After successful login, you will see the start page. You may return to the start page by clicking the  icon at the top left anytime

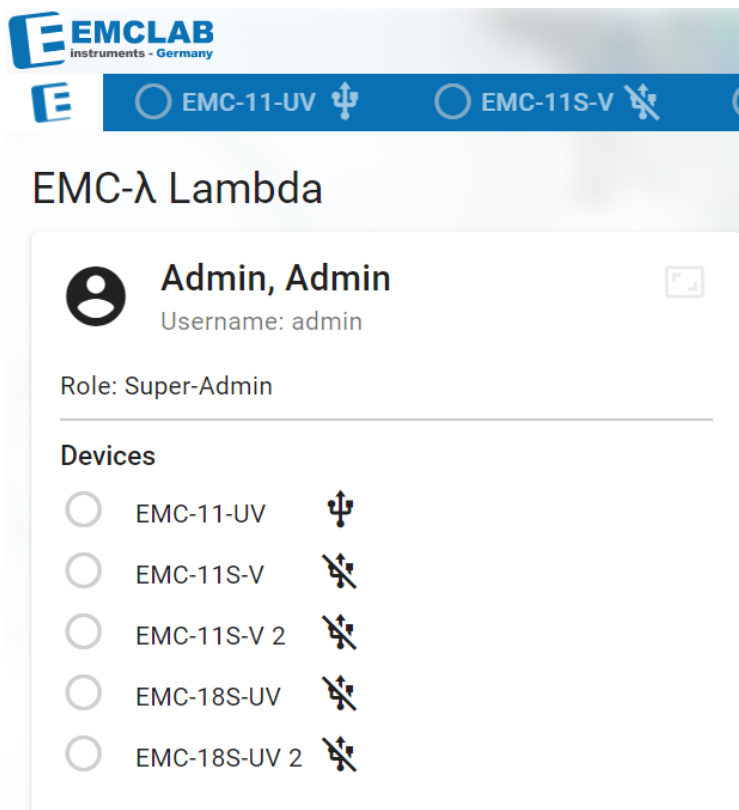
Create New Device

- Click on *Devices*
 **Devices**
- Click *Create New Device...*
- Select your device's type from the dropdown menu
- Choose a name to identify the device in the software or keep the automatically inserted type name.
- Click *Create device*
- Close the dialog

Repeat for all devices you wish to use with this software installation.

Information: Only Pro+ license allows connecting to and controlling up to three devices simultaneously, but you are able to add all your devices, there is no limit.

After adding a device, it is listed on the *start page* and as a device tab.



Connecting and Using a Device

Precondition: Start software and open your browser at <http://localhost:5000>, device is created (see “Create New Device”)

Caution: *Do not use a passive USB Hub, only use powered hubs or directly connect the device to your computer (recommended).*

- Plug your USB cable into your PC and your EMCLAB device
- Power up your device
- Wait for self-check and warmup to complete

Important: *Always let your device warm up before using it. Any measurements performed before proper warmup are not valid and should not be used for any report.*

- Select your device from the *start page* or click your device’s tab header
- If properly connected, you will see a *COM* port preselected in the *Port* dropdown menu
- In case you have more than one device of the same type, all available devices’ ports will be listed in the dropdown menu
- *
- Click *Connect*
- Your EMCLAB device should now show the *online* notification screen

Calibrating Device

Before being able to use your device for measuring it needs to be calibrated properly. The calibrations can be triggered via the user interface. All Analysis will be disabled if any calibration is required. The calibrations will expire after a specified time. These expiration times can be specified in the *Settings* window.

Dark Current

The device will scan through all wavelengths with lamps turned off, to measure the sensor’s zero energy level

- Click *Dark Current*
- Follow the instructions on the *Checklist* and check all items
- Click *Start*
- The required time may vary between twenty seconds and one minute, depending on device type
- Close the dialog when calibration is finished

Information: *It is recommended to always perform a complete System Baseline calibration after calibrating the Dark Current*

System Baseline

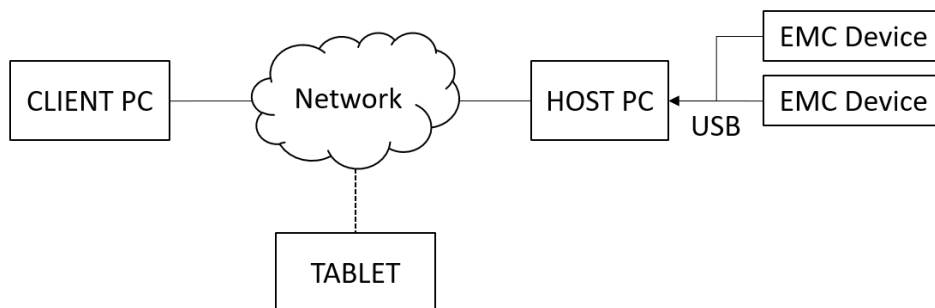
The device will scan through all wavelengths with no sample in the light path to find the optimal amplification gain of the sensor

- Click *System Baseline*
- Follow the instructions on the *Checklist* and check all items
- Click *Start*
- The required time may vary between one and four minutes, depending on device type
- Close the dialog when calibration is finished

Caution: *Running a System Baseline requires a valid Dark Current calibration. Please perform Dark Current calibration first, if both calibrations are marked as invalid!*

Network use

It is possible to use another device to display the software's user interface while using a stationary computer to host the device communication:



To access EMC Lambda from your internal network, use your host PC's IP address in the web browser of your client PC or tablet, e.g.:

<http://192.168.0.xxx:5000>

Make sure you are using http protocol (https is not yet supported) and the port 5000.

Access may be blocked by the host PC's firewall. If this is the case, please contact your network administrator.

To find out the IP address of your host PC, please contact your network administrator.

License Features Software as a Service

EMC-λ Lambda is supplied with a default BASIC license. You can see the license features in the table below:

	BASIC	PRO / PRO+
Number of Devices/PC license	1 Device	PRO 1 Device, PRO+ 3 Devices
Multi Wavelength Measurement		
Number of Wavelengths	1	20
Measurements per Task	1	unlimited
Tasks per Day	3	unlimited
Spectrum Scan		
Wavelength range	Fixed 550 - 750 nm	free selection
Wavelength interval	Fixed 5 nm	free selection
Measurements per Task	1	unlimited
Tasks per Day	3	unlimited
Quantitative Measurement		
Measurements per Task	1	unlimited
Tasks per Day	3	unlimited
DNA/RNA		
Predefined Methods	1	2
Definition of own Methods	no	yes
Measurements per Task	1	unlimited
Tasks per Day	3	unlimited
Kinetic Measurement		
Fixed start delay	30 s	free selection
Fixed measurement interval	5 s	free selection
Fixed total-runtime	60 s	free selection
Fixed wavelength	550 nm	free selection
Measurements per Task	1	unlimited
Tasks per Day	3	Unlimited
Selectable cells 0.5/10/50/100 mm	yes	yes

For more information about licenses and pricing, please contact your reseller or info@emc-lab.de

Administration

Logged in as a user with administrative privileges, you are able to configure globally valid settings.

User Management

Right hand top menu, button “Users”



On the *User Management* window, you can change the password of the current user and add, edit and delete other users. Everyone using the software should be assigned their own user, to be able to trace who made a measurement.

Current User Change password

Username admin

Last name Admin

First name Admin

Role Super-Admin

Users Add user

Username	Last name	First name	Role	Actions
admin	Admin	Admin	Super-Admin	Edit Delete

Change Password

To change the password of the currently logged in user, click *Change password*.

Change Password

Current password

New password

Repeat new password

Cancel
Apply changes

- In the *Current password* field, type in the current password
- In the *New password* field, type in the new password

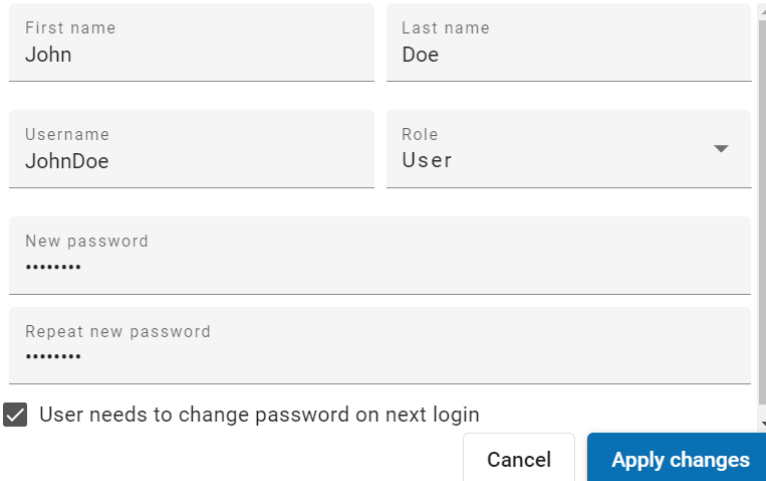
Information: *The new password has to be at least three characters long*

- In the *Repeat new password* field, type in the new password again
- To confirm, click *Apply changes*. To close the window without saving, click *Cancel*

Add a User

- To add a new user, click *Add user*

Add user



- Fill in the fields *First name and Last name* with the respective values of the new user
- In the *User name* field, type in the ID to be used to identify the user on the login screen
- In the *Role* dropdown menu, select the desired role from the values *User*, *Administrator*, *Super-Admin*

Information: The default user after installation has role *Super-Admin*. For new users, *Super-Admin* and *Administrator* have the same privileges. The only difference is that when deleting users, all *Administrators* can be deleted, but instead all but the last *Super-Admin* can be deleted, so there always remains one *Super-Admin* in the system.

- In the *New password* field, type in the new password

Information: The new password has to be at least three characters long

- In the *Repeat new password* field, type in the new password again
- If desired, check the box next to *User needs to change password on next login*

Information: This option ensures that only the user knows his or her password

- To confirm, click *Apply changes*. To close the window without saving, click *Cancel*

Edit a User

- To edit the details of a user, click *Edit*

Edit user (Doe, John)

First name John	Last name Doe
Username JohnDoe	Role User
New password	
Repeat new password	
<input type="checkbox"/> User needs to change password on next login	
<div style="display: flex; justify-content: flex-end; gap: 10px;"> Cancel Apply changes </div>	


- Modify the *First name*, *Last name* or *Username* as desired
- Choose a new password if the user forgot theirs
- To force the user to change his password on next login, check the box next to *User needs to change password on next login*
- To confirm, click *Apply changes*. To close the window without saving, click *Cancel*.

Delete a User

- To delete a user, click *Delete*
- A confirmation dialogue appears

Delete user

You won't be able to revert this operation!



Cancel
Confirm to delete user

- To confirm deletion, click *Confirm to delete user*, to abort the operation without deleting any user, click *Cancel*

Note: *If there are any data that were generated by that user, they remain in the database and are referenced by First and Last name.*

Settings

Right hand top menu, button “Settings”

 Settings

On the *Settings* window, you can customize the appearance and behavior of the software.

Color Theme

For the Color Theme, you can choose from three options:

- EMCLAB Theme
- Deep Purple & Amber
- Indigo & Pink.

Color Theme

Theme
EMCLAB Theme

Examples:

Primary

Accent

Default

Color Theme

Theme
Indigo & Pink

Examples:

Primary

Accent

Default

Your choice is reflected on three *Examples* items *Primary*, *Accent* and *Default*. Your choice is applied immediately.

Localization

In the *Localization* section, you can choose the Language (English or German) of the Software and the unit of Temperature (°C or °F)

Note: *Currently only English is available*

Localization

Language

Language
English

Temperature

Temperature
°C

Caution: *Changing the temperature unit does not change or convert any previously saved numerical values! Be aware that old values will be displayed with ne new (incorrect) unit!*

To confirm your changes, click *Save settings*. To close the window without saving, click *Close*

Expiration Time

In the *Expiration Time* section, you can specify the times that the *System Baseline* and the *Dark Current* calibrations are valid.

Expiration time

System Baseline

hours *
48

Dark Current

hours *
2

After these expiration times, the system requires a new *System Baseline* and *Dark Current* calibration before any further measurements can be performed.

To confirm your changes, click *Save settings*. To close the window without saving, click *Close*

Usability

When performing a measurement, you will be prompted to confirm the preparation steps by clicking checkboxes. If you do not want to use that feature, you might change the behavior. In the *Auto fill checkboxes* section, you can select from three choices:

- All checkboxes must be clicked manually
- Zero and first main scan must be clicked manually

Information: A Zero is a scan with a clean reference sample in the light path

- All checkboxes are preselected

Usability

Auto fill checkboxes

Save settings

All checkboxes must be clicked manually

Zero and first main scans must be clicked manually













All checkboxes are preselected (not recommended)

This setting affects the behavior in the *Prepare wavelength (zero) measurement Checklist* which supports to ensure that all prerequisite conditions are fulfilled to perform a meaningful measurement.


To confirm your changes, click *Save settings*. To close the window without saving, click *Close*.

Concentration Units Configuration

In the *Concentration* section, you can define custom identifiers for units of concentration. This is applicable to the *Quantitative Measurement Analysis Method*.

1	Short name * g/l	Name * grams per liter	Factor * 1000	Basis	
2	Short name * IU	Name * International Units	Factor * 1	Basis	
3	Short name * kg/l	Name * kilograms per liter	Factor * 1	Basis	
4	Short name * µg/ml	Name * micrograms per milliliter	Factor * 1000	Basis	
5	Short name * mg/l	Name * milligrams per liter	Factor * 1000	Basis	
6	Short name * mg/ml	Name * milligrams per milliliter	Factor 1	Basis	
7	Short name * mM/l	Name * millimol per liter	Factor * 1	Basis	
8	Short name * M/l	Name * mol per liter	Factor * 1	Basis	
9	Short name * ng/ml	Name * nanograms per milliliter	Factor * 1000000	Basis	
10	Short name * ppb	Name * parts per billion	Factor * 1	Basis	
11	Short name * ppm	Name * parts per million	Factor * 1	Basis	
12	Short name * %	Name * percent	Factor * 1	Basis	

To define a custom unit, click *Add new unit*

 Add new unit

Short name *	Name *	Factor * 1	Basis
--------------	--------	---------------	-------

type in *Short name*, (Full) *Name*, a *Factor* to apply to the *Basis*.


Units that are already in use cannot be deleted.





To confirm your changes, click *Save units*. To remove an entry, use the *trash can* symbol.

Closing the settings window by clicking *close* discards all unsaved changes.

Pathway Configuration

The *Pathway* corresponds to the size of the cuvette you will use in your analyses.

Pathway configuration 

1	Cuvette light path [mm] * 0.5	
2	Cuvette light path [mm] * 10	
3	Cuvette light path [mm] * 50	
4	Cuvette light path [mm] * 100	

0.5, 10, 50 and 100 mm are included per default.

To define a custom pathway, click *Add new Pathway*

Insert the value in millimeters.

To confirm your changes, click *Save pathways*. To remove an entry, use the *trash can* symbol.

Closing the settings window by clicking *close* discards all unsaved changes.

 Add new pathway

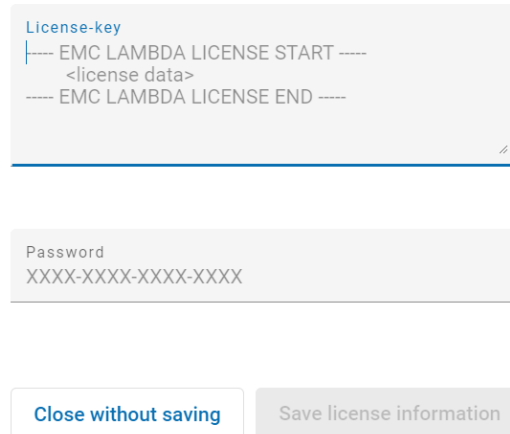
License

In the *License* section, you can review your active license's information. Per default you are using the BASIC license.

- To activate a license click *Edit license information* and enter the license data and password you received from your reseller.



License



The screenshot shows a form with two input fields. The first field is labeled 'License-key' and contains the text: 'EMC LAMBDA LICENSE START ----', '<license data>', and 'EMC LAMBDA LICENSE END ----'. The second field is labeled 'Password' and contains the text 'XXXX-XXXX-XXXX-XXXX'. Below the fields are two buttons: 'Close without saving' and 'Save license information'.

- To confirm your changes, click *Save license information*. To close the window without saving, click *Close without saving*
- For more information about licenses and pricing, please contact your reseller or info@emc-lab.de











Devices

 Devices

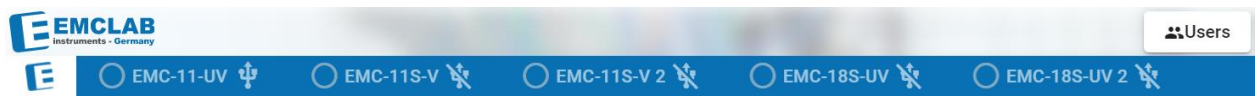
Right hand top menu, button “Devices”

On the *Devices* window, you can create device objects (subsequently called “Devices” for short) to use with the software.

Devices

#	Type	Name		
1	EMC-11-UV	EMC-11-UV		
2	EMC-11S-V	EMC-11S-V		
3	EMC-11S-V	EMC-11S-V 2		
4	EMC-18S-UV	EMC-18S-UV		
5	EMC-18S-UV	EMC-18S-UV 2		

The created Devices appear as tabs of the main window, as shown below:




The actual physical devices need to be physically connected to a USB port and will be linked to the Device on the corresponding device tab. See chapter [Device Tab](#).

Create New Device

- To create a new device, click *Create New Device...*

Device type * ▼

Device name *

 Create device


× Cancel

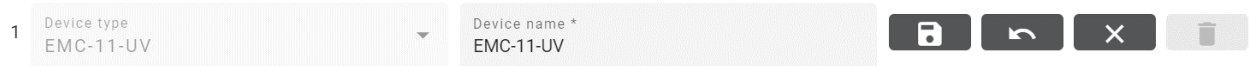
The device type can be found printed on your device




A unique and informative display name for your device

- In the *Device type* dropdown menu, select the device that corresponds to the spectrometer hardware you wish to use
- In the *Device name* field, type in an identifier that will be used to refer to the device.
- To confirm your inputs, click *Create device*, to abort without saving, click *Cancel*


Edit Device Name

- To change the name of a device, click the *Edit* icon  next to the respective device




- To cancel the edit operation, click the Cancel icon 
- To undo the modifications, click the Undo icon 
- To save the modifications, click the Save icon 

Delete Device



- To delete a device, first click the *Edit* icon  next to the respective device
- Then click the *Delete* icon 

Note: *You can only delete a device if there are no measurements performed with it yet*



Configure Device

New Devices are created with default values for its parameter's settings. To change these default values, configure the Device. To configure a device, click the *Configure* icon  next to the respective device on the *Devices* window. The *Device config* window opens and shows the current settings of the device.

Device config

Device	EMC-11-UV		
Type	EMC-11-UV		
Range:	190 - 1000 nm		
Lamps:	Tungsten halogen lamp		<input checked="" type="checkbox"/>
	Deuterium lamp		<input checked="" type="checkbox"/>

These settings are user-independent and control each measurement made with this device

device internal sampling times	device internal sampling times *	
	25	
Default pathway / cuvette size	Default pathway *	
	10 mm	

The following parameters can be specified accordingly:

device internal sampling times

Number of times the device samples its sensor to generate the measurement value. A higher value can help with unstable readings.

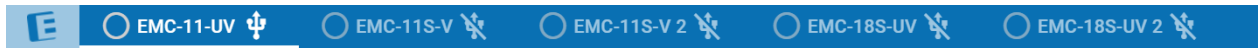
Default pathway / cuvette size

Size of the cuvette commonly used with this device. This will set a preselection for each newly created *task* but can be changed individually in the process of *task* creation.

To confirm your changes, click *Save*. To close the window without saving, click *Cancel*

Device Tab

Left hand top menu. Example (Device names depend on your defined names)



By clicking the *Device Tabs*, you can switch between different configured devices. Devices can be *ready* (physically connected by a cable) and *online* (electronic communication link established).

Connection

A *Connection* is an established electronic communication link between a hardware device and a software Device instance.

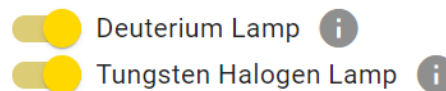
By selecting a Device tab, the software will automatically detect the COM Port that the corresponding physical device is connected to.

- To be able to use the physical device with the software, it has to be connected a Device in the software. This is achieved by selecting the corresponding COM Port and clicking *Connect*
- If the connection was established successfully, the online indicator (circle next to the device name on the device tab) turns green.



- The available lamps appear

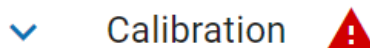
Toggle lamps






They can be switched off or on by clicking the toggle controls

Calibration

Before measurements can be performed, the Device has to be calibrated. This is indicated by a red *Attention* triangle



To open the *Calibration* section, click the expand arrow  or anywhere on the *Calibration* window. The expanded section shows the status of the *System Baseline* and the *Dark Current*.

Calibration	Status
System Baseline	 27.04.2022 10:00:02 (3 h)
Dark Current	 27.04.2022 09:53:54 (3 h)

For both calibrations, corresponding actions are available to renew it.

Actions



Renew Baseline...



Renew Dark Current...

Note: *With expired Dark Current calibration, even Baseline renewal is not possible. It is recommended to perform complete calibration before each relevant measurement:*

Dark Current → Baseline → Zero Measurement → Sample Measurement

- To renew the System Baseline, click *Renew Baseline ...* The *Renew System baseline* window opens.
- Perform all preparatory actions listed in the *Checklist* and confirm completion by clicking the respective check boxes. Then the *Start* button becomes active

Renew Dark Current

Checklist

- No Sample in lightpath
- Lid closed

▶ Start

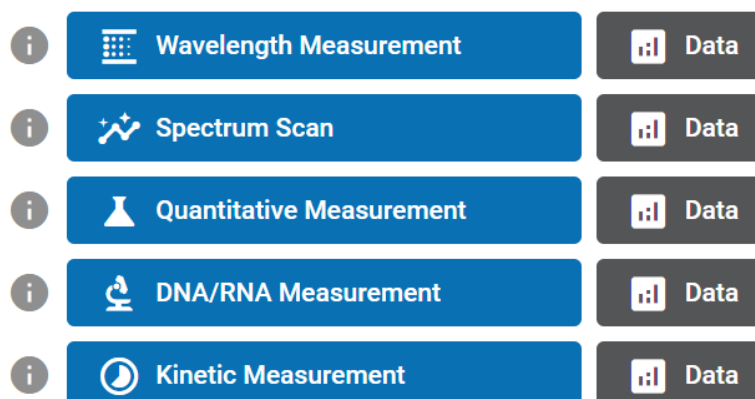
- Click the *Start* button and observe the progress indicator The *Start* button changes to a *Cancel* button.
- If you discover that you made a mistake or if the calibration takes too long, you can click the *Cancel* button. A confirmation window appears
- You can choose to *Cancel calibration* or – if you changed your mind – to *Continue calibration*
- After successful calibration, a corresponding information window is displayed. The *Calibration* Section is marked with a green checkmark:

∨ Calibration ✓

Analysis Methods

EMC-λ Lambda includes five measurement methods:

Analysis



- **Wavelength Measurement:** Measurement of sets of single arbitrary user-defined wavelengths (maximum 20 wavelengths). This can be used if you want to analyze a sample with a claimed substance of which you know the wavelength. You can then define the set of wavelengths that corresponds to the known spectrum to confirm or reject the hypothesis that the sample is indeed the claimed substance.
- **Spectrum Scan:** Scan of a user-defined range of wavelengths in a specific interval grid. This can be used if you want to analyze a sample with an unknown substance. From the obtained spectrum, you can possibly determine which substance or substances are contained in the sample.
- **Quantitative Measurement:** Measures the absorption of a solution with specific solute to determine its concentration. To calculate measured values of samples a standard curve is required.
- **DNA/RNA Measurement:** Measures concentration ratio for DNA/RNA sample preparation
- **Kinetic Measurement:** Measuring absorption at one wavelength over time

Method: Wavelength Measurement

Prerequisite: Device connected and online

 Wavelength Measurement

This method allows you to measure the absorption/transmission of a sample at up to 20 individually specified wavelengths. These wavelengths are configured and saved in *Wavelength Sets*. (Limited functions for EMC-λ Lambda BASIC)

In your Device tab, make sure your device is online and calibrated. To set up or perform a wavelength measurement, click *Wavelength Measurement* in the *Analysis* section.

The *Wavelength measurement tasks* window opens.

 Wavelength measurement tasks



Task: (4)

All Unfinished Sort by: **Time** Name [Reset filter](#)

In this window, you can create and set up new tasks, and copy existing tasks, or select existing tasks to execute measurements that the tasks consist of.

Add a Task

Wavelength Measurement is organized in *Tasks*. A Task is a series of measurements. Each measurement is performed on a different sample. When there aren't any *Tasks* created yet, the task list is empty.

- To create a new task, click *New Task*
- In the field *Task name*, type the name of your task.
- To reuse any previously used task names they are listed below the *name* input. Double click *previous names* to change the automatic incrementing of numbers.



Note: *The name of the task should reflect the purpose of the series of measurements, e.g., the parameter varied when preparing the series of samples.*

- In the dropdown menu *Pathway for all measurements*, select the value corresponding to the size of cuvette used

Create a Wavelength Set


You can open *Wavelength Sets* window while creating a task:

Set up wavelength measurement task

Task name *
Calib. EMC-11-UV F2-F4

Last names: Calib. EMC-11-UV UV60-UV600, Calib. EMC-11-UV F2-F4

Wavelength set:
Please select wavelength set






- Next to *Wavelength set*, click on *Sets...*
- The *Wavelength Sets* window opens. Example:



Wavelength Sets

New Set >





System methods

N2-N4 EMC-SET 100	
N2-N4 EMC-SET 100	
EMC-18S-UV	

Page 1 of 1
8 items per page


Wavelength sets

2. F2-F4 18S (1) 27.04.2022 14:24:06		
1. F2-F4 18S (2) 14.04.2022 16:05:59		

- The *System methods* list shows defined wavelength sets. Example:

Name *
N2-N4 EMC-SET 100



Notes
Predefined method to check device calibration

1	Wavelength * 440	
2	Wavelength * 465	
3	Wavelength * 546	
4	Wavelength * 590	
5	Wavelength * 635	

Accept selection Cancel


- To create a new wavelength set, click on *New Set* or choose the copy Button next to an existing Wavelength Set to copy its values to the form.

Note: Choose the characteristic wavelengths of the sample to be examined




- In the *Name* field, type in the desired name for the wavelength set.
- The *Notes* field is optional
- In the *Wavelength* list, define the desired wavelengths.
- For better visualization of the settings, the approximate color corresponding to the wavelength is displayed next to the numerical value
- To add a single wavelength, click *Add a wavelength* 
- To delete a single wavelength, click the *Delete* icon 
- To confirm your input, click *Accept selection*. To close the window without saving, click *Cancel*
- The selected *Wavelength Set's* name is displayed in the *Task* creation form

Add Measurements

A *Wavelength Measurement Task* consists of a series of *Measurements*. A *Zero (Measurement)* is added to a new *Task* by default.

- In the *New zero sample name* field, type the name of the zero sample (a clean reference sample for the *Task*)
- In the *Measurements* list, add as many measurements you need to measure all samples by clicking on the  icon.

Note: A *Measurement* corresponds to an individual sample. It is always recommended that the name of the measurement identifies the sample.

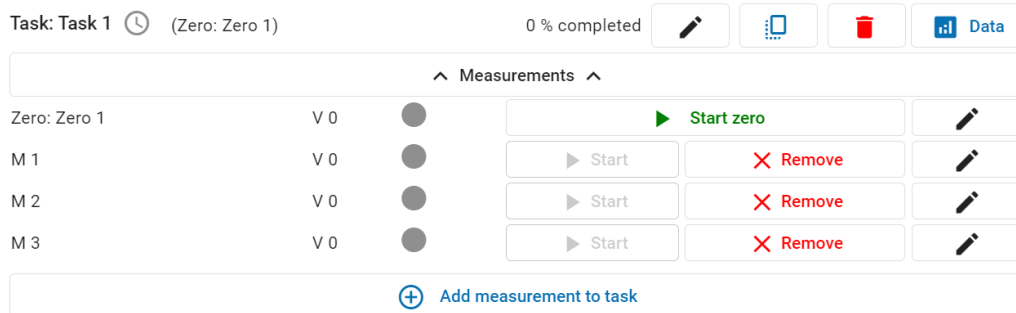
- You can reorder the measurements in the list by clicking the arrow icons  and , and you can delete an obsolete measurement by clicking the  icon
- In the *Measurements per wavelength* line, you can choose between *Fast mode* (one sensor reading per wavelength) and *Fine mode* (three sensor readings per wavelength)

Measurements per wavelength: **Fast mode (1)**  **Fine mode (3)** 

Note: The three sensor readings are not averaged, and all values read are shown in reports. This has to be distinguished from the Sampling Times setting in the Device Configuration.

- In the optional *Temperature* and *Humidity* fields, enter the appropriate values that correspond to the current environmental conditions.
- The *Notes* field is optional.


- When finished with your input, you can choose between *Save Task* and *Back to Task* to discard the input and return to the *Tasks* window, and *Cancel and Close* which brings you back to the *Device* tab.
- After saving the task, it is shown on the *Wavelength measurement tasks* list. A Zero measurement is added automatically to the list of measurements



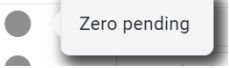
- When hovering with the mouse pointer over the clock icon, the timestamp of creation of the task is displayed:

Task: Task 1  27.04.2022 14:35:16

Edit a Task

- On the headline of the task, you can *Copy* or *Delete* the task. To display the *Data* for a task, click the *Data* icon
- To add measurements to a task, click on *Add measurement to task* 
- You can collapse and expand the list of measurements of a task by clicking on

the *Measurements* header 

- The status of individual measurements is indicated by a circle. If the Zero is pending, the circle is grey 
- You can edit the name of a measurement by clicking the *Edit* button

Execute a Measurement

- On the *Wavelength measurement tasks* window, you can edit the task or individual measurement names. Since inserting a cuvette with a sample requires manual action, you need to start each measurement individually by clicking the *Start* button
- To perform a Zero measurement, click on the *Start zero* button. The *Prepare wavelength zero measurement* window opens:



☰ Prepare wavelength zero measurement (Task: Task 1)

Name	Zero 1
Baseline	27.04.2022 14:12:22 (28 min.)
N2-N4 EMC-SET 100	440, 465, 546, 590, 635nm
Measurements per Wavelength	fast (1)
Pathway	10 mm
Version	2

Temperature °C *
20

Humidity % *
40

Checklist

- Clean reference sample inserted
- Sample moved in light path
- Lid closed

Checklist completed?

▶ Start

- Enter the appropriate values for *Temperature* and *Humidity* corresponding to the current environmental conditions.
- Perform the prerequisite manual actions on the *Checklist* list and toggle the checkmark of each action to confirm
 1. A zero measurement requires a clean reference sample to be inserted.
- After all checks are toggled, the *Start* button becomes active

- After the Zero measurement finished, the tasks list displays the status with a green checkmark and an increased version number

Zero: Zero 1

V 1  

- If necessary, you also have the option of replacing the zero measurement.
- Next, you can start the first individual measurement by clicking on *Start*

▶ Start

- The *Prepare wavelength measurement* window opens:

☰ Prepare wavelength measurement (Task: Task 1)

Name	M 1
Baseline	27.04.2022 14:12:22 (30 min.)
N2-N4 EMC-SET 100	440, 465, 546, 590, 635nm
Measurements per Wavelength	fast (1)
Task	Task 1
Pathway	10 mm
Version	1
Zero measurement	Zero 1 (27.04.2022 14:38:02)

Temperature °C *	Humidity % *
20	40

Notes

Checklist

- Sample inserted
- Sample moved in light path
- Lid closed

Checklist completed?

[▶ Start](#)

- Perform the prerequisite manual actions on the *Checklist* list and toggle the checkmark of each action to confirm
- The measurement requires the respective sample to be inserted into the light path.
- During the measurement, the progress bar, the current wavelength and the corresponding readings for absorption and transmission are displayed
- After all measurements of a task have been taken, you can choose to *continue measuring* or *show data*

Viewing Measured Data



- You can choose to display measurement data either by clicking the *Data* button of a Task in the *Wavelength measurement tasks* window, or by directly clicking the *Data* button on the Device tab.
- When choosing to show the data from the *Wavelength measurement tasks* window, the *Wavelength measurement data* window is displayed for the selected task. Otherwise, you have to select the desired task from the *Task Reports* list

Device EMC-11-UV

Type EMC-11-UV

Range: 190 - 1000 nm

Page 1 of 2
8 items per page

< >

Task reports

13. Task 1
27.04.2022 14:35:16

- In the *Measurement select* section, the list of measurements with *Version*, *Status* and *Date* are displayed

Measurement select

<input checked="" type="checkbox"/>	#	Name	Version	Notes	Status	Date
<input checked="" type="checkbox"/>	1	F2	1		✓	
<input checked="" type="checkbox"/>	2	F3	1		✓	
<input checked="" type="checkbox"/>	3	F4	1		✓	

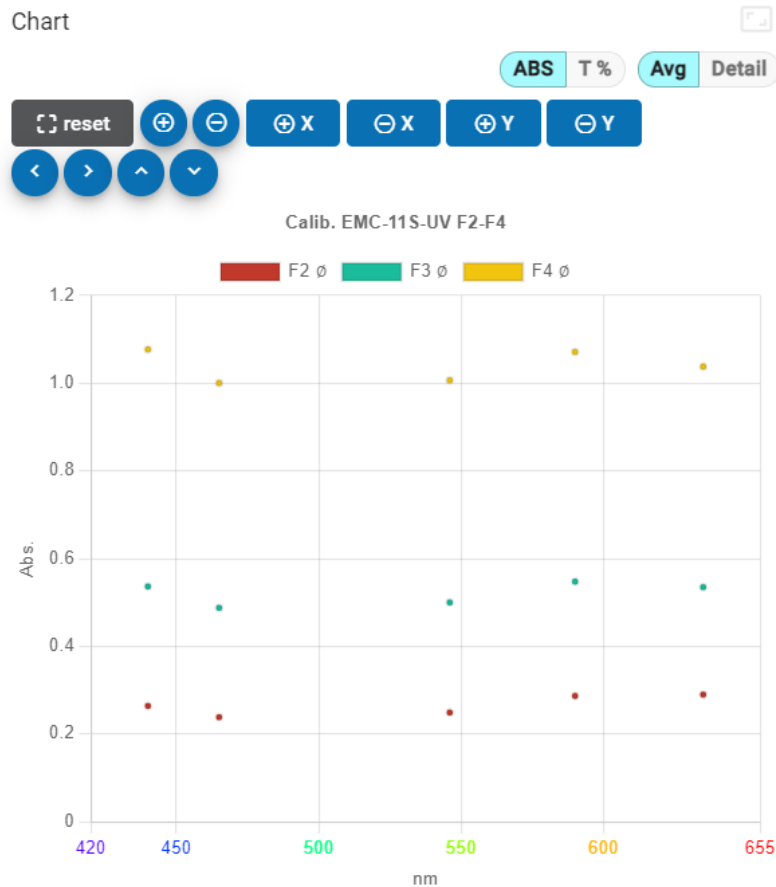
- The *Data* section shows a tabular view of the numerical measurement values:

Data

ABS
T %
Avg
Detail


#	wavelength in nm	F2	F3	F4
		Abs. ø	Abs. ø	Abs. ø
1	440	0.2639	0.5365	1.0772
2	465	0.2383	0.4877	1.0005
3	546	0.2489	0.5000	1.0068
4	590	0.2868	0.5476	1.0715
5	635	0.2898	0.5348	1.0381

- You can choose to display absorption or transmission data by clicking the ABS T % appropriate toggle
- When selected *Fine Measurements per Wavelength* you can choose to display the individual values or averages by clicking the appropriate toggle Avg Detail
- You have the option to swap rows and columns by clicking on and to export the report to an *Excel* file by clicking on
- In the *Chart* section you can display a scatter plot of the measured values in a diagram.



- Each set of measured values is represented by a different color. The legend shows the association. The wavelength is shown on the x-axis, the absorption or transmission is shown on the y-axis. You can pan the graph by dragging the mouse in the graph area
- You can zoom in or zoom out both axis by clicking on the appropriate buttons

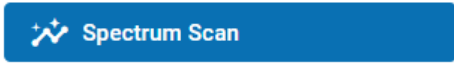


- If you decide to repeat a measurement, you can click on the *Replace*  *Replace* button, either in the *Measurement select* section of the *Wavelength measurement data* window, or in the *Wavelength measurement tasks* window. Replacement is only available while still using the same Baseline calibration. After successful measurement, the version number is increased

Note: *the numerical values in the figures are for illustration only and have no physical meaning/equivalent. Do not use any of the given values as an indicator for the correctness of your own measurements*

Method: Spectrum Scan

Prerequisite: Device connected and online



This method allows you to measure the absorption/transmission of over ranges of wavelengths at defined equidistant intervals. In your Device tab, make sure your device is online and calibrated. To perform a spectrum scan, click *Spectrum scan* in the *Analysis* section.

The *Spectrum scan tasks* window opens.

Add a Task

Spectrum Scan is organized in *Tasks*. A Task is a series of measurements. Each measurement is performed on a different sample. When there aren't any *Tasks* created yet, the task list is empty.

- To create a new task, click *New Task*
- In the field *Task name*, type the name of your task



Note: *The name of the task should reflect the purpose of the series of measurements, e.g., the parameter varied when preparing the series of samples.*


- In the dropdown menu *Pathway for all measurements*, select the value corresponding to the type of cuvette used
- In the *New zero sample name* field, type in the name of the zero sample
- In the *from wavelength [nm]* field, type in the lower boundary of the desired wavelength range
- In the *to wavelength [nm]* field, type in the upper boundary of the desired wavelength range
- In the *wavelength steps [nm]* field, enter the size of the interval between the wavelengths to scan. If the specified wavelength range cannot be divided without remainder by the step size, a message is displayed:

Wavelength configuration invalid, please press **"fit to interval"**




If you click on *"fit to interval"*, the upper boundary of the range is reduced to accommodate an integer number of steps. A message then shows the resulting number of wavelengths

- From the *Presets* dropdown menu, you may select predefined wavelength ranges for holmium oxide scans e.g., to check calibration


Add Scans



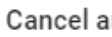
- In the *Scan* section, create as many scans as you need to scan all samples you, by clicking the  icon

Note: A *Scan* corresponds to an individual sample. It is always recommended that the name of the scan identifies the sample.



- In case you want to delete a scan, click the  icon
- To reorder the scans in the list, click the arrow icons  and 

In the *Measurements per wavelength* line, you can choose between *Fast mode* (one measurement per wavelength) and *Fine mode* (three measurements per wavelength)

Measurements per wavelength: **Fast mode (1)** **Fine mode (3)** 

- In the optional *Temperature* and *Humidity* fields, enter the appropriate values that correspond to the current environmental conditions.
- The *Notes* field is optional.
- When finished with your input, you can choose between *Save Task*  *Save Task* which saves the task, *Back to Tasks*  *Back to Tasks* to discard the input and return to the *Tasks* window, and *Cancel and Close*  *Cancel and Close* which brings you back to the *Device tab*.

Execute a Task/Scan

- On the *Spectrum scan tasks* window, you can start individual scans by clicking the *Start*  *Start* button
- To perform a Zero measurement, click on the *Start zero* button.  *Start zero*
The *Prepare zero spectrum scan* window opens.
- Enter the appropriate values for *Temperature* and *Humidity* corresponding to the current environmental conditions.
- Perform the prerequisite manual actions on the *Checklist* and toggle the checkmark of each action to confirm
- A zero scan requires a clean reference sample to be inserted.
- After all checks are toggled, the *Start* button becomes active. Click it to start the scan.
- After the scan finished, you can start individual scans by clicking on *Start* for the respective scan. The *Prepare spectrum scan* window opens
- Perform the prerequisite manual actions on the *Checklist* and toggle the checkmark of each action to confirm.
- The scan requires the desired sample to be inserted into the light path.

- During the scan, a progress bar is shown with information on the current wavelength and measured values for absorption and transmission. In addition, a graph is drawn in real time to visualize the measured values

✧ Spectrum scan running...

Current Baseline: 27.04.2022 14:12:22 (60 min.) ✓

Name

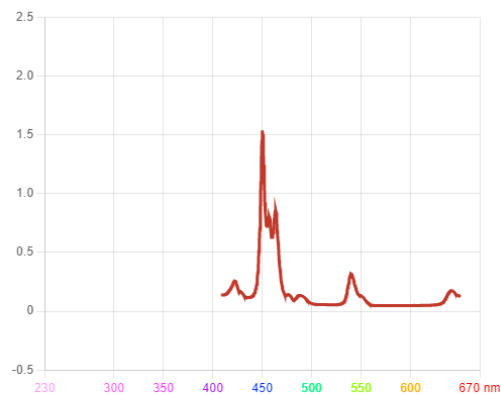
Scan 1

Wavelengths

250 - 650 nm in steps of 0.5 nm (801 total)

Temperature °C
0

Humidity %
0



✖ Cancel

Current position: 71% - 458.0nm

Current data: absorption: 0.1408 - transmission: 72.3128 %

View Scan Results

 Data

- The results of the spectrum scans can be investigated on the *Spectrum scan data* window. This can be opened by clicking on *Data* in the *Spectrum scan tasks* window, or from on the *Analysis* section on the *Device* tab

- After *Spectrum scan* is finished, you can select the appropriate task from the *Task reports* list

Spectrum scan data

Device EMC-11-UV

Type EMC-11-UV

Range: 190 - 1000 nm

Page 1 of 1
8 items per page

< >

Task reports

3. Task
27.04.2022 15:05:34

- In the *Scan select* section, the list of scans with *Version*, *Status* and *Date* are displayed

<input type="checkbox"/>	#	Name	Version	Notes	Status	Date
<input checked="" type="checkbox"/>	1	Scan 1	1		✓	
<input type="checkbox"/>	2	Scan 2	0			

- A spectrum scan can generate a large number of values that are not initially of interest. To view the full list of values, click *Show All Data*. You will find the description of peak detection *tolerance* on page 40.

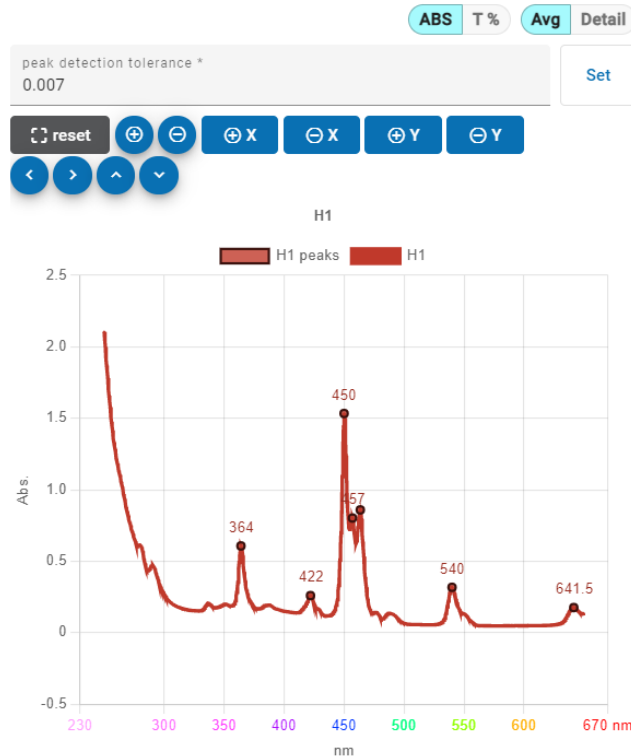
Data

XLSX

Show all data

- You can choose to display absorption or transmission data by clicking the appropriate toggle ABS T %
- When selected *Fine Measurements per Wavelength* you can choose to display the individual values or averages by clicking the appropriate toggle Avg Detail
- You have the option to swap rows and columns by clicking on and to export the report to an *Excel* file by clicking on XLSX

- In the *Chart* section you can display a line plot of the measured values in an xy-diagram.



Each set of measured values is represented by a different color. The legend shows the association. The wavelength is shown on the x-axis, the absorbance or transmission is shown on the y-axis. You can pan the graph by dragging the mouse in the graph area.

You can zoom in or zoom out both axis by clicking on the appropriate buttons:



Note: the numerical values in the figures are for illustration only and have no physical meaning/equivalent. Do not use any of the given values as an indicator for the correctness of your own measurements ↻ Replace

Peak detection


In the *Peaks* section you can find the output of the peak detection function. To adjust the detection, you can change the peak detection *tolerance* (located above the chart and on the *Peaks* window). Per default the *tolerance* is set to 0.007, which serves well for most applications. Increase the value to make the detection stricter (less *peaks* are detected, steep *peaks* only), or decrease to list more *peaks*.

- All detected *peaks* are also shown on the task's *chart* as black dots.

- If you decide to repeat a measurement, you can click on the *Replace* button, either in the *Scan select* section of the *Spectrum scan data* window, or in the *Spectrum scan tasks* window. Replacement is only available while still using the same Baseline calibration. After successful measurement, the version number is increased

Method: Quantitative Measurement

Prerequisite: Device connected and online



This method allows you to determine the concentration of a solution in a specific solute. To perform a *Quantitative Measurement*, click in the *Analysis* section of the Device tab. The *Quantitative measurement tasks* window opens.

Add a Task

Quantitative Measurements are organized in *Tasks*. A *Task* is a series of measurements. Each measurement is performed on a different sample. When there aren't any tasks created yet, the task list is empty

- To create a new task, click *New Task*
- In the field *Task name*, type the name of your task.



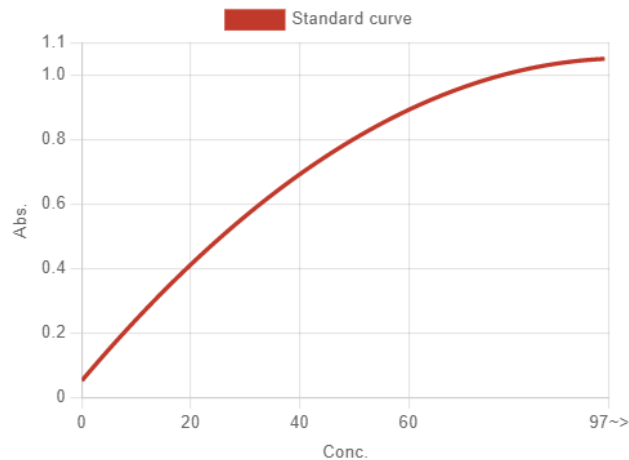
Note: *The name of the task should reflect the purpose of the series of measurements, e.g., the parameter varied when preparing the series of samples.*

- In the dropdown menu *Pathway for all measurements*, select the value corresponding to the type of cuvette used.
- Next to the *Standard curve* field, click on the *Standard Curves* button. The *Standard Curves* window opens.
- To create a new standard curve, click on *New standard curve*




Standard Curves

Standard curves are a mighty tool for calculating concentrations from absorption values when an absorption curve is known. By measuring known concentrations it's also possible to calculate the approximate absorption curve for further measurements.



The absorption value required for the standard curve is calculated from one, two or three wavelengths using the following formulas:

- One wavelength: $abs = A1$
- Two wavelengths: $abs = m * A1 - n * A2$ with m, n being weights
- Three wavelengths: $abs = A1 - (WL1 - WL2) * \frac{(A2 - A3)}{WL2 - WL3} - A3$

The energy difference between the wavelengths is taken into account.

- Choose a meaningful name for every standard curve, as you can reuse them
- Select the unit in which the measurements should be defined

Standard curves by known curve coefficients

In *Curve Setup* choose *Coefficient*.

Standard curves are approximated by simple linear or exponential functions. Choose your curve appearance:

- Linear: $abs = k0 * c + k1$ as in $f(x) = a * x + b$
- Linear Zero: $abs = k0 * c$ as in $f(x) = a * x$
- Exponential: $abs = k0 * c^2 + k1 * c + k2$ as in $f(x) = ax^2 + bx + c$

Enter your known values in the respective input fields. If the inputs are valid, a preview of the curve is rendered on the right.

Standard curves by measuring samples with known concentrations

In *Curve Setup* choose *Concentration*.

Fill in *Environment* information (*temperature/humidity*) and the used pathway / cuvette size for your measurement.

Choose measuring in *fast* or *fine* mode (for fine mode, the calculation will use the average value).

The approximation algorithm will try to find a curve fitting your later measurements into linear or exponential functions, choose the appearance you expect:

- Linear
 - Linear Zero (function through origin)
 - Exponential
- Enter the known concentrations of your samples in the respective input fields. At least three samples are required
 - After definition of the standard curve is complete, you have the options *Save*, *Save and select* or *Cancel*
 - When a standard curve is selected, the details are shown on the *New Task* window:
Standard curve: Curve 1 | 550nm square - Measurement required
 - If *Concentration* is selected and the values have not yet been measured, *Measurement required* is displayed. All required measurements for standard curve measurement will be added automatically

Add Measurements and save task

On the *Set up quantitative measurement task* window, in the *Measurements* list, add all samples you want to measure by clicking the ⊕ icon.

Note: A *Measurement* corresponds to an individual sample. It is recommended that the name of the measurement identifies the sample.

- In case you want to delete a measurement, click the ✕ icon
- To reorder the measurements in the list, click the arrow icons ↑ and ↓
- In the *Measurements per wavelength* line, you can choose between *Fast mode* (one measurement per wavelength) and *Fine mode* (three measurements per wavelength)

Measurements per wavelength: **Fast mode (1)** **Fine mode (3)**

- In the optional *Temperature* and *Humidity* fields, enter the appropriate values that correspond to the current environmental conditions
- The *Notes* field is optional
- When finished with your input, you can choose between *Save Task*, *Back to Tasks* to discard the input and return to the *Tasks* window, and *Cancel and Close*, which brings you back to the *Device* tab

Execute a Task / Curve measurement

If you have selected a *standard curve* with known *coefficients*, you can start measuring your samples immediately.

If you have selected a standard curve with absorption values to be measured, you must first carry out the measurements for determining the curve.

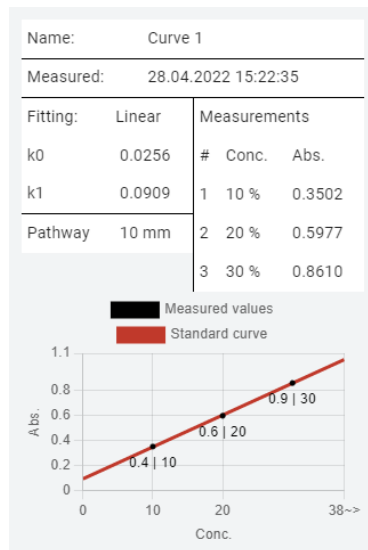
Follow the steps to first measure zero, then measure the absorption for each of your known concentration's samples.

^ Curve measurements ^

Curve zero	V 1	✓	🔒	🔄 Replace zero
Conc. 10 %	V 1	✓	🔒	🔄 Replace
Conc. 20 %	V 1	✓	🔒	🔄 Replace
Conc. 30 %	V 1	✓	🔒	🔄 Replace

Curve valid ✓ ⓘ

To get information about your measured Standard curve, hover the ⓘ icon next to Curve valid:



Then you can continue measuring your unknown concentration samples. Click on the *Start zero* button to get a blank reference.



After the measurement you will see the results immediately:

Task zero	V 1	✓	🔒
M1	V 1 conc.: 13.4180 %	✓	🔒
M2	V 1 conc.: 1.4844 %	✓	🔒
M3	V 1 conc.: 5.1641 %	✓	🔒

Viewing Measured Data



- You can choose to display measurement data either by clicking the *Data* button of a Task in the *Quantitative measurement tasks* window, or by directly clicking the *Data* button on the Device tab

- When choosing to show the data from the *Quantitative measurement tasks* window, the *Quantitative measurement data* window is displayed for the selected task. Otherwise, you have to select the desired task from the *Task Reports* list

Device EMC-11-UV

Type EMC-11-UV

Range: 190 - 1000 nm

Page 1 of 1
8 items per page










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< Page 1 of 1 >

Task reports

1. Task 1
28.04.2022 15:20:34

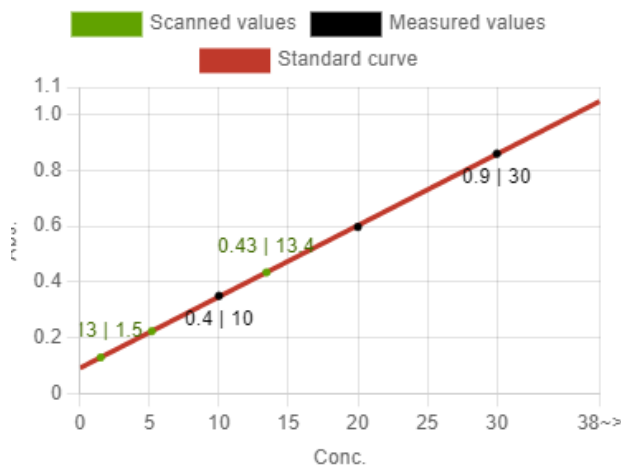
- In the *Measurement* section, the list of measurements with *Version*, *Status* and *Date* are displayed

#	Name	Version	Notes	Status	Date	Abs.	Conc.
1	M1	1				0.4344	13.4180 %
2	M2	1				0.1289	1.4844 %
3	M3	1				0.2231	5.1641 %

- To export the report to an *Excel* file click  **XLSX**

Note: *the numerical values in the figures are for illustration only and have no physical meaning/equivalent. Do not use any of the given values as an indicator for the correctness of your own measurements.*

- In the following section you can have a line and point cloud of the measured values displayed in an xy-diagram according to the configured standard curve



Standard curve measurements


Curve: Curve 1 (550 nm | linear) - 28.04.2022
15:22:35

Pathway: 10 mm

One wavelength: Abs. = A1

Conc. formula: $abs = k_0 * c + k_1$

#	Conc.	Abs.
1	10 %	0.3502
2	20 %	0.5977
3	30 %	0.8610

- Each set of measured values is represented by a different color. The legend shows the association. The concentration is shown on the x-axis, the absorption is shown on the y-axis.
- If you decide to repeat a measurement, you can click on the *Replace*  *Replace* button, either in the *Measurement select* section of the *Quantitative measurement data* window, or in the *Quantitative measurement tasks* window. Replacement is only available while still using the same Baseline calibration. After successful measurement, the version number is increased, and the concentration results are recalculated

Method: DNA/RNA Measurement

Prerequisite: Device connected and online

 DNA/RNA Measurement

This method allows you to measure the concentration ratio for DNA/RNA sample preparation. For this, the software uses defined *Methods*. These methods consist of two sample wavelengths and an optional reference wavelength, and rely on the following formulas:

With reference wavelength:

$$C_{DNA} = (A_1 - A_{ref}) * f_1 - (A_2 - A_{ref}) * f_2$$

$$C_{Protein} = (A_2 - A_{ref}) * f_3 - (A_1 - A_{ref}) * f_4$$

$$Ratio = (A_1 - A_{ref}) / (A_2 - A_{ref})$$

Without reference wavelength:

$$C_{DNA} = A_1 * f_1 - A_2 * f_2$$

$$C_{Protein} = A_2 * f_3 - A_1 * f_4$$

$$Ratio = A_1 / A_2$$

where A_1 , A_2 and A_{ref} are the absorptions at the wavelengths 1, 2 and reference, respectively. The factors f_1 , f_2 , f_3 and f_4 are constant empirical factors.

- In your *Device tab*, make sure your device is online and calibrated. To set up or perform a DNA/RNA Measurement, click *DNA/RNA Measurement* in the *Analysis* section
- The *DNA/RNA measurement task* window opens
- In this window, you can create and set up new tasks, and copy existing tasks, or select existing tasks to execute measurements

Create a Method

You can open the *DNA/RNA methods* window while creating a task.

- Next to *Please select method* click on *Method select...*
- The *DNA/RNA methods* window opens
- The *System methods* list shows defined methods



DNA/RNA methods

New DNA/RNA method >


System methods

Method 1



Method 2



- You can create a new method from scratch by clicking on *New DNA/RNA method* or based on the existing *System methods* by clicking the copy button 
- Choose whether to use the reference wavelength and insert your wavelength values and factors
- Choose a meaningful name for your method, you can reuse the method

- To save your changes, click *Save* to save and select the method for the task currently being edited, click *Save and select*, to close the window without saving, click *Cancel*

Add a Task

DNA/RNA Measurement is organized in *Tasks*. A Task is a series of measurements. Each measurement is performed on a different sample. When there aren't any *Tasks* created yet, the task list is empty.

- To create a new task, click *New Task*
- The *Set up DNA/RNA measurement task* window opens
- Choose a task name to identify the series of measurements and enter it in field *Task name*
- Select the cuvette size from the *Pathway for all measurements* dropdown menu
- Select the applicable method by clicking on *Method select ...*
- Select the desired method by clicking on the method name in the list at the left of the window and accept the selection.
- Enter values for the current environmental conditions in the optional *Temperature* and *Humidity* fields
- The *Notes* field is optional
- To save the task, click *Save Task*; to discard the input and return to the tasks list, click *Back to Tasks*; to close the Dialog without saving, click *Cancel and Close*.
- After saving the task, it appears in the list on the *DNA/RNA measurement task* window, a Zero measurement is added automatically to the list of measurements.
- There is one measurement added per default, but you can add further measurements by clicking *Add measurement to task*





 **Add measurement to task**

🔍 DNA/RNA measurement task



Available Tasks (1)

All Unfinished Sort by: **Time** Name [Reset filter](#)

Task: Task 1   0 % completed     Data



Method: **Method 1** Wavelengths: **260, 280, 320nm** Factors: **f1: 62.9, f2: 36, f3: 1552, f4: 757.3**

^ Measurements ^




Task zero V 0  

Measurement 1 V 0  Task: Task 1  27.04.2022 14:35:16  



- You can change the name of a measurement or edit notes to it by clicking on the *Edit*  button.
- You can delete obsolete measurements by clicking on the  *Remove* button

Execute a Measurement

- If not yet done, perform a zero measurement by clicking on *Start zero* 
- The window shows a green checkmark, a version number increased by one, a thermometer icon to show environmental conditions, and a *Replace zero*  button
- On the *DNA/RNA measurement task* window, click *Start* 
- The *Prepare DNA/RNA measurement* window opens

📌 Prepare DNA/RNA measurement

Current Baseline: 09.04.2022 11:33:25 (477 h) ✓

Name	Measurement 1
Baseline	09.04.2022 11:33:25 (477 h)
Measurements per Wavelength	fast (1)
Task	Task 1
Method 1 - 260, 280, 320nm	
Pathway	10 mm
Version	1
Temperature °C *	Humidity % *
0	0
Notes	

- Fill in the current environmental conditions for *Temperature* and *Humidity*
- The *Notes* field is optional
- Perform all prerequisite actions in the *Checklist*

Checklist

- Sample inserted
- Sample moved in light path
- Lid closed

- When all actions are confirmed with a checkmark, the *Start* button becomes active
- Click on *Start* and wait for the measurement to complete
- The result shows in the *DNA/RNA measurements task* window


Measurement 1 V 1 Ratio: 2.0816  ✓ 

Measurement 2 V 1 Ratio: 1.4771  ✓ 

Note: The target Ratio value is around 2.0, the value is colored in red, yellow and green depending on the quality of the result.

- If you hover the mouse pointer over the *Ratio* icon, a tooltip displays the values of the numerator and denominator of the ratio
- To complete a task, repeat this procedure for all measurements (samples) of the task

View Measured Data

- You can choose to display measured data either by clicking the *Data*  *Data* button of a Task in the *DNA/RNA measurement task* window, or by clicking the *Data* button on the Device tab
- The *DNA/RNA concentration measurement data* window opens
- When choosing to access the window from the Device tab, the task has to be selected from the *Task reports* list on the left

Device	EMC-11-UV
Type	EMC-11-UV
Range:	190 - 1000 nm


Page 1 of 1
8 items per page

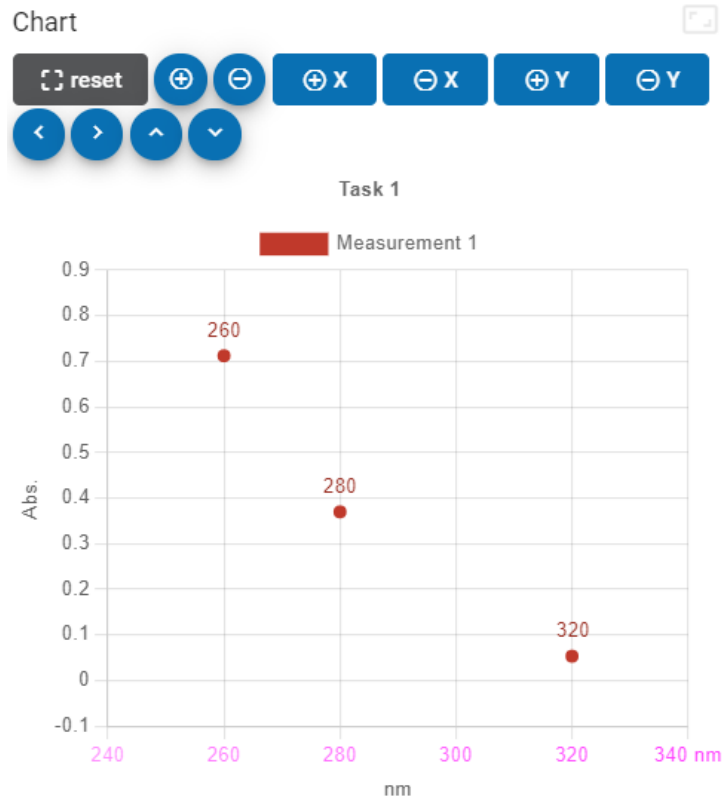
Task reports

1. Task 1
29.04.2022 09:24:36

- When choosing to access the window from the tasks list, the respective task is already selected
- You can find the results of your measurements at the data window

Data						
Measurement	Ratio	C _{DNA}	C _{Protein}	A ₁	A ₂	A ₃
Measurement 1	2.0816	30.0598 µg/ml	7.5755 µg/ml	0.7123	0.3698	0.0532

- Click *XLSX*  *XLSX* to generate and save an Excel file report
- On the *Chart* you can visualize the data in a scatterplot



Note: *the numerical values in the figures are for illustration only and have no physical meaning/equivalent. Do not use any of the given values as an indicator for the correctness of your own measurements.*

Method: Kinetic Measurement

Prerequisite: Device connected and online

 Kinetic Measurement

The method allows you to measure the absorption at one wavelength over time. This allows you to determine information about chemical reaction kinetics. A measurement is characterized by the single wavelength at which the repeated sensor readings are performed, and the total time, time increment, and possibly a start delay.

- In your Device tab, make sure your device is online and calibrated. To set up or perform a kinetic measurement, click *Kinetic Measurement* in the *Analysis* section
- The *Kinetic measurements tasks* window opens

Kinetic measurement tasks

 New Task

Task: (0)

All Unfinished Sort by: **Time** Name [Reset filter](#)

[Why can't I see any tasks?](#)

- In this window, you can create and set up new tasks, and copy existing tasks, or select existing tasks to execute measurements that the tasks consist of

Add a Task

Kinetic Measurement is organized in *Tasks*. A Task is a series of measurements. Each measurement is performed on a different sample. When there aren't any *Tasks* created yet, the task list is empty.

 New Task

- To create a new task, click *New Task*
- The *Set up kinetic measurement task* window opens

🕒 Set up kinetic measurement task

Current Baseline: 09.04.2022 11:33:25 (479 h) ✓

Task name *	
Last names:	
Pathway for all measurements * 10 mm	
cuvette size	
Wavelength * 500	
Total * 50 s	
Total time including start delay	
Measurement interval * 5 sec.	
11 measurements	
Start delay * 0 s	
Temperature °C * 0	Humidity % * 0
Notes	

- Choose a task name to identify the series of measurements and enter it in the field *Task name*
- Select the cuvette size from the *Pathway for all measurements* dropdown menu
- Specify the desired wavelength in nanometers [nm] in the *Wavelength* field

Time control

Kinetic measurement performs a series of measurements over time at a fixed wavelength:

- In the *Total* field, specify the total time, including any start delay
- In the *Measurement interval* field, specify the duration of the time interval between two readings of the sensor. Below the field, the number of readings is displayed.
- In the *Start delay* field, specify the time that should pass before the data collection starts.

Example:

Start delay of 5 seconds at a total time of 10 seconds with an interval of 1 second:

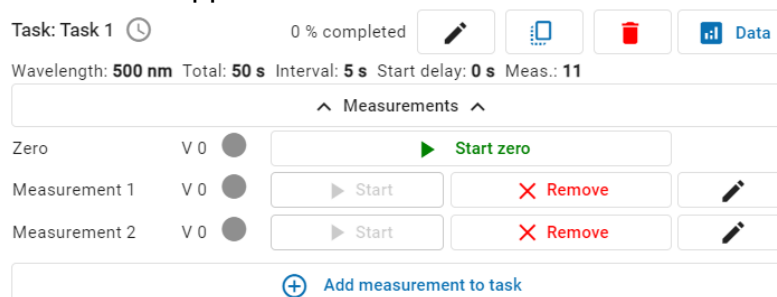
First measurement at second 5, last measurement at second 10
= total of 6 measurements

- In the *Temperature* and *Humidity* fields, specify the current environmental conditions
- The *Notes* field is optional.
- To save the task, click on *Save Task*

Add, Edit and Remove Measurements


A *Kinetic Measurements* task consists of a series of *Measurements*. A *Zero* and a *Measurement 1* measurement are added by default upon creation of the task. To add measurements, open the *Kinetic measurement tasks* window.

- To add a measurement to a task, click on *Add measurement to task* of the respective task.
- The *Add measurement to task* window opens
- Choose a name for the measurement which identifies the sample to be analyzed, and click *Add to task*
- The measurement appears in the list of measurements





- You can change the name of a measurement or edit notes to it by clicking on the *Edit* button
- You can delete obsolete measurements by clicking the *Remove* button.
- Repeat the above steps for all samples that you wish should be measured for this task.

Execute a Measurement

- If not already done, perform a zero measurement by clicking on *Start zero*
- After completion, the window shows a green checkmark, a version number increased by one, and a *Replace zero* button
- On the *Kinetic measurement tasks* window, click *Start*  **Start**
- The *Prepare kinetic measurement* window opens
- Fill in the current environmental conditions for *Temperature* and *Humidity*
- Perform all prerequisite actions in the *Checklist*
- When all actions are confirmed with a checkmark, the *Start* button becomes active.
- Click on *Start* and wait for the measurement to complete
- While the measurement is running, a graph visualizes the sensor readings, also a countdown for each measurement is shown:

Waiting interval time 4 seconds till measurement 5 of 11

- The completed measurement shows a green checkmark in the *Kinetic measurement tasks* window

Measurement 1 V 1  

- Repeat the above steps for all measurements of a task

View Measured Data

- You can choose to display measured data either by clicking the *Data* button of a Task in the *Kinetic measurement tasks* window, or by clicking the *Data* button on the Device tab
- The *Kinetic measurement data* window opens
- When choosing to access the window from the Device tab, the task has to be selected from the *Task reports* list on the left

Device	EMC-11-UV
Type	EMC-11-UV
Range:	190 - 1000 nm

Page 1 of 1
8 items per page

Task reports

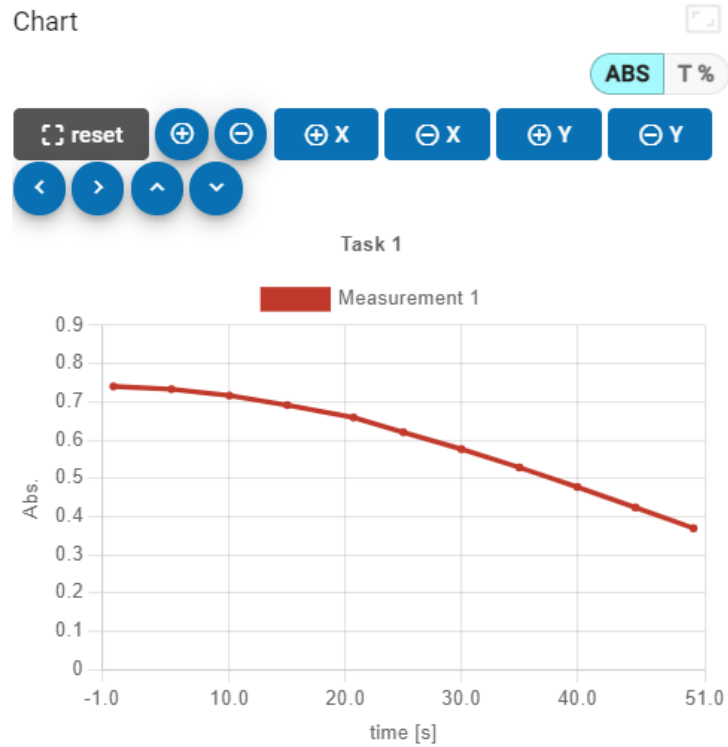
1. Task 1
29.04.2022 11:30:22

- When choosing to access the window from the tasks list, the respective task is already selected
- You can find the results of your measurements at the data window

#	time	Measurement 1 Abs.
	start delay 0 seconds	
1	0.0 s	0.7405
2	5.0 s	0.7332
3	10.0 s	0.7166
4	15.0 s	0.6915
5	20.7 s	0.6591
6	25.0 s	0.6204
7	30.0 s	0.5764
8	35.0 s	0.5283
9	40.0 s	0.4770
10	45.0 s	0.4237
11	50.0 s	0.3693

- Click **XLSX** to generate and save an Excel file report  **XLSX**

- On the *Chart* you can visualize the data in a scatterplot



Note: *the numerical values in the figures are for illustration only and have no physical meaning/equivalent. Do not use any of the given values as an indicator for the correctness of your own measurements.*

Troubleshooting

Attention: Always make sure you are using the latest version of the software!
The current software and manual can be found at www.emc-lab.de.

There is a fault reporting when opening EMC λ Lambda more than one time

We do not recommend opening the software more than once, because the software will have trouble connecting with the device(s), since it can only be used with one PC at a time.

EMCLAB device is not recognized in EMC λ Lambda

Please connect your device directly with USB port of your computer or with a powered USB hub. (Note: passive hub is not working)

Second or third EMCLAB device is not recognized in EMC λ Lambda

It's possible that your second or third device's automatically assigned COM port is already used.

- open the Device Manager control window
- Under *Ports (COM & LPT)* search for **Silicon Labs CP210x USB to UART Bridge**
or
CP2102 USB to UART Bridge Controller
- If multiple devices are listed and are marked with the same (COMX) port, right click one of them and select *Properties*
- Select tab *Port Settings*
- Click *Advanced*
- Choose an unused *COM Port Number* in the dropdown below
- Click *OK* and close the *Properties* dialog and the *Device Manager*

I can't find my measured data

Measurement and scan tasks are tied to the device for which they were created and are only available when you select the appropriate device in the *Devices* tab.

Help and Support

For personal help and support in using the software or to report software errors, please contact your reseller or info@emc-lab.de.

Always state your software version and the type of device you are using with every request!

Appendix

Methods of Quantitative Analysis

Single Wavelength Method: $Abs = A_1$

Double Wavelength Method: $Abs = m * A_1 - n * A_2$

Three Wavelengths Method: $Abs = A_1 - (WL_1 - WL_2) * (A_2 - A_3) / (WL_2 - WL_3) - A_3$

Methods of DNA/Protein Analysis

$$C_{DNA} = (A_1 - A_{ref}) * f_1 - (A_2 - A_{ref}) * f_2$$

$$C_{Protein} = (A_2 - A_{ref}) * f_3 - (A_1 - A_{ref}) * f_4$$

$$Ratio = (A_1 - A_{ref}) / (A_2 - A_{ref})$$

	A_1	A_2	A_{ref}	f_1	f_2	f_3	f_4
Method 1	A_{260nm}	A_{280nm}	A_{320nm}	62,9	36,0	1552	757,3
Method 2	A_{260nm}	A_{230nm}	A_{320nm}	49,1	3,48	183,0	75,8

A_{ref} is always optional



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