

スマートファイバアンプ

形E3NX-FA□0シリーズ

取扱説明書

このたびは、本製品をお買い上げいただきまして、誠にありがとうございます。

ご使用に際しては、次の内容をお守りください。

- 電気の知識を有する専門家がお取り扱いください。
- この取扱説明書をよくお読みになり、十分にご理解のうえ、正しくご使用ください。
- この取扱説明書はいつでも参照できるよう大切に保管してください。

オムロン株式会社

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警告

正しい取扱いをしなければ、この危険のために、軽傷・程度の傷害を負ったり、万一の場合には重傷や死亡に至る恐れがあります。また、同様に重大な物的損害をもたらす恐れがあります。

警告表示

警告

安全を確保する目的で直接的または間接的に人体を検出する用途に本製品は使用できません。人体保護用の検出装置として本製品を使用しないでください。

故障や発火の恐れがあります。
定格電圧を超えて使用しないでください。

破裂の恐れがあります。
AC電源では絶対に使用しないでください。

以下に示す項目は安全を確保するうえで必要なことですので必ず守ってください。破損・発火の恐れがあります。

・下記の設置場所では使用しないでください。

- ①直射日光が当たる場所
- ②湿度が高く、結露する恐れがある場所
- ③腐食性ガスのある場所
- ④振動や衝撃が定格の範囲を超える場所
- ⑤水・油・化学薬品の飛沫がある場所
- ⑥蒸気の当たる場所
- ⑦強電界・強磁界のある場所

・引火性、爆発性ガスの環境では使用しないでください。

・定格を超える周囲雰囲気・環境では使用しないでください。

・操作や保守の安全性を確保するため、高圧機器や動力機器から離して設置してください。

・高圧線、動力線と本製品の配線は別配線としてください。同一配線あるいは同一ダクトにすると誘導を受け、誤動作あるいは破損の原因になることがあります。

・負荷は定格以下でご使用ください。破損、発火の恐れがあります。

・負荷を短絡させないでください。破損、発火の恐れがあります。

・負荷の接続を正しく行ってください。

・電源の極性など、誤配線をしないでください。

・連結して使用する場合、必ず同一の電源に接続し、電源投入を同時に実施ください。別電源にすることで、連結時の機能に影響を与えます。

・ケースが破損した状態で使用しないでください。

・火傷の恐れがあります。使用条件(周囲温度、電源電圧、他)によってはセンサ表面温度が高くなります。操作時や清掃時にはご注意ください。

・センサ設定時は、装置を停止していただく等、安全をご確認された上で行ってください。

・配線を着脱するときは、必ず電源を切ってから行ってください。

・本体の分解、修理、改造をしないでください。

・廃棄するときは、産業廃棄物として処理してください。

・水中、降雨中、および屋外での使用は避けてください。

使用上の注意

- DINレールへの取り付け時には、カチッと音がするまで取り付けてください。
- 感電や短絡防止のため、使用しない連絡用電源端子には保護用キャップを付けてください。



- コードの延長は合計で30m以下としてください。延長には0.3mm²以上のコードをご使用ください。
- コード部に加わる力は下記の値以下としてください。
- 引っ張り29.4N以下、トルク0.1N・m以下、押圧20N以下、屈曲29.4N以下
- ファイバユニットをアンプユニットに固定した状態で、引っ張り、圧縮、ねじりなどの無理な力を加えないでください。
- 保護カバーは必ず装着した状態で使用してください。誤動作の危険があります。
- 電源投入直後は使用環境に応じて受光量・測定値が安定するまで時間がかかる場合があります。
- 電源投入後、200ms以上経過後に検出が可能となります。
- モジュールコンパイル形E3X-MC11、形E3X-MC11-SV2、形E3X-MC11-Sは使用できません。
- 通信ユニット形E3X-DRT21-S、形E3X-CRT、形E3X-ECT、形E3N-CRTは使用できません。
- 形E3C/E2C/E3Xとは相互干渉防止機能が働きます。
- 過大なセンサ光が入光した場合は、相互干渉防止機能が十分に機能せず誤動作する場合があります。その場合はしきい値を大きく設定してください。
- センサ通信ユニット形E3NWが使用できますが、形E3X-DRT21-S、形E3X-CRT/ECTは使用できません。
- 力が一瞬、異常を感じたときには、すぐに使用を中止し、電源を切った上で、当社支店・営業所までご相談ください。
- 清掃にはシンナー、ベンジン、アセトン、灯油類は使用しないでください。
- アンプユニットはEEPROMメモリを使用し設定情報を保存しています。メモリの書き換え回数(100万回)を超えた場合は、メモリエラーが表示されますのでアンプユニットの交換が必要です。ゼロリセット、しきい値変更、チューニングなどを実施するとメモリのデータを書き換えます。

パッケージ内容の確認

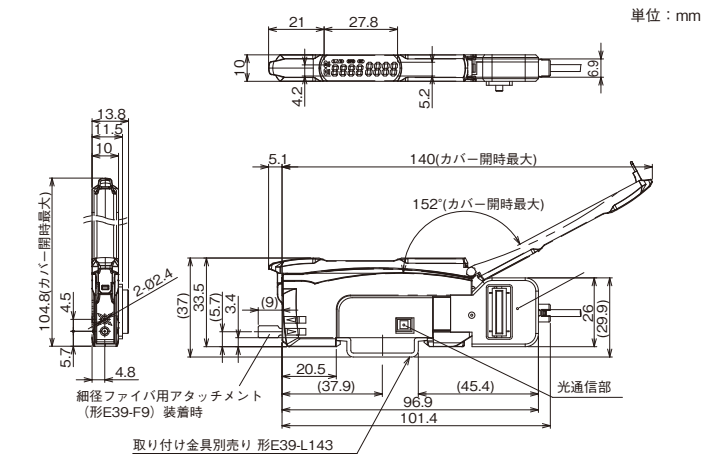
・アンプユニット 1台 ・取扱説明書(本書) 各1部(日本語 英語 中国語)

対応通信ユニット(別売り)

E3NWシリーズ通信ユニット、分散ユニット 形E3NW-DS

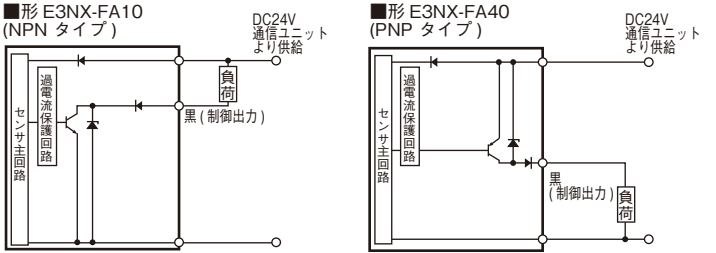
1 設置編

1-1 外形寸法図



() 内の寸法は関連部品との寸法になります。
カバーを152度以上傾けると外れる事があります。

1-2 入出力段回路図



1-3 アンプユニットの取付け

- DIN レールへの取付け
- ファイバユニット挿入部側のツメをレールにかけます。
 - フックがカチッと音がするまで押し込みます。
- DIN レール (形 PFP-□N) は別売りです。
- DIN レールからの取外し
- 本体を矢印 1 の方向へ押します。
 - (1) をしながら矢印 2 の方向へ持ち上げます。
- 連結して使用する場合
- アンプユニットを1台ずつ DIN レールに取り付けます。
 - アンプユニットが密着するまで、アンプユニットをスライドさせます。(矢印3)
 - 振動で離れないように、別売のエンドプレート (形 PFP-M) でアンプをしっかりととまんでください。(矢印4)
 - ドライバで別売のエンドプレート (形 E39-EP1) のネジを締めてください。(矢印5)

E3NW シリーズ通信ユニットとの最大連結可能台数は16台です。

振動等がある場合は、アンプユニット単体でもエンドプレートを使用してください。

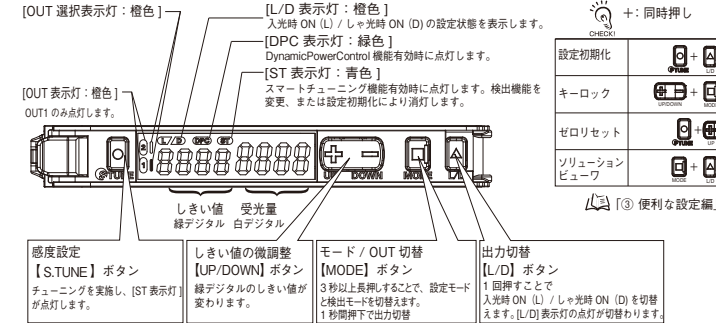
アンプユニットを連結せずに設置する場合は、側面の光通信部を遮光テープでふさいでください。

1-4 ファイバユニットの取付け

- ファイバカッターの使用法
- ファイバをファイバカッターの穴に挿入します。
 - 刃を一気に押し下げて切断します。
- ファイバユニットの取付け
- カバーを開きます。
 - ロックレバーを起こします。(解放)
 - ファイバユニット挿入口にファイバユニットを確実に奥まで差し込みます。
 - ロックレバーを元の方向に戻して、ファイバユニットを固定します。(ロック)
- ・細径ファイバユニットを取り付けるには、アタッチメント (形 E39-F9) が必要です。(アタッチメントは、適用ファイバユニットに付属しています。)
- ・同軸反射形ファイバユニットを本体に取り付ける場合、単芯ファイバを取り付け穴の上 (投光) 側に、複芯ファイバを下 (受光) 側に取り付けてください。

2 設定編

2-1 操作・表示早見表



2-4 スマートチューニング【簡単感度調整】

①検出体のあり／なしを検出したい

2点チューニング

受光量設定: 1 点目 / 2 点目の大きい方をパワーチューニングレベルに調整します。
しきい値設定: 1 点目 / 2 点目の受光量の中に設定します。

検出体あり状態 → 検出体なし状態

指を離すことで"2Pnt"を表示

設定完了

②ほこりや汚れに強くしたい

最大感度チューニング

受光量設定: ボタン押下時の受光量を"0"に調整します。
しきい値設定: ボタン押下時の約 7% の受光量に設定します。

透過形: 検出体あり状態 → 検出体なし状態

反射形: 検出体なし状態

3秒以上長押し

"FULL"が表示されたら指を離す

設定完了

③ラインを止めずに移動する検出体で調整したい

フルオートチューニング

受光量設定: ボタン押下中の最大受光量をパワーチューニングレベルに調整します。
しきい値設定: ボタン押下中の最大受光量と最小受光量の中に設定します。

検出体なし状態 → 検出体 → 検出体なし状態

7秒以上長押し

検出体を通し終わったら指を離す

設定完了

④検出体の位置を決めたい

位置決めチューニング

受光量設定: 検出したい位置の受光量をパワーチューニングレベルの半分の受光量に調整します。
しきい値設定: 検出したい位置の受光量と同じ値に設定します。

検出体なし状態 → 検出体 → 検出体なし状態

指を離すことで"2Pnt"を表示

3秒以上長押し

設定完了

⑤透明体や小物を検出したい (受光量比率でしきい値を設定したい)

パーセントチューニング

受光量設定: 検出体がない状態の受光量をパワーチューニングレベルに調整します。
しきい値設定: (上記設定された受光量 × パーセントチューニングレベル) に設定します。

検出体なし状態 → 検出体 → 検出体なし状態

1秒以上長押し

設定完了

⑥ほこりや汚れによる受光量変化を元に戻したい / 飽和状態の受光量を元に戻したい

パワーチューニング

受光量設定: ボタン押下時の受光量をパワーチューニングレベルに調整します。
しきい値設定: 変更されません。

検出体なし状態 → 検出体 → 検出体なし状態

1秒以上両押し

設定完了

エラー名 / 表示	原因	対応方法
ニアエラー nErr Err	1点目と2点目の受光量差が小さすぎる状態です。	・検出機能を応答時間が遅いモードに変更ください。 ・投受光間距離を狭めてください。(透過形) ・ファイバヘッドを検出体に近づけてください。(反射形)
オーバーエラー auErr Err	受光量が大きい状態です。	・投受光間距離を広げてください。(透過形) ・ファイバヘッドを検出体から遠ざけてください。(反射形) ・細径ファイバを使用してください。
ローエラー Lo Err	受光量が小さい状態です。	・投受光間距離を近づけてください。(透過形) ・ファイバヘッドを検出体に近づけてください。(反射形)

以下の動作中、または動作直後はチューニングが実施できません。少し待ってからチューニングを実施してください。

■チューニング実施不可となる動作:

- 設定モード時 / チューニング / 設定初期化 / ユーザーリセット・セーブ / センサ OFF / 投光 OFF / フラッシング (投光点滅)

チューニング実行不可時に通信コマンドでチューニングを開始させた時はファイバアンプはコマンドに対してエラーを返します。

通信ユニットでチューニング、設定変更したい方は通信ユニット付属のユーザーズマニュアルを参照してください。

Smart Fiber Amplifier

E3NX-FA□0 Series

INSTRUCTION SHEET

Thank you for selecting an OMRON product. This sheet primarily describes precautions required in installing and operating the product.

• A specialist who has the knowledge of electricity must treat the product.

• Please read this manual carefully, and use it correctly after thoroughly understanding the product.

• Please keep this manual properly for future reference whenever it is necessary.

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⚠

WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death.Additionally there may be significant property damage.

● Warning Indications

⚠

WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purpose.

Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.

Never use the product with an AC power supply. Otherwise, explosion may result.

PRECAUTIONS FOR SAFE USE

The following precautions must be observed to ensure safe operation of the product. Doing so may cause damage or fire.

• Do not install the product in the following locations.

(1) Locations subject to direct sunlight (2) Locations subject to condensation due to high humidity

(3) Locations subject to corrosive gas (4) Locations subject to vibration or mechanical shocks exceeding the rated values

(5) Locations subject to exposure to water, oil, chemicals (6) Locations subject to steam

(7) Locations subjected to strong magnetic field or electric field

• Do not use the product in environments subject to flammable or explosive gases.

• Do not use the product in any atmosphere or environment that exceeds the ratings.

• To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.

• High-Voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.

• Do not apply any load exceeding the ratings. Otherwise damage or fire may result.

• Do not short the load. Otherwise damage or fire may result.

• Connect the load correctly.

• Do not miswire such as the polarity of the power supply.

• If you use two or more units connected, always connect all of the units to the same power supply and turn on the power of them at the same time. Otherwise functions for the connected units may be affected.

• When using the amplifier unit by connecting to other units, be sure to connect them to the same power supply and turn ON the power simultaneously. Using a separate power supply affects the functionality of the units when they are connected.

• Do not use the product if the case is damaged.

• Burn injury may occur. The product surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Attention must be paid during operation or cleaning.

• When setting the sensor, be sure to check safety such as by stopping the equipment.

• Be sure to turn off the power supply before connecting or disconnecting wires.

• Do not attempt to disassemble, repair, or modify the product in any way.

• When disposing of the product, treat it as industrial waste.

• Do not use the Sensor in water, rainfall, or outdoors.

PRECAUTIONS FOR CORRECT USE

• Be sure to mount the unit to the DIN track until it clicks.

• To prevent electric shock or short circuit, put a protection cap on unused connection power supply terminals.

Protective Cap

• The length for the cable extension must be 30 m or less. Be sure to use a cable of at least 0.3 mm² for extension.

• Do not apply the forces on the cord exceeding the following limits:
Pull: 29.4N; torque: 0.1N·m; pressure: 20N; bending: 29.4N

• Do not apply excessive force such as tension, compression or torsion to the amplifier unit with the fiber unit fixed to the amplifier unit.

• Always keep the protective cover in place when using the product. Not doing so may cause malfunction.

• It may take time until the received light intensity and measured value become stable immediately after the power is turned on depending on use environment.

• The product is ready to operate 200 ms after the power supply is turned ON.

• The Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.

• The Communication Unit E3X-DRT21-S, E3X-CRT, E3X-ECT and E3NW cannot be connected.

• The mutual interference prevention function does not work when in combination with E3C/E2C/E3X.

• If the unit receives excessive sensor light, the mutual interference prevention function may not work properly, resulting in malfunction of the unit. In such case, increase the threshold.

• Sensor communication unit E3NW can be used. E3X-DRT21-S and E3X-CRT/ECT cannot be used.

• If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.

• Do not use thinner, benzine, acetone, and lamp oil for cleaning.

• The amplifier unit uses EEPROM to save the configuration information. If memory rewrite count exceeds the limit (1,000,000times), the memory error appears, in which case you must replace the amplifier unit.Memory data rewrite occurs when you perform zero reset, threshold change, tuning and so on.

♻

Dispose of in accordance with WEEE Directive

Checking the Package Content

• Amplifier Unit: 1

• Instruction Sheet (this sheet): 1 (Japanese, English and Chinese)

Compatible Communication Unit (Sold Separately)

E3NW Series Communication Unit, Distribution unit E3NW-DS

1 Installation

1-1 Dimensions

Unit: mm

21

27.8

10

4.2

5.2

6.9

13.8

11.5

10

4.5

5.7

4.8

2.2

2.4

93.5

5.1

140(Max. with the protective cover open)

152(Max. with the protective cover open)

93.5

5.7

5.4

20.5

37.9

96.9

101.4

29.9

2.6

OPTICAL COMMUNICATION POSITION

With an thin-diameter fiber attachment (E39-F9)

Mounting bracket E39-L143 (sold separately)

Dimensions in parentheses () indicates the ones with related components.

The cover could come off if it is tilted by 152 degrees or more.

1-2 Input/Output Circuit Diagram

■E3NX-FA10
(NPN TYPE)

Supply 24 VDC from the communication unit

Black: Control Output

■E3NX-FA40
(PNP TYPE)

Supply 24 VDC from the communication unit

Black: Control Output

1-3 Mounting the Amplifier Unit

■Mounting on DIN Track

(1) Let the hook on the Amplifier Unit's Fiber Unit connection side catch the track.

(2) Push the unit until the hook clicks into place.

DIN track (PFP-□N) is sold separately.

■Removing from DIN Track

(1) Push the unit in the direction 1.

(2) Lift the unit in the direction of arrow 2 while performing step (1).

■Joining Amplifier Units

(1) Mount the Amplifier Units one at a time onto the DIN track.

(2) Slide the Amplifier Unit until the Amplifier Unit is closely attached.(Arrow 3) (For the wire-saving connector type, be sure that a master connector and a slave connector, or a slave connector and a slave connector are connected.)

(3) Use End Plates (PFP-M: separately sold) at the both ends of the grouped Amplifier Units to prevent them from separating due to vibration or other cause.(Arrow 4)

(4) Use a screwdriver to tighten the screw of the separately sold end plate (E39-EP1). (Arrow 5)

Up to 16 Amplifier Units can be connected to E3NW Series Communication Unit.

Under environments such as vibration, use an End Plate even with a single amplifier unit. If mounting the product without joining the amplifier unit, seal the side optical communication part with lightproof tape.

1-4 Mounting Fiber Unit

■Use Fiber Cutter

(1) Insert a Fiber Unit into a fiber cutter hole.

(2) Press down the blade at a single stroke to cut the Fiber Unit.

■Mount Fiber Unit

(1) Open the cover.

(2) Raise the lock lever.(Release)

(3) Insert the Fiber Unit in the fiber unit hole to the bottom.

(4) Return the lock lever to the original position and fix the Fiber Unit.(Lock)

• To mount the thin-diameter Fiber Unit, an attachment (E39-F9) is required.(The attachment is included with the applicable Fiber Unit.)

When mounting a coaxial reflective Fiber Unit, insert the single-core Fiber Unit to the upper hole (Emitter side) and the multi-core Fiber Unit to the lower hole (Receiver side).

Fiber Cutter E39-F4
(Provided with the Fiber Unit)

Thin-diameter Fiber Unit Hole x 2

Thin-diameter Fiber Attachment: E39-F9

Standard Fiber Unit Hole (dia. 2.2 mm) x 3

Lock Lever

Lock Release

Cover

Fiber Unit

Single Core

Multi Core

2 Settings

2-1 Setting and Display Overview

[OUT Selection Indicators : Orange]

Only OUT1 turns ON.

[L/D Indicator : Orange]

Displays Light ON/Dark ON setting.

[DPC Indicator : Green]

Turns ON when Dynamic Power Control is effective.

[ST Indicator : Blue]

Turns ON when Smart Tuning is in progress.

Threshold Level

Green Digital Display Level

White Digital

Sensitivity Setting [S.TUNE] Button

Performs tuning and [ST Indicator] turns ON.

Minute Threshold Adjustment [UP/DOWN] Button

The green digital value changes.

Mode/OUT Switch [MODE]Button

Switches between SET mode and RUN mode by a long press (3 seconds or longer) of the key.

Output Switch [L/D] Button

A single press switches between Light ON/Dark ON, [L/D] Indicator changes.

Setting Reset

Key Lock

Zero Reset

Solution Viewer

+: Press both

Refer to "③ Convenient Setting Features".

2-4 Smart Tuning [Easy Sensitivity Setting]

① Detecting Presence/Absence of Workpiece

● 2-point Tuning

Received light intensity setting: Adjust to the either higher value of Point 1 and Point 2 power tuning levels.

Threshold setting: Set to the middle between Point 1 and Point 2 received light intensity values.

Workpiece is present

Workpiece is absent

Setting is Completed

② Increasing Resistance to Dust and Dirt

● Maximum Sensitivity Tuning

Received light intensity setting: Adjust the received light amount to "0" when the button is pressed.

Threshold setting: Set the light intensity of approximately 7% when the button pressed.

Workpiece

Workpiece

Setting is Completed

③ Making Adjustment with Moving Workpiece without Stopping the Line

● Full Auto Tuning

Received light intensity setting: Adjust the power tuning level to the maximum received light amount when the button is pressed.

Threshold setting: Set to the middle between the maximum and minimum received light amount values when the button is pressed.

Workpiece

Workpiece

Setting is Completed

④ Determining the Workpiece Position

● Position Tuning

Receiving light setting: Adjusts the receiving light amount to a half of that for the power tuning level with Desirable detection position.

Threshold setting: Set to the same value as the received light amount Desirable detection position.

Workpiece is absent

Desirable detection position

Setting is Completed

⑤ Detecting a Transparent or Microscopic Object (Setting a Threshold with Received Light Intensity Ratio)

● Percentage Tuning

Received light intensity setting: Adjusts the light intensity level without the presence of a sensing object to the power tuning level.

Threshold setting: Set to (Light intensity level that has been set according to the setting above x Percentage tuning level).

Percentage tuning setting ON

Workpiece is absent

Setting is Completed

⑥ Restoring the Received Light Intensity Weakened due to Dust or Dirt / Restoring the Saturated Received Light Intensity

● Power Tuning

Received light intensity setting: Adjust the power tuning level to the received light amount when the button is pressed.

Threshold setting: Not changed.

Workpiece is absent

Setting is Completed

●Smart Tuning Error

Error / Display	Cause	Remedy
Normal Error nErr Err	The light level difference between Points 1 and 2 are extremely small.	• Change the detection function to the mode of slower response time. • Narrow the distance between emitter and receiver. (Through-beam model) • Move the Fiber Head closer to the sensing object. (Reflection model)
Over Error oErr Err	Incident light level is too high.	• Widen the distance between emitter and receiver. (Through-beam model) • Move the Fiber Head away from the sensing object. (Reflection model) • Use a thin-diameter Fiber.
Low Error Lo Err	Incident light level is too low.	• Make the distance between emitter and receiver closer. (Through-beam model) • Move the Fiber Head closer to the sensing object. (Reflection model)

2-2 Output switching

Press button.

Through-beam: Set to "Dark ON" to turn the output ON with a workpiece in the detection area.

[L/D Indicator] turns ON.

Reflective: Set to "Light ON" to turn the output ON with a workpiece in the detection area.

[L/D Indicator] turns ON.

Blocking ON or Unblocking ON can be set on output 1 and 2 individually.

Workpiece

Workpiece

2-3 Minute Adjustment of Threshold Level

Press button to adjust the threshold level.

Hold the key for high-speed level adjustment.

The threshold level becomes higher.

The threshold level becomes lower.

⑦ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑧ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑨ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑩ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑪ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑫ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

⑬ Smart Tuning Error

During or directly after the following operation, tuning cannot be executed. Wait for a while before executing tuning.

■ Operation disabling tuning:
In the setting mode, tuning, setting initialization, user resetting/saving, sensor OFF, emission OFF, and flashing (blinking during emission)

When tuning is disabled, if starting tuning, the fiber amplifier returns an error to the command. To do tuning or setting change using the communication unit, refer to the user's manual attached to the communication unit.

E3NX-FA□0 Series

3 Convenient Setting Features

For Stable Detection Regardless of Received Light Intensity Changed due to Dust or Dirt

● DPC Function
Use of the DPC function with through-beam model or regressive reflection model is recommended.

The DPC indicator turns ON when the DPC function is effective.

Smart Tuning → Run → SET mode → Select → DPC Function ON

When smart tuning is in error/maximum sensitivity tuning is executed/ the 1st point of the position tuning is smaller/ area check/ detection mode, the DPC function is disabled.

Refer to "② Settings".

Incident Light Level
Displayed Incident Light Level
Internal Incident Light Level
Threshold Level
Time

Stabilize the displayed incident level by correcting internal incident level charges.

Initializing Settings

● Setting Reset Initialize all settings to the factory-set defaults.

Hold both for 3 sec. or longer

MODE

UP/DOWN

MODE

Saving/Reading Settings

● User Save Function/User Reset Function

User Save Function → [SAUE] → [SAUE no] → [SAUE YES]

User Reset Function → [rSt] → [rSt no] → [rSt USER]

Hold both for 3 sec. or longer

MODE

UP/DOWN

MODE

User Resetting and User Saving are applicable to the bank common setting only.

Preventing Malfunction

● Key Lock Function Disables all the button operations.

Enable/Cancel (The same procedure)

Hold both for 3 sec. or longer

MODE

UP/DOWN

MODE

* Press either of UP/DOWN.

4 Maintenance

4-1 Troubleshooting

Problem	Cause	Remedy
Nothing is shown on the indication.	No power supplied or the cable broken.	Check the connection of the connector between the Communication Unit and Amplifier.
Nothing is shown on the digital indication.	Eco mode is ON.	Turn OFF Eco mode. *1
Sensing/Detection not possible despite the minimum threshold level.	Detection set to a small light level mode Dust or dirt influences.	Setting GIGA Mode increases emission power and light intensity. *1
The OUT indicator blinking.	Mutual interference or other reason.	Check the Amplifier Units mounted in a group and turn ON the power again. *2
Incident light level displayed in a negative value.	The zero reset function is enabled.	Cancel the zero reset function. *3
LED is not emitted. [LoFF] or [SoFF] is displayed on the screen.	The unit is in the emission OFF or sensor OFF state.	Check if the communication unit does not send the emission OFF command or the power isn't turned ON after the sensor OFF command is turned ON.
Lost tracking of the settings made.	-	Reset the settings. *3
The light intensity level display changes.	Affected by dust or dirt, temperature change, vibration, etc.	The receiving light intensity display is stabilized using the DPC function. *3

*1 Refer to "⑤ Detailed Settings". *2 Refer to "1-3 Mounting Amplifier Unit" *3 Refer to "③ Convenient Setting Features"

For information on troubleshooting with Communication Unit, refer to the User's Manual provided with the Communication Unit.

Error Name / Display	Cause	Remedy
DPC Error *1 2000 4000	The incident light level has deteriorated due to dust or dirt.	Wipe the dust off the Fiber Unit detection surface or other relevant areas and recover the original incident light level. Then, perform Smart Tuning. *2
EEPROM error E-rrE *	Failed internal data read/out.	Turn ON the power again. Reset the settings if the error is not corrected. *3 If the error persists, it is a memory error due to the rewrite counts exceeding the limit, etc. Replace the amplifier unit.
Lock ON LoC on	The key lock function enabled.	Cancel the key lock function. *3
Load short circuit detection error E-SL	Over current flowing to the control output.	Check the connection of the connector between the Communication Unit and Amplifier.
Setting change execution error * Err	Setting change or writing to the EEPROM are disabled.	In the sensor OFF or emission OFF state, setting initialization and user resetting are disabled. Cancel the sensor OFF or emission OFF state before trying again. While writing in the EEPROM, setting initialization and user resetting are disabled. Wait for a couple of seconds and try again.

*1 The DPC indicator blinks. *2 Refer to "2-3 Smart Tuning" *3 Refer to "③ Convenient Setting Features"

Returning Received Light Intensity Display to "0"

● Zero Reset Function

Enable

Hold both for 3 sec. or longer

MODE

UP/DOWN

MODE

Cancel

Hold both for 3 sec. or longer

MODE

UP/DOWN

MODE

The threshold also changes accordingly. The lower threshold limit is -1999.

Executing DPC function/ smart tuning releases the zero reset.

Checking Received Light Intensity When Workpiece Passes at High Speed

● Change finder

1. Select [Setting Mode] → [Digital Display] to set [diSP CFdr].

2. Pressing the [MODE] button for 3 seconds or longer exits the SET mode.

3. Let the workpiece pass.

4. Displays and retains the light intensity (maximum/minimum value) in white digital for 0.5 seconds when the workpiece passes.

Before Passing

Right after passing

The change finder is not displayed in [Setting Mode]. If the product is the reflective type, the local maximum value is displayed by setting light-on. If it is the through-beam type, the local minimum value is displayed by setting dark-on.

Determining If Workpiece is Detectable

● Solution Viewer

1. Press both the [MODE] and [L/D] buttons for at least 3 seconds to set to [SoLU on]. To release the setting, press the [MODE] and [L/D] buttons for at least 3 seconds to set to [SoLU oFF].

2. Let the workpiece pass.

3. Passing time and light amount difference are displayed.

4. Press the [MODE] and [L/D] buttons at the same time for at least 3 seconds to exit setting mode.

Passing time (m msec, μ sec) Light amount difference (m msec, μ sec)

Light amount difference Passing time(ms or μs)

Solution Viewer cannot be used when SHS Super High-speed Mode is selected for Detection Function, and Area Detection Mode for Output 1 Mode.

4-2 Ratings and Specifications

Model	NPN	E3NX-FA10 2M
	PNP	E3NX-FA40 2M
Control output	1 *3	
Connection method	Communication Unit compatible wire-saving connector Cable lead (2 m)	
Supported communications unit	E3NW Series Communication Unit, E3NW-DS	
Light source (Wavelength)	Red 4-element LED (625nm)	
Power supply voltage	Supplied from the connector through the communication units	
Power consumption	Power supply voltage 24V: Normal mode: 920mW max.(Current consumption 38mA max.) Eco function ON: 680mW max.(Current consumption 28mA max.) Eco function LO: 800mW max. (Current consumption at 33mA max.)	
Control output	Load power supply voltage: 30 VDC, open collector output type Load current: 100 mA max. for 1 to 3 units use, 20 mA max. for 4 or more units connected Residual voltage: Load current less than 10 mA: 1 V max., load current 10 to 100 mA: 2 V max. Off-state current: 0.1 mA max.	
Protection circuit	Power supply reverse polarity protection, output short-circuit protection and output incorrect connection protection	
Maximum connectable Units	16 units	
Number of units for mutual interference prevention*1	10 units Note: The mutual interference prevention functions are disabled if Super High Speed mode (SHS) is selected for detection function.	
Bank Switch Setting	Selectable from BANK1-4	
Auto Power Control (APC)	Provided (Always effective)	
Ambient illumination	Illumination intensity Incandescent lamp: 20,000 lux max. / Sunlight: 30,000 lux max.	
Surrounding air Temperature range*2	Operating: 1 to 2 amplifiers connected: 0 to 55°C, 3 to 10 amplifiers connected: 0 to 50°C, 11 to 16 amplifiers connected: 0 to 45°C Storage: -30 to +70°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35 to 85% (with no condensation) within the surrounding air temperature range shown above	
Altitude	2000m max.	
Installation environment	Pollution degree 3	
Insulation resistance	20 MΩ min. (at 500 VDC)	
Dielectric strength	1,000 VAC, 50/60 Hz, 1 minute	
Vibration resistance	10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs each in X, Y and Z directions	
Shock resistance	150 m/s ² , for 3 times each in X, Y and Z directions	
Weight (packed state/sensor)	Approx. 95 g/Approx. 45 g	
Materials	Case and cover: Polycarbonate (PC), Cable: PVC	

- *1. The tuning will not change the number of units.
The least unit count among the mutual interference prevention units of E3NX and E3NC.
Check the mutual interference prevention unit count and response speed of each model.
- *2. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.
- *3. Output status can not be confirmed in communication.

5 Detailed Settings

Hold [MODE] button for 3 seconds or longer to enter SET mode.

The OUT Selection Indicators show items for only Output1.

SET mode provides the following function settings. The initial display shown after transition from one function to another represents the factory default.

1. Function Selection Enabling 6 to 15

Basic setting: FUnC dFLt

Detailed setting: FUnCoPt

2. Detection Function Changing Light Level and Response Time

HS High-speed Mode: H5 500

STND Standard Mode: Stnd 500

GIGA Giga Mode: GIGA 4000

SHS Super High-speed Mode: SHS 125

3. DPC Function Stable Detection Regardless of Incident Light Level Change

DPC OFF: dPC oFF

DPC ON: dPC on

4. Timer Function Setting Output Timer

Time Off: tOFF ----

After pressing the [MODE] button, Use [MODE] button to set the time.

(1) to 9999ms in 1ms steps; the initial value: 10ms Error range: 0.1ms

(a) Off-delay Timer: oFFd 10

(b) On-delay Timer: on-d 10

(c) One shot: SHot 10

(d) On Off-delay Timer: onoF ----

5. Power Tuning Level Changing the Target Incident Light Level (Power Tuning Level)

P-Lu 9999

Use [MODE] button to set the power tuning level. (100 to 9999 in 1 steps; the initial value: 9999)

Function Selection: dFLt

Function Selection: [oPt]

6. BANK Switching Set values are saved for each configured bank.

BANK1: bAnK 1

BANK2: bAnK 2

BANK3: bAnK 3

BANK4: bAnK 4

7. Power Tuning ON/OFF Setting To Turn ON/OFF the Light Amount Adjustment at Tuning

Power tuning adjustment ON: PtUn on

Power tuning adjustment OFF: PtUn oFF

Power tuning adjustment during power-up: PtUn Pon

8. Percentage Tuning Detecting Transparent or Microscopic object

Percentage tuning OFF: PEr oFF

Percentage tuning ON: PEr on

Press [MODE] button in [PEr on] menu, then use [MODE] button to set the percentage tuning level. (-99% to 99% in 1% steps; the initial value: -6%)

9. Output 1 Mode Output mode for the output 1 is changed.

Normal detection mode: oUt Stc

Area detection mode *1: oUt Ar-ER

Differential detection mode *2 *3: oUt dFF

10. Sensor OFF setting *4 Turning ON/OFF the sensor OFF function

Sensor OFF function OFF: SoFF oFF

Sensor OFF function ON: SoFF on

Operation when the emission OFF command is received varies. When the sensor OFF function is ON, emission is OFF and output is OFF. In addition, when turning ON the power, this product starts up with sensor OFF. The sensor OFF state can be cancelled by the emission OFF command. For communication commands, refer to the user's manual attached to the communication unit.

11. Digital Display *4 Changing Digital Display in RUN Mode for Specific Purpose

Threshold /Receiving light amount: d.iSP Stc

(a) To see the reserve of the light intensity level for the threshold: d.iSP PEr

(b) To set the threshold with a microscopic object or fast-moving object: d.iSP P-b

(c) To see the intuitive and easy to follow display: d.iSP bAr

(d) To see the received light intensity when workpiece passes at high speed: d.iSP CFdr

(e) To know the CH number when two or more units connected: d.iSP CH

(f) To adjust the beam: d.iSP PEAR

12. Inverted Display *4 Mounting Amplifier in Inverted Direction The display reverses.

Normal: rEu oFF

Reverse: rEu nJ

13. Eco Function *4 Saving Power Consumption

Eco function OFF: Eco oFF

Eco function ON: Eco on

Eco function LO: Eco Lo

14. Hysteresis width (Reference value)

Standard setting: H5td 37

User setting: H5Ur 37

15. Writing to EEPROM *4 (Only the model with External Input type)

ON: CnSu on

OFF: CnSu oFF

Move to Detection Mode by holding the button for 3 seconds or longer.

*1. The relationship between the control output and output switch during area detection mode is as follows:

Light intensity: HI, Lo

Light ON: ON, OFF

Control output: ON, OFF

Light ON: ON, OFF

Control output: ON, OFF

*2. be sure to set the detection function to HS first when setting the differential detection mode.

*3. It detects if the relative value of the received light intensity change of the configured response time is larger than the threshold. The variation of the received light intensity of the response time that has been set to the white digital is displayed. The detection function setting becomes disabled when the differential function is enabled. Smart tunings other than power tuning are disabled.

*4. It is a common setting for BANK. Only one set value can be set between BANK1 to BANK4.

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also Product catalog for Warranty and Limitation of Liability.

OMRON Corporation	Industrial Automation Company
Tokyo, JAPAN	Contact: www.ia.omron.com
Regional Headquarters	
■ OMRON EUROPE B.V. Sensor Business Unit Carl-Benz-Str. 4, D-71154 Nufringen, Germany Tel: (49) 7032-811-0/Fax: (49) 7032-811-199	
■ OMRON ELECTRONICS LLC 2895 Greenspoint Parkway, Suite 200 Hoffman Estates, IL 60169 U.S.A. Tel: (1) 847-843-7900/Fax: (1) 847-843-7787	
■ OMRON ASIA PACIFIC PTE. LTD. No. 438A Alexandra Road # 05-05/08 (Lobby 2), Alexandra Technopark, Singapore 119967 Tel: (65) 6835-3011/Fax: (65) 6835-2711	
■ OMRON (CHINA) CO., LTD. Room 2211, Bank of China Tower, 200 Yin Cheng Zhong Road, PuDong New Area, Shanghai, 200120, China Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200	

D Oct, 2014

智能光纤放大器

型号E3NX-FA□0系列

使用说明书

感谢您购买本产品，谨致谢意。
使用时请务必遵守以下内容。
• 请具备电气知识的专业人员实施操作。
• 请在阅读并理解本说明书的基础上正确使用。
• 请妥善保管本说明书，以备随时查阅。

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OMRON





(3/3)

警告

若使用不当，则可能会造成轻伤、中等程度伤害，有时甚至可能导致重伤或死亡。
此外，还可能带来重大的经济损失。

警告

请勿出于安全目的将本产品直接或间接使用在人体检测用途上。
也勿使用在人体保护用的检测装置上。

可能会引起故障或火灾。
使用时，请勿超过额定电压。

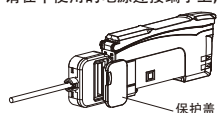
可能会导致产品破裂。
严禁在AC电源下使用。

安全要点

- 为了确保您的安全，请务必遵守以下内容。否则可能会引起损坏或火灾。
- 请勿在以下环境中使用。
 - ①阳光直射的场所
 - ②湿度高、易结露的场所
 - ③有腐蚀性气体的场所
 - ④振动或冲击超出额定范围的场所
 - ⑤有水、油、化学药品等飞溅的场所
 - ⑥接触到蒸汽的场所
 - ⑦强电场、强磁场的场所
 - 请勿在有易燃、易爆气体的环境下使用。
 - 请勿在超出额定范围的环境下使用。
 - 请将传感器设置在远离高压或动力设备的地方，以免操作或维护时发生危险。
 - 请将传感器和高压线、动力线分开布线。若使用同一排线或在同一线槽内排线，会相互感应，引起错误动作或破损。
 - 请确保负载在额定范围以下使用。否则可能会引起损坏或火灾。
 - 请勿让负载短路。否则可能会引起损坏或火灾。
 - 请正确连接负载。
 - 请注意电源的极性，防止错误接线。
 - 连接后使用时，请务必连接于同一电源，并同时接通电源。如果连接不同电源，则会影响连接时的功能。
 - 连接并使用时，请务必连接于同一电源，并同时接通电源。如果分别连接于不同电源，则会影响连接时的功能。
 - 请勿在外壳破损的状态下使用。
 - 可能会导致烫伤。根据使用条件（环境温度、电源电压等）不同，传感器表面温度会升高，操作或清扫时请多加注意。
 - 设定传感器时请停止装置运行，确认安全后再执行操作。
 - 请务必切断电源后再安装或拆卸导线。
 - 请勿擅自拆卸、修理、改造本产品。
 - 废弃时，请作为工业废弃物处理。
 - 请勿在水中、雨中、及室外使用。

使用注意事项

• 安装至 DIN 导轨时，请推压放大器直至钩爪完全嵌入导轨。
• 为了防止触电或短路，请在不使用的电源连接端子上，盖上保护盖。



• 请确保延长导线在 30m 以下。请使用截面积为 0.3mm² 以上的延长导线。
• 施加于导线部的力请确保在以下范围内。
拉伸 29.4N 以下、扭矩 0.1N・m 以下、压紧力 20N 以下、弯曲时受重 29.4N 以下。
• 光纤固定于放大器状态下，请勿对其强行施加拉伸力、压缩力、扭转力等。
• 请务必安装保护罩后使用。可能会导致错误操作。
• 接通电源后，由于周围环境不同，到受光量 / 测定值安定为止可能需要一定时间。
• 接通电源后经过 200ms 即可检测。
• 无法连接手持式控制器型号 E3X-MC11、E3X-MC11-SV2、E3X-MC11-S。
• 无法连接通信单元型号 E3X-DRT21-S、E3X-CRT、E3X-ECT、E3X-NW。
• 无法与型号 E3C、E2C、E3X 之间启用相互干涉防止功能。
• 若接收过多的其他传感器发出的光量，相互干涉防止功能可能会无法充分发挥作用，发生误动作。此时请调大阈值。
• 可以连接通信单元型号 E3NW，但无法连接型号 E3X-DRT21-S、E3X-CRT、E3X-ECT。
• 万一感觉异常时，请立即切断电源停止使用，并联系本公司或代理商。
• 请勿使用稀释剂、汽油、丙酮、煤油类溶剂清洁。
• 放大器单元使用 EEPROM 存储器并保存设定信息。超出存储器的重写次数 (100 万次) 后弹出存储器错误提示时，需更换放大器单元。执行归零重置、阈值变更、调整等操作后即可重写存储器的数据。

包装内容确认

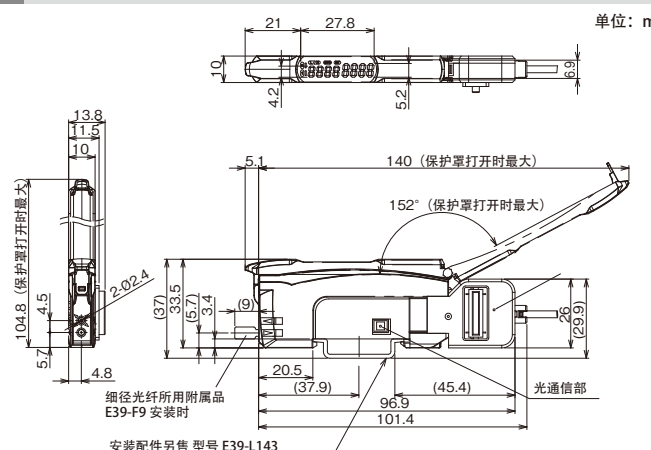
• 放大器 1 台 • 使用说明书 (本说明书) 日语、英语、中文各 1 份。

对应通信单元 (另售)

E3NW 系列通信单元，分散单元型号 E3NW-DS

1 设置

1-1 外形尺寸图



单位: mm

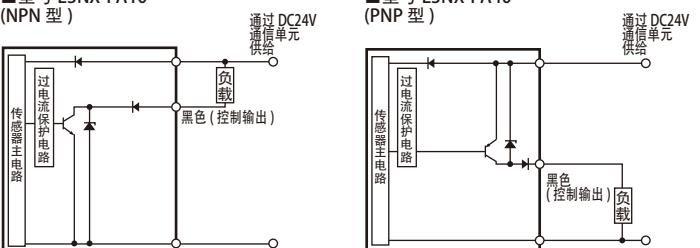
安装配件另售 型号 E39-L143

○ 内的尺寸为相关部件的配合尺寸。
保护罩打开角度超过 152 度时可能会脱落。

1-2 输出输入段电路图

■型号 E3NX-FA10 (NPN 型)

■型号 E3NX-FA40 (PNP 型)

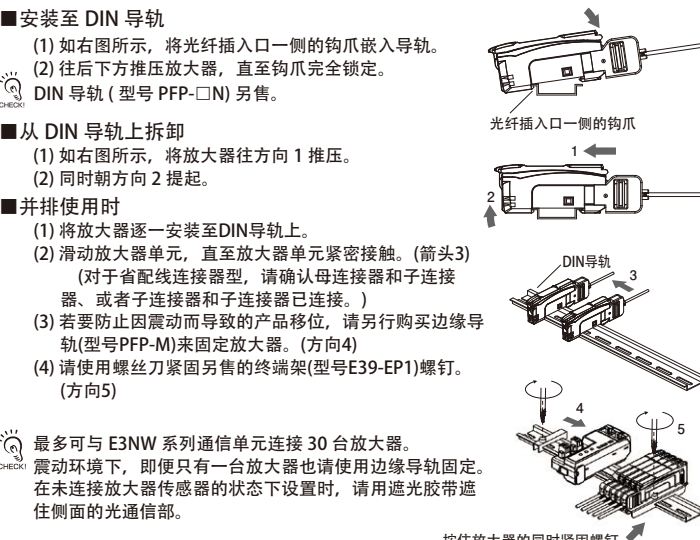


1-3 放大器的安装

■安装至 DIN 导轨

■从 DIN 导轨上拆卸

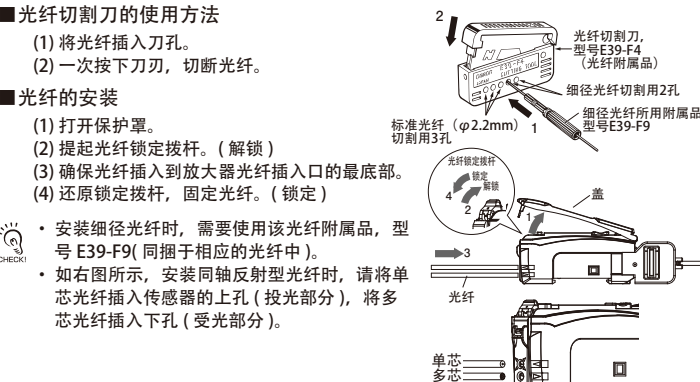
■并排使用时



1-4 光纤的安装

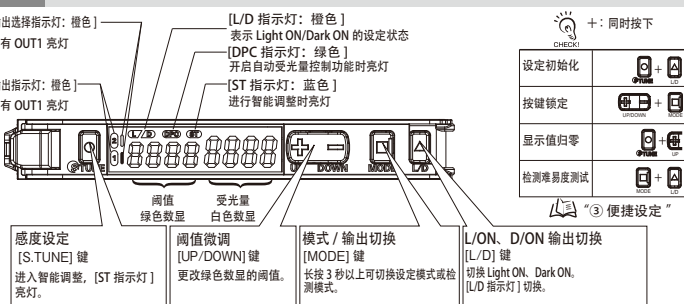
■光纤切割刀的使用方法

■光纤的安装



2 设定


2-1 操作・显示一览表



2-4 智能调整【灵敏度的简单调整】


①想要检测有／无检测物体

●两点示教




②想要加强防尘抗污力

●最大灵敏度调整




③想要不停止运行、通过移动的检测物体进行调整

●全自动调整




④想要确定检测物体的位置

●定位调整



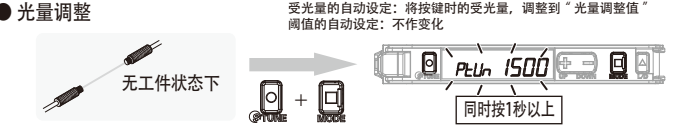
⑤想要检测透明物体或微小物体(想要通过受光量比率设定阈值)

●百分比调整



⑥想要将灰尘或污垢导致的受光量变化/饱和状态的受光量还原时

●光量调整



●智能调整的错误代码

错误名 / 显示	原因	对策
Near Error nErr Err	调整过程中受光量差值过小	• 请设定为响应速度较慢的检测模式 • 请减少投受光间的距离(对射型) • 请减少光纤头部和工件的距离(反射型)
Over Error ouErr Err	受光量过大	• 请增大投受光间的距离(对射型) • 请增大光纤头部和工件的距离(反射型) • 请使用细径光纤
Low Error Lo Err	受光量过小	• 请减小小投受光间的距离(对射型) • 请减小小光纤头部和工件的距离(反射型)

2-2 L/ON、D/ON输出切换方法

●键进行设定。

对射型: 要让传感器在有工件时进入 ON 状态，请设定为“Dark ON” [L/D 指示灯] 的  亮灯。

反射型: 要让传感器在有工件时进入 ON 状态，请设定为“Light ON” [L/D 指示灯] 的  亮灯。



2-3 微调阈值

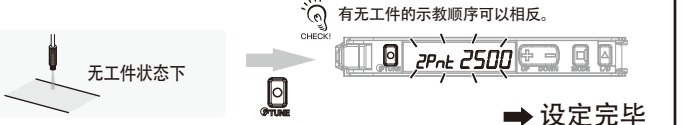
●键进行设定。

长按即可高速调整。



①想要检测有／无检测物体

●两点示教



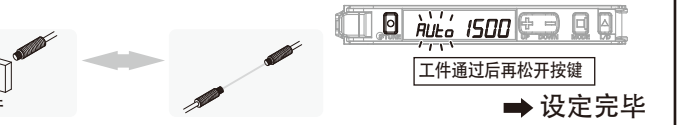
②想要加强防尘抗污力

●最大灵敏度调整



③想要不停止运行、通过移动的检测物体进行调整

●全自动调整



④想要确定检测物体的位置

●定位调整



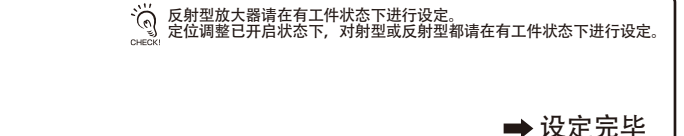
⑤想要检测透明物体或微小物体(想要通过受光量比率设定阈值)

●百分比调整



⑥想要将灰尘或污垢导致的受光量变化/饱和状态的受光量还原时

●光量调整



●智能调整的错误代码

错误名 / 显示	原因	对策
Near Error nErr Err	调整过程中受光量差值过小	• 请设定为响应速度较慢的检测模式 • 请减少投受光间的距离(对射型) • 请减少光纤头部和工件的距离(反射型)
Over Error ouErr Err	受光量过大	• 请增大投受光间的距离(对射型) • 请增大光纤头部和工件的距离(反射型) • 请使用细径光纤
Low Error Lo Err	受光量过小	• 请减小小投受光间的距离(对射型) • 请减小小光纤头部和工件的距离(反射型)

以下操作中、或操作刚结束后无法执行调整。请稍待片刻后再执行调整。

■不可执行调整的操作:

设定模式时 / 调整 / 设定初始化 / 用户复位、保存 / 传感器 OFF / 投光 OFF / 冲洗 (投光闪烁)

不可执行调整时，如果通过通信指令开始调整，光纤放大器将会针对指令回复错误信息。通过通信单元执行调整、修改设定的方法请参阅通信单元附带的用户手册。

