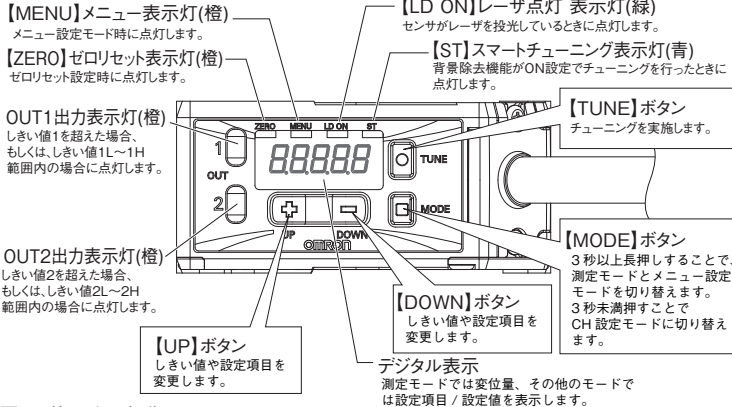


2 設定編

2-1 操作・表示早見表

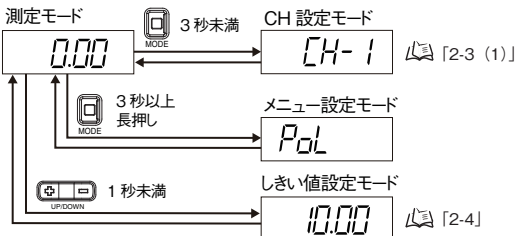
■各部の名称とはたらき



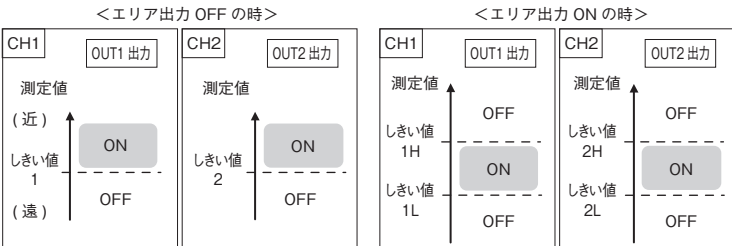
■その他のボタン操作

チューニング実行	ボタン	「2-3」
ゼロリセット設定	ボタン + ボタン同時押し 3秒未満	「③(1)」
ゼロリセット解除	ボタン + ボタン同時押し 3秒以上	「③(1)」
キーロック設定 / 解除	ボタン + ボタン同時押し 3秒以上	「③(2)」

■各モードへの切り替え方法



2-2 出力としきい値の関係



上記は出力極性 [POL] がノーマルオープン [no] (初期値) の場合の動作です。ノーマルクローズ [nc] に設定した場合、上記の ON/OFF は反転します。	出力極性	検出時の出力
	no	ON
	nc	OFF

2-3 チューニングする

■チューニング操作早見表 (CH1/CH2 の選択後にチューニングを実施します。)

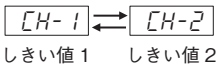
CH 設定モード	ボタンを押し CH 設定モードに入ってから、 ボタンか ボタンのいずれかで設定する CH を選択します。
1 点チューニング 「2-3 (3)」 「2-3 (5)」	ボタンを 3 ～ 5 秒押す
2 点チューニング 「2-3 (2)」 「2-3 (4)」	1 点目で ボタンを一回押す 2 点目で ボタンを一回押す
ワークなしチューニング 「2-3 (6)」	ボタンを 5 秒以上押す

- ・ボタンの代わりに外部入力端子である TUNE1 入力でも、同様に CH1 に対してチューニングすることができます。TUNE2 入力の場合でも CH2 に対してチューニングすることができます。
- ・チューニング種別を変更すると ボタンや外部入力端子の割付を固定することができます。
「④ 詳細設定編 2. チューニング種別」
- ・背景除去機能を ON に設定し、チューニングを実行すると、チューニング時の感度に合わせて測定値、感度の制限を行うことができます。周囲の壁などの乱反射による異常な距離が検出されるときにご使用ください。
「④ 詳細設定編 5. 背景除去機能」
- ・チューニングを行うと、センサ内部の EEPROM (不揮発性メモリ) にしきい値を記録します。この EEPROM の書き込み寿命は 10 万回です。測定ごとのチューニングは寿命にも気をつけてお使いください。

(1) しきい値を設定するチャンネルを切り替えたい！

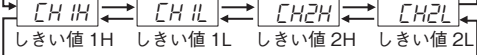
●CH 設定モード

- 測定モードで ボタンを 1 回短く押します。
- ボタンを押すことで、以下の順に切り替わります。



しきい値 1 しきい値 2

＜エリア出力 ON の場合＞



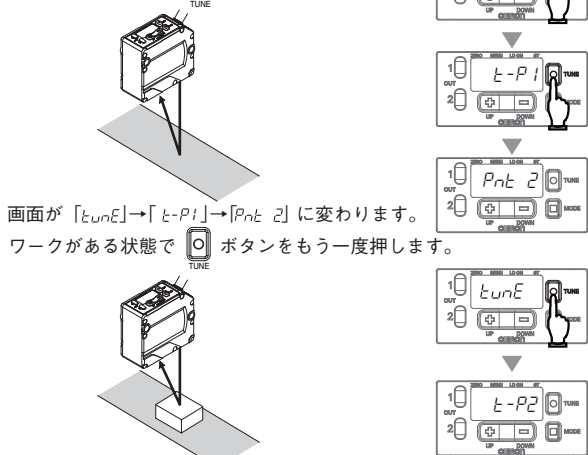
- ボタンを押すと、測定モードに戻ります。

(2) ワークのあり / なしを検出したい！

●2点チューニング

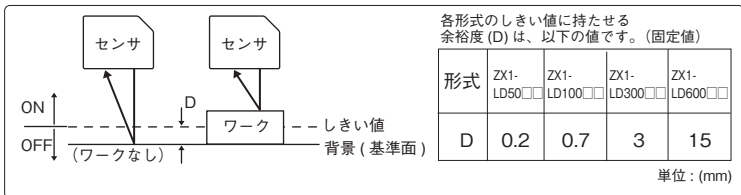
良品と不良品、ワークと背景（基準面）、ワーク A とワーク B のように、異なる高さとなるものを判別するときに用います。

- ワークがない状態で ボタンを押します。



画面が「t-unE」→「t-P2」に変わり、2点チューニングを完了し、測定値表示に戻ります。

→ 設定完了



ワークの順序はどちらが先でもかまいません。

「⑤ エラーメッセージ」

(3) ワークのあり / なしを検出したい！（基準面だけでチューニング）

●1点チューニング

背景（基準面）がすでに決まっており、それを基準にワークのありなしを判別するときに用います。

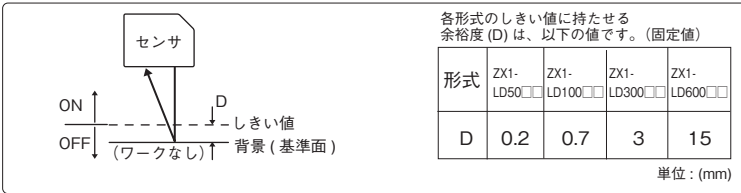
- ワークがない状態で ボタンを「t-unE」点減するまで（3 秒以上 5 秒未満）押し続けます。



- 「t-unE」が点減したら ボタンから指を離します。

画面が「t-unE」→「t-P1」に変わり 1 点チューニングを完了し、測定値表示に戻ります。

→ 設定完了

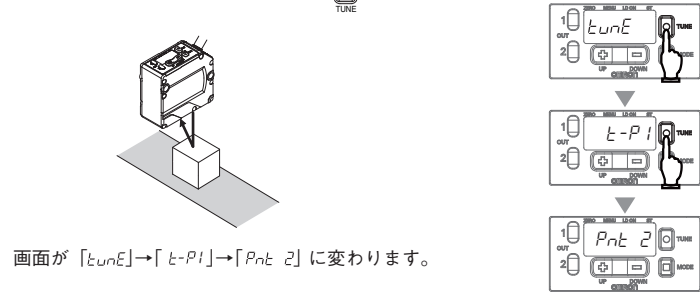


(4) 上限と下限を設定したい！（エリア出力を使う）

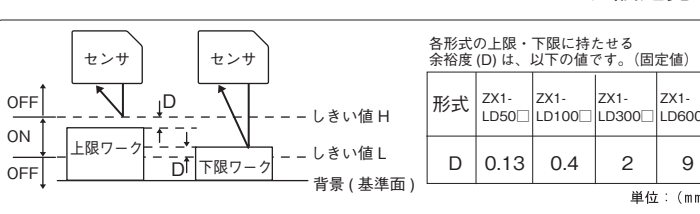
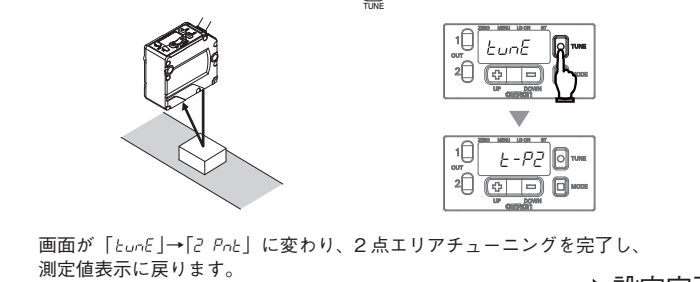
●2点エリアチューニング 「④ 詳細設定編 7. エリア出力」

上限ワークと下限ワークを使って、範囲内にあるかどうかを判別するときに用います。

- メニュー設定モードのエリア出力で ON を選択して、測定モードに戻ります。
- 検出させたい上限にワークを設置して ボタンを押します。



- 検出させたい下限にワークを設置して ボタンを 1 回短く押します。



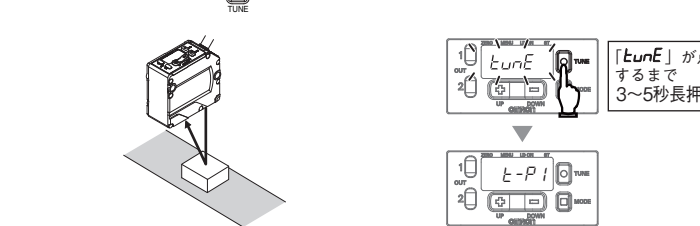
ワークの順序はどちらが先でもかまいません。

(5) ± で公差を設定したい！

●1点エリアチューニング 「④ 詳細設定編 7. エリア出力」

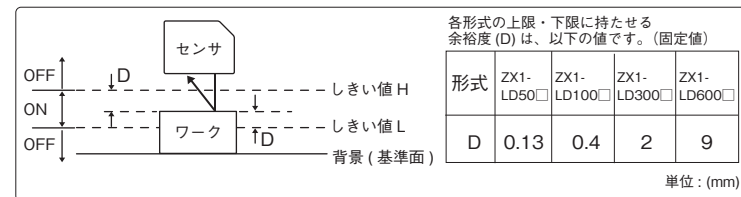
1 つの実ワークを用いて、それを基準に上限と下限を持たせて範囲内にあるかどうかを判別するときに用います。

- メニューの AREA 項目で ON を設定し、測定値表示に戻ります。
- 検出したいワークがある状態で ボタンを「t-unE」が点減するまで（3 秒以上 5 秒未満）押し続けます。
- 「t-unE」が点減したら ボタンから指を離します。



画面が「t-unE」→「t-P1」に変わり、1 点エリアチューニングを完了し、測定値表示に戻ります。

→ 設定完了



背景（基準）をゼロとして、プラスマイナスいくらかのしきい値を設定したい場合は、まずゼロリセットをして、ワークとの距離をゼロにしてから 1 点エリアチューニングを実行してください。

「③ 便利な設定編 (1)」

(6) 「(2) ～ (5)」の方法でうまく設定できなかった場合は？

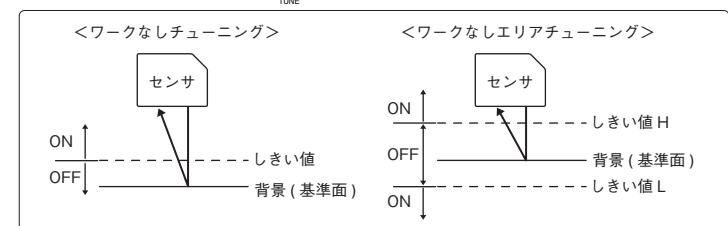
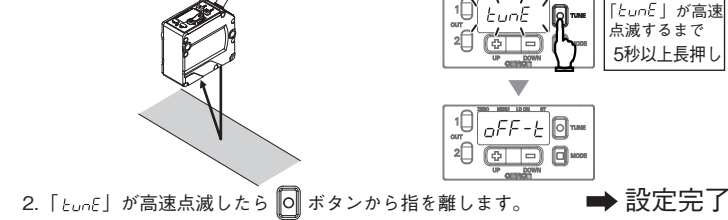
●ワークなしチューニング（エリア出力 OFF の場合）

背景（基準面）がすでに決まっており、それを基準にワークのありなしを判別するときに用います。1 点チューニングと異なり、ワークなしであることを基準に判定しますので、ワーク形状が複雑で受光量不足エラーや計測範囲外エラーになる場合であってもワークありとして判別します。

●ワークなしエリアチューニング（エリア出力 ON の場合）

基準となる面との距離に上限と下限を持たせ、範囲内にあるかどうかを判別するときに用います。2 点エリアチューニングと異なり、ワークなしであることを基準に判定しますので、ワーク形状が複雑で受光量不足エラーや計測範囲外エラーになる場合であってもワークありとして判別します。

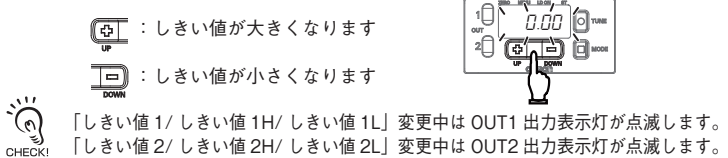
- ワークがない状態で ボタンを「t-unE」が高速点減するまで（5 秒以上）押し続けます。



2-4 しきい値の微調整

●しきい値設定

ON/OFF が切り換わる条件を緩めたり厳しくする場合、 ボタンでしきい値を微調整することができます。



2-5 ヒステリシス幅の微調整

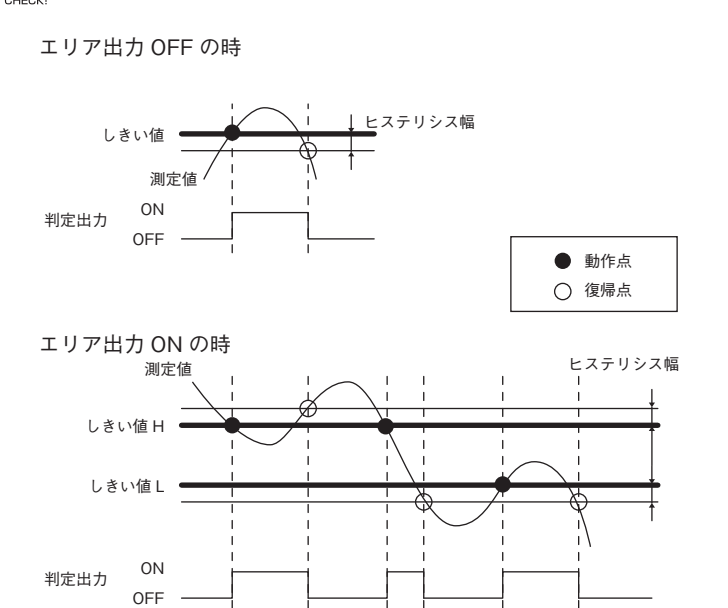
●ヒステリシス幅の設定

ワークに応じてヒステリシス幅を小さく調整することで微小な段差の判別ができます。ただし、ワークが動いていたり、反射光量が小さいなどの要因により変位値が変動している場合にヒステリシス幅を小さくすると、判定出力がばたつくことがありますのでご注意ください。

●ヒステリシス幅とは

判定出力が OFF から ON に変化する点を動作点、ON から OFF に変化する点を復帰点といいます。この動作点と復帰点の間の距離をヒステリシス幅といいます。本センサではしきい値＝動作点となっており、ヒステリシス幅により復帰点までの距離を設定することができます。

エリア出力の ON/OFF によって、しきい値に対してヒステリシス幅が設定される方向が異なりますのでご注意ください。



3 便利な設定編

(1) 今の距離を“0”にしたい！

●ゼロリセット

現在の値を“0”にします。

1. ボタンと ボタン
または ボタンと ボタン
を同時に 1 回短く押します。

現在値が“0”になります。ゼロリセット設定時には、ゼロリセット表示灯が点灯します。 ➡ 設定完了

ボタンの代わりに外部入力端子であるゼロリセット入力を 4ms 以上 3 秒未満 ON することでゼロリセットを行うことができます。

●ゼロリセット解除

1. ボタンと ボタン、
または ボタンと ボタン
を同時に 3 秒以上押すと、ゼロリセットは

解除されます。

ボタンの代わりに外部入力端子であるゼロリセット入力を 3 秒以上 ON することでゼロリセットを解除することができます。 ➡ 設定解除

(2) 誤操作を防ぎたい！

●キーロック機能

測定モードにおけるボタン操作を禁止することができます。

1. ボタンと ボタン、
または ボタンと ボタンを同時に
3 秒以上押します。

画面は「LoL」を表示します。 ➡ 設定完了

●キーロック解除

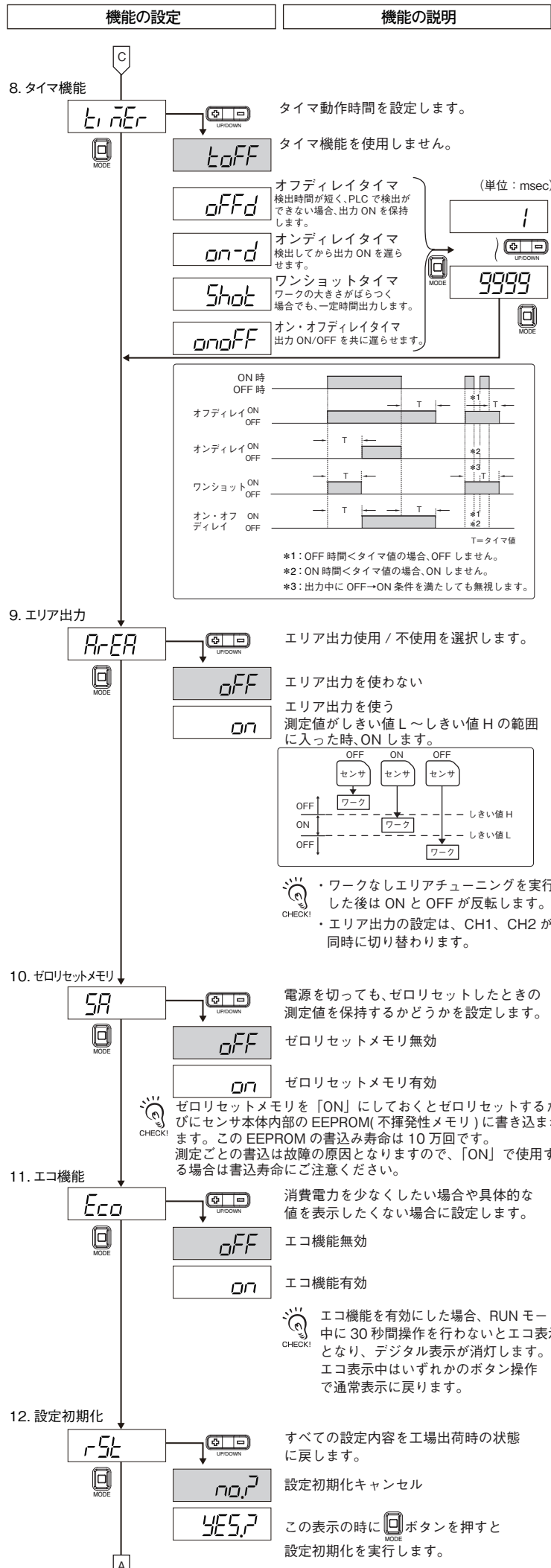
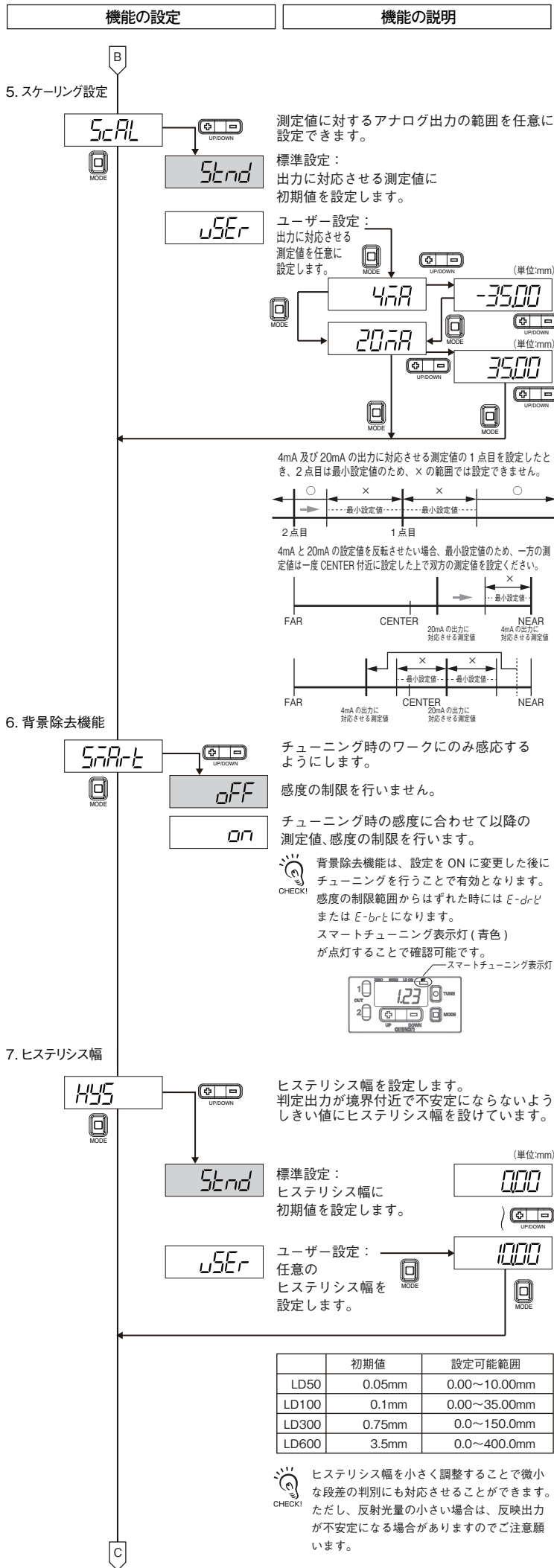
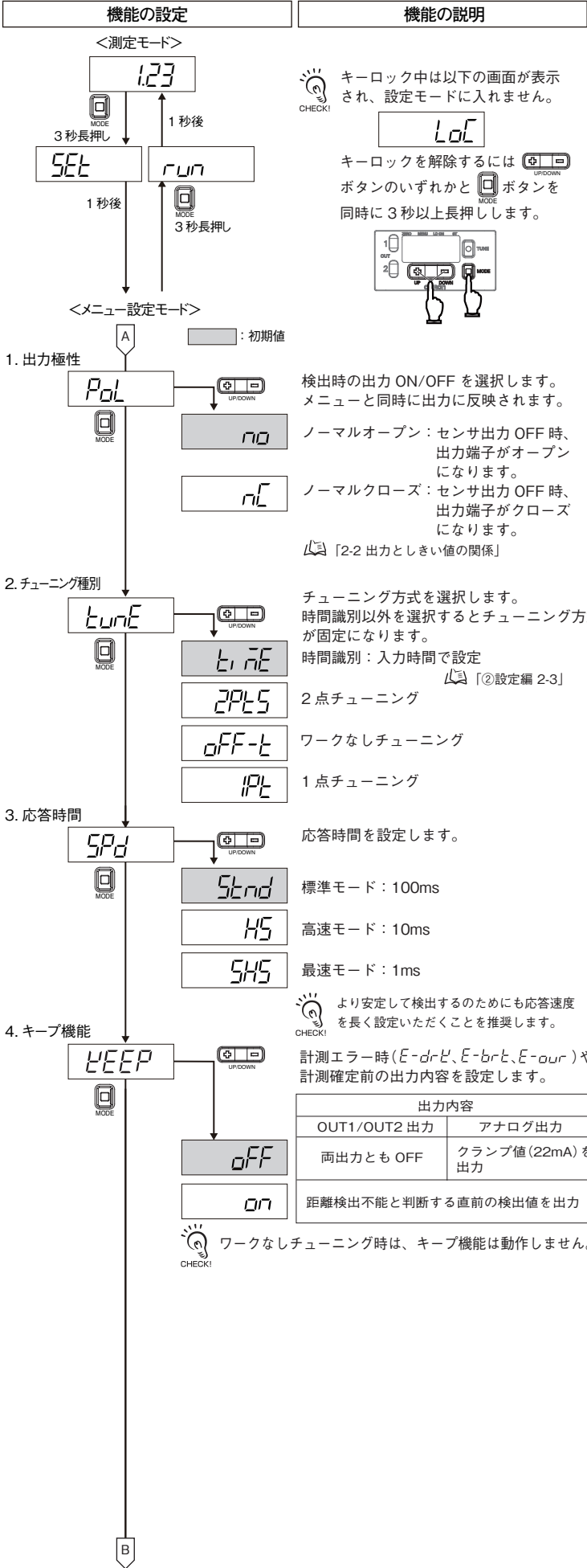
1. キーロック設定後に ボタンと ボタン、
または ボタンと ボタン
を同時に 3 秒以上押すとキーロック解除します。

キーロックは電源再投入後も保持されます。

➡ 設定解除

4 詳細設定編

測定モードで ボタンを 3 秒以上長押しするとメニュー設定モードとなります。メニュー設定モードでは以下の機能設定ができます。項目設定から ボタンを押下することで、次の項目メニューに移ります。また、全ての設定は CH1、CH2 で共通に適用されます。



5 エラーメッセージ

ここでは、デジタル表示に表示されるエラー内容とその処置について記載します。		
エラー名/表示	原因	処置
LD故障エラー 	レーザダイオードが劣化しています。	いったん電源を切り、センサが正しく結線されているか確認後、電源を再投入してください。それでもエラーが解決しない場合は、センサが故障しています。センサを交換してください。
システムエラー 	センサが故障しています。	
EEPROMエラー1 	センサ設定メモリが異常です。	いったん電源を切り、センサが正しく結線されているか確認後、電源を再投入してください。それでもエラーが解決しない場合は、センサが故障しています。センサを交換してください。
EEPROMエラー2 	センサ設定メモリが異常です。	ボタンを3秒長押しすることにより、設定内容を初期化してください。それでもエラーが解決しない場合は、センサが故障しています。センサを交換してください。
負荷短絡検知エラー 	判定出力線が短絡しています。	いったん電源を切り、白OUT1/緑OUT2の出力線が短絡していないか確認後、電源を再投入してください。
チューニング実行エラー 	チューニングに失敗しました。	応答時間をより遅い設定に変更してから、再度チューニング実施してください。センサとワークの距離が測定範囲内か確認後、再度実施してください。
光量不足エラー 	受光量が不足しています。	応答時間を遅くするか、センサ本体とワーク間の距離をセンサが検出できるように調整してください。背景除去機能の動作中は、制限感度以下の受光量になっています。
光量飽和エラー 	受光量飽和による計測異常です。	正反射光がセンサに入らないようにしてください。背景除去機能の動作中は、制限感度以上の受光量になっています。
測定範囲外エラー 	測定値が計測範囲外です。	センサ本体とワーク間の距離を測定範囲内に設置してください。

6 定格/仕様

形式	NPN 出力	コード引き出しタイプ	形ZX1-LD 50A61	形ZX1-LD 50A61L	形ZX1-LD 100A61	形ZX1-LD 100A61L	形ZX1-LD 300A61	形ZX1-LD 300A61L	形ZX1-LD 600A61	形ZX1-LD 600A61L
		コネクタ中継タイプ	形ZX1-LD 50A66	—	形ZX1-LD 100A66	—	形ZX1-LD 300A66	—	形ZX1-LD 600A66	—
	PNP 出力	コード引き出しタイプ	形ZX1-LD 50A81	形ZX1-LD 50A81L	形ZX1-LD 100A81	形ZX1-LD 100A81L	形ZX1-LD 300A81	形ZX1-LD 300A81L	形ZX1-LD 600A81	形ZX1-LD 600A81L
コネクタ中継タイプ		形ZX1-LD 50A86	—	形ZX1-LD 100A86	—	形ZX1-LD 300A86	—	形ZX1-LD 600A86	—	
外形サイズ		52.5mm × 47mm × 24.1mm					66mm × 50.1mm × 27.2mm			
計測範囲		50±10mm		100±35mm			300±150mm		600±400mm	
光源(発光波長)		可視光半導体レーザ (660nm)								
FDA class		class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)
JIS規格 IEC/EN class		class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)	class 1 (最大0.24mW)	class 2 (最大1mW)
スポット径(代表例) (検出距離中心にて規定) *1		φ0.17mm		φ0.33mm		φ0.52mm		φ0.56mm		
電源電圧		DC10～30V(リップル (p-p) 10%含む) クラス2								
消費電流		250mA以下(電源電圧DC10V時)								
アナログ出力		電流出力4～20mA、最大負荷抵抗300Ω								
表示灯		デジタル表示、出力表示灯(OUT1、OUT2)、ゼロリセット表示灯、メニュー表示灯、 レーザ点灯表示灯、スマートチューニング表示灯								
応答時間	判定出力	最速(SHS)モード:1ms、高速(HS)モード:10ms、標準(STND)モード:100ms								
	レーザOFF入力	200ms以下								
ZERO入力		200ms以下								
使用周囲照度		受光面照度 白熱ランプ 7,500lx以下	受光面照度 白熱ランプ 5,000lx以下	受光面照度 白熱ランプ 7,500lx以下	受光面照度 白熱ランプ 5,000lx以下	受光面照度 白熱ランプ 5,000lx以下	受光面照度 白熱ランプ 5,000lx以下	受光面照度 白熱ランプ 2,500lx以下	受光面照度 白熱ランプ 5,000lx以下	受光面照度 白熱ランプ 2,500lx以下
ウォーミングアップ		電源投入後30分のアナログ出力変動 ±0.1%F.S.以下								
リニアリティ *2		±0.15%F.S.		±0.15%F.S.		±0.25%F.S.		±0.25%F.S.(Near側) ±0.5%F.S.(全範囲)		
温度特性 *3		±0.03%F.S./℃		±0.03%F.S./℃		±0.03%F.S./℃		±0.04%F.S./℃		
静止分解能 *4		2μm		7μm		30μm		80μm		
周囲温度範囲		動作時:-10～+55℃、保存時:-15～+70℃(ただし氷結露しないこと)								
周囲湿度範囲		動作時・保存時:35～85%RH (ただし結露しないこと)								
耐電圧		AC1,000V 50/60Hz 1min								
振動(耐久)		10～55Hz 複振幅 1.5mm X、Y、Z各方向2h								
衝撃(耐久)		500m/s ² X、Y、Z各方向3回								
保護構造 *5		IEC規格 IP67								
標準コード長さ *6		2m(コード引き出しタイプ)、5m(コード引き出しタイプ) *7、0.5m(コネクタ中継タイプ) *7								
質量 (梱包状態/本体のみ)	コード引き出しタイプ (2m)	約240g/約180g					約270g/約210g			
	コネクタ中継タイプ (0.5m)	約170g/約110g					約200g/約140g			
材質		ケース・カバー:ポリブチレンテレフタレート、光学窓:ガラス、ケーブル:PVC								
適合規格		EC規格適合,RoHS準拠,UL認証取得								

*1 スポット径:検出距離中心における中心光強度の1/e²(13.5 %)で定義しています。定義域外にも漏れ光があり、ワーク周囲の光反射率がワークに比べて高い状況では、影響の出る場合があります。また、スポット径より小さいワークを検出する場合は、正しい計測値が得られない場合があります。
*2 25℃環境下での当社標準対象物(白セラミク)測定時における変動出力の理想曲線に対する誤差を示します。
*3 センサとワークの間をアルミの治具で固定した場合の検出距離中心における温度特性。
*4 STNDモード、標準白色セラミクにて、背景除去機能をONに設定し、チューニングを実施した状態で静止定義。
*5 コネクタ中継タイプのコネクタ部も、延長コードと接続したとIP67です。
*6 コネクタ中継タイプ:延長コード10Mもしくは延長コード20Mとセットで使用してください。
*7 形ZX1-LD□□□□は2m(コード引き出しタイプ)のみとなります。

	定格	NPNオープンコネクタ出力		PNPオープンコネクタ出力	
		DC30V 100mA以下		DC30V 100mA以下	
判定出力	残留電圧	1V以下(負荷電流≤10mA)		1V以下(負荷電流≤10mA)	
		2V以下(10mA<負荷電流≤100mA)		2V以下(10mA<負荷電流≤100mA)	
外部入力	ON時	0V短絡または1.5V以下		電源電圧短絡または電源電圧-1.5V以内	
	OFF時	開放(漏れ電流0.1mA以下)		開放(漏れ電流0.1mA以下)	

7 メンテナンス編：トラブルシューティング

トラブル	原因	対応方法
デジタル表示がされない	エコ機能が ON になっていませんか？	エコ機能を OFF してください。 [④ 詳細設定編]
画面に何も表示されない	電源が入っていないか、断線していませんか？	配線の見直し、電源電圧・電源容量の見直しを行ってください。 [① 設置編 1-3]
稼動中に再起動される		
レーザ光が投光されない	LD-OFF入力が短絡していませんか？	配線の見直しを行ってください。 [① 設置編 1-3]
画面に「LD OFF」が表示される		
入力信号を受け付けない	各コードが正しく接続されていないか、断線の可能性があります。	配線の見直しを行ってください。 [① 設置編 1-3]
測定値が日や時刻によって変動し安定しない	温度特性の影響が考えられます。	ウォーミングアップを30分以上行ってください。定期的に基準対象物でゼロリセットを実行し、補正するようにしてください。
画面に「E-drL」が表示される	検出距離が長く、測定範囲外になっていませんか？ 投受光面がほこり汚れや治具などで遮蔽されていませんか？	センサの設置環境を見直してください。
OUT1表示灯/OUT2表示灯が点滅する	他センサによる相互干渉が発生している可能性があります。	他センサのレーザ光線の光路や反射した迷光の影響を受けないよう、設置環境を見直してください。
OUT1表示灯/OUT2表示灯が計測範囲外にもかかわらず点灯し続ける	キープ機能「KEEP」=「on」で、かつ、受光量不足「E-drL」または測定範囲外「E-our」の場合が考えられます。	キープ機能「KEEP」=「off」にしてください。
明らかに測定範囲外の領域で、異常な距離が検出される	センサの特性上、このような現象が発生する場合があります。	背景除去機能「Snare-L」=「on」にしてチューニングを行ってください。 [④ 詳細設定編] 検出物体との測定距離を確認のうえ、使用してください。
初期設定に戻したい	—	設定初期化を行ってください。 [④ 詳細設定編]

ご承諾事項

当社商品は、一般工業製品向けの汎用品として設計製造されています。従いまして、次に掲げる用途での使用を意図しておらず、お客様が当社商品をこれらの用途に使用される際には、当社は当社商品に対して一切保証をいたしません。ただし、次に掲げる用途であっても当社の意図した特別な商品用途の場合や特別の合意がある場合は除きます。

(a) 高い安全性が必要とされる用途(例:原子力制御設備、燃焼設備、航空・宇宙設備、鉄道設備、昇降設備、娯楽設備、医用機器、安全装置、その他生命・身体に危険が及ぶる用途)

(b) 高い信頼性が必要な用途(例:ガス・水道・電気等の供給システム、24時間連続運転システム、決済システムほか権利・財産を取扱う用途など)

(c) 厳しい条件または環境での用途(例:屋外に設置する設備、化学的汚染を被る設備、電磁的妨害を被る設備、振動・衝撃を受ける設備など)

(d) カタログ等に記載のない条件や環境での用途

* (a)から(d)に記載されている他、本カタログ等記載の商品は自動車(二輪車含む。以下同じ)向けではありません。自動車に搭載する用途には利用しないで下さい。自動車搭載用商品については当社営業担当者にご相談ください。
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オムロン株式会社 インダストリアルオートメーションビジネスカンパニー

●製品に関するお問い合わせ先
お客様相談室

フリーダイヤル 0120-919-066

携帯電話・PHS・IP電話などではご利用いただけませんので、下記の電話番号へおかけください。

電話 055-982-5015 (通話料がかかります)

●オムロンFAクイックチャット
www.fa.omron.co.jp/contact/tech/chat/
技術相談員にチャットでお問い合わせいただけます。
(i-Webメンバーズ限定)

■営業時間：9:00～17:00 (土曜日、日曜日、12月31日～翌年1月3日を除く)

●FAXやWebページでもお問い合わせいただけます。
FAX 055-982-5051 / www.fa.omron.co.jp

●その他のお問い合わせ
納期・価格・サンプル・仕様書は貴社のお取引先、または貴社担当オムロン販売員にご相談ください。
オムロン制御機器販売店やオムロン販売拠点は、Webページでご案内しています。

Smart Sensor

ZX1-LD

Laser Displacement Sensor CMOS Type

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.

Notice:
In a residential environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

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OMRON

CE


* 0 1 9 5 6 0 - 4 0 *

PRECAUTIONS ON SAFETY

● Meanings of Signal Words

 **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.

● Meaning of Alert Symbols



- Laser beam
Cautions to indicate potential Laser beam hazard.



- Do not disassemble
Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.

● Alert Statements / Messages d'alerte

 **WARNING / AVERTISSEMENT**

Looking into the Outgoing light continuously may cause visual impairment. Do not look directly into the Outgoing light.
Caution-Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Fixer en continu la lumière sortante peut provoquer des troubles visuels. Ne pas fixer directement la lumière sortante.
Attention-L'utilisation des commandes ou réglages ou l'exécution des procédures autres que celles spécifiées dans les présentes exigences peuvent être la cause d'une exposition à un rayonnement dangereux.

Do not disassemble this product. Doing so may cause exposure to the built-in light source which can damage eyes and skin.
Never disassemble it.

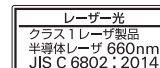
Ne pas démonter ce produit. Cela pourrait provoquer une exposition à la source lumineuse intégrée, qui peut endommager les yeux et la peau.
Ne jamais le démonter.

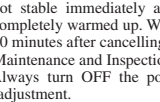
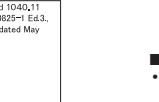


SAFETY PRECAUTIONS FOR USING LASER EQUIPMENT PRÉCAUTIONS DE SÉCURITÉ POUR L'UTILISATION D'ÉQUIPEMENTS LASER

Laser safety measures for laser devices are stipulated both in Japan and overseas. Here, five cases are described.
(1) Usage in Japan
The JIS C6802:2014 standard stipulates the safety precautions that users must take according to the class of the laser product.
The ZX1-LD is classified into class 2 defined by this standard.
The ZX1-LD is classified into class 1 defined by this standard.

■ Labeling on Laser Use
The ZX1-LD has the following WARNING label or explanatory label on the side of the sensors.
• ZX1-LD Laser Warning Label
• ZX1-LD Explanatory Label





(2) USA
This product is subject to the U.S. FDA (Food and Drug Administration) Laser regulations. The ZX1-LD and ZX1-LD is already reported to CDRH (Center for Devices and Radiological Health).
Accession Number:
(ZX1-LD : 1210041-002)
(ZX1-LD : 1210041-003)
When using a device equipped with the ZX1-LD and the ZX1-LD in the U.S., attach an FDA certification label on the sensor at the correct location as indicated, and replace the warning label or explanatory label with corresponding English label.
• The ZX1-LD is classified into Class 2 by the IEC 60825-1:2014 standard according to the regulations of Laser Notice No.56 of the FDA standard.
• The ZX1-LD is classified into Class 1 by the IEC 60825-1:2014 standard according to the regulations of Laser Notice No.56 of the FDA standard.





(3) China
• The ZX1-LD is classified into Class 2 by the GB/T 7247.1-2024 standard according to the regulation of GB 44703-2024. When using in China, warning labels must be replaced by Chinese ones supplied with the product.
• REPETITION RATE :3.71kHz
• ZX1-LD Laser Warning Label(Chinese)



• The ZX1-LD is classified into Class 1 by the GB/T 7247.1-2024 standard according to the regulation of GB 44703-2024. (1类激光产品)

(4) Canada
• The ZX1-LD is Classified into Class 2 by the IEC60825-1:2014 standard.
Le ZX1-LD est classé dans la classe 2 selon la norme IEC 60825-1:2014.



• The ZX1-LD is Classified into Class 1 by the IEC60825-1:2014 standard.
Le ZX1-LD est classé dans la classe 1 selon la norme IEC 60825-1:2014.

(5) Usage in countries other than Japan, U.S., China and Canada
• When usage in countries other than Japan, U.S., China and Canada, warning labels must be replaced by suitable for the area ones supplied with the ZX1-LD. When exporting to Europe, labels fall under EU standard EN 60825-1:2014+A11:2021. The ZX1-LD is classified into Class 2 by the IEC 60825-1:2014 / EN 60825-1:2014+A11:2021 standard.
• ZX1-LD Laser Warning Label(English)
• ZX1-LD Explanatory Label(English)



PRECAUTIONS FOR SAFE USE

The following precautions must be observed, since they are essential to ensure safety in operation.

- Installation Environment
 - Do not use the Sensor in locations subject to explosive or flammable gases.
 - To ensure safety in operation and maintenance, do not install the Sensor near high-voltage equipment or power devices.
- Power Supply and Wiring
 - Do not impose voltage exceeding the rated voltage: 10 to 30 VDC, including 10% ripple (p-p).
 - When supplying power to the Sensor, make sure that the polarity of the power is correct, and do not connect to an AC power supply.
 - Do not short-circuit the load for the open collector output. Short-circuiting the load may cause fire or damage on the Sensor.
 - Connect the load correctly. Short-circuiting the load may cause fire or damage on the Sensor.
 - Keep the load within the rated range. Overloading may result in fire or damage on the Sensor.
 - Wire the product cable separately from high-voltage or power lines. Placing them in the same wiring or the same duct may cause induction, resulting in the product malfunction or damage.
 - Always turn off the power of the Sensor before connecting or disconnecting the cable or connector.
 - Do not use the Sensor for the safety circuits in nuclear power or life-critical applications.
 - Implement safety measures e.g. fail-safe circuits.
- Installation
 - Make sure that all installation screws must be tighten securely.
Tightening torque: M3, 0.5N·m (ZX1-LD50 / ZX1-LD100)
M4, 1.2N·m (ZX1-LD300 / ZX1-LD600)
- Others
 - Do not attempt to disassemble, deform by pressure, incinerate, repair, or modify this product.
 - When disposing of the product, treat as industrial waste.
 - 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.

PRECAUTIONS FOR CORRECT USE

- Installation Location
 - Do not install the product in locations subjected to the following conditions:
 - Surrounding air temperature outside the rating
 - Rapid temperature fluctuations (causing condensation)
 - Relative humidity outside the range of 35 to 85%
 - Presence of corrosive or flammable gases
 - Presence of dust, salt, or iron particles
 - Direct vibration or shock
 - Reflection of intense light (such as other laser beams, electric arc-welding machines, or ultra-violet light)
 - Direct sunlight or near heaters
 - Water, oil, or chemical fumes or spray, or mist atmospheres
 - Strong magnetic or electric field
 - In the water, rain, or outdoors
- Power Supply and Wiring
 - Do not supply the power to the Sensor before checking the I/O wiring.
 - Ground the FG terminal when using a commercially-available switching regulator.
 - If the power supply line is subject to surges, connect a surge absorber that meets the conditions of the operating environment.
- Do not turn ON the power after wiring before making sure that the power supply is connected correctly; there are no faulty connections, e.g. load short-circuits; the load current is correct. Incorrect wiring may result in failure.
- Use a ZX0-XC Extension Cable (sold separately) to extend the Sensor's cable. Use only one cable. Do not extend the cable for the Sensor to a length exceeding 20 m.
- The display and indicators turn ON after approx. 2.5 seconds after the power is turned ON.
- The sensor is certificated by the UL standard on the assumption of the following installation conditions.
 - It is based on the assumption of usage in "Class 2 circuit". Please use it with "Class 2 power supply" in the United States or Canada. The current rating of overcurrent protection is 0.8A max.
 - It is certificated as open type. The sensor shall be installed within an enclosure.
 - Rating of the cable is 30V. Please use it as internal cable wiring only in the end products equipment.

Checking the Package Content

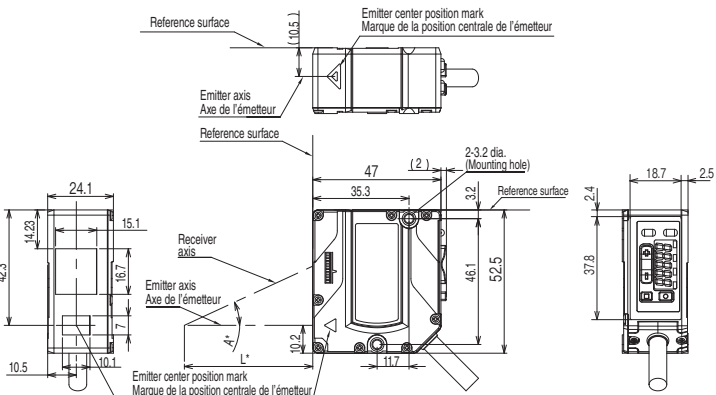
- Sensor: 1
- Instruction sheet (this sheet): 1 each (Japanese and English)
- FDA Certification label : 1
- Laser Warning Label : 1 each (Japanese, English and Chinese)
(The explanatory labels are attached to ZX1-LD instead of the warning explanation labels. (Japanese, English))

1 Installation

1-1 Dimensions

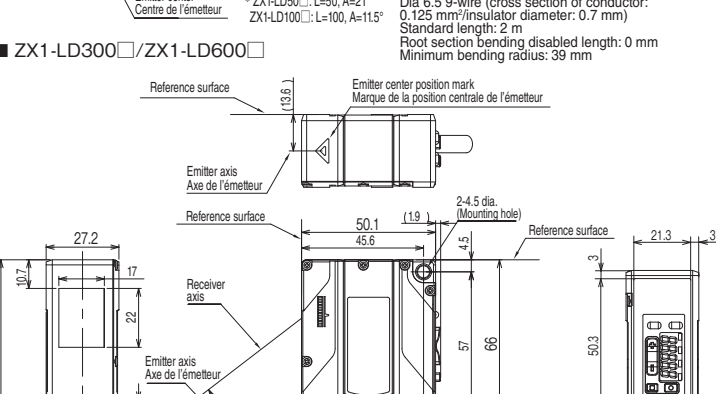
(Unit: mm)

■ ZX1-LD50 / ZX1-LD100



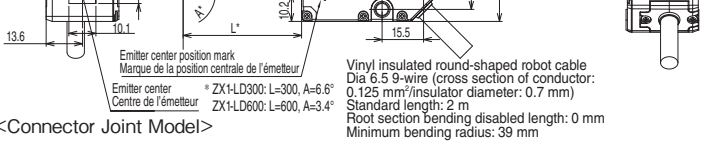
Vinyl insulated round-shaped robot cable
Dia 6.5 9-wire (cross section of conductor:
0.125 mm²/insulator diameter: 0.7 mm)
Standard length: 2 m
Root section bending disabled length: 0 mm
Minimum bending radius: 39 mm

■ ZX1-LD300 / ZX1-LD600



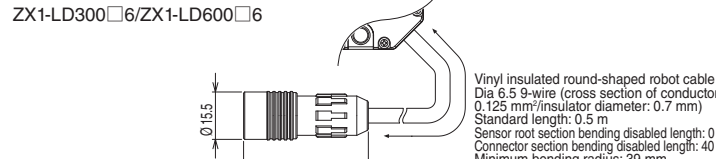
Vinyl insulated round-shaped robot cable
Dia 6.5 9-wire (cross section of conductor:
0.125 mm²/insulator diameter: 0.7 mm)
Standard length: 2 m
Root section bending disabled length: 0 mm
Minimum bending radius: 39 mm

<Connector Joint Model>



Vinyl insulated round-shaped robot cable
Dia 6.5 9-wire (cross section of conductor:
0.125 mm²/insulator diameter: 0.7 mm)
Standard length: 0.5 m
Sensor root section bending disabled length: 40 mm
Connector section bending disabled length: 40 mm
Minimum bending radius: 39 mm

<Extension Cable>

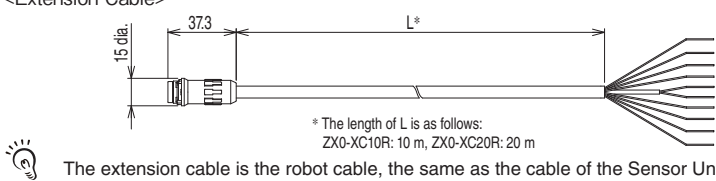


The length of L is as follows:
ZX0-XC10R: 10 m, ZX0-XC20R: 20 m

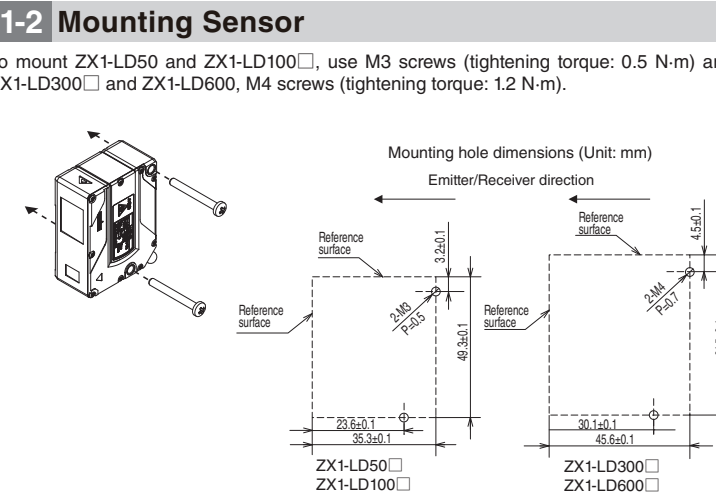
The extension cable is the robot cable, the same as the cable of the Sensor Unit.

1-2 Mounting Sensor

To mount ZX1-LD50 and ZX1-LD100, use M3 screws (tightening torque: 0.5 N·m) and ZX1-LD300 and ZX1-LD600, M4 screws (tightening torque: 1.2 N·m).



Mounting hole dimensions (Unit: mm)

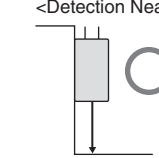




Do not touch the sensor emitter and receiver sections. Correct detection may not be possible if fingerprints are attached to these areas. If fingers have inadvertently touched the areas, wipe the areas using a soft, clean cloth.

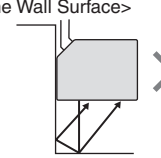
■ Caution on Mounting Direction

<Detection Near the Wall Surface>



The Sensor is less influenced by ambient lighting.

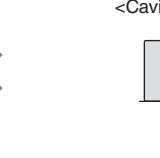
<Cavity Detection>



The Sensor is easily influenced by ambient lighting, which may cause detection value variations. *

Detection is not possible if the emitter or receiver section is blocked.

<Detection of Workpiece with Level Difference>



Stable detection is possible regardless of level difference.

Level difference may cause an abnormal detection value.

* Before performing tuning, apply mat paint on the wall surface or turn ON the background suppression function to avoid laser light reflection. Refer to "5. Background suppression function, (4) Detailed Settings"

1-3 Wiring

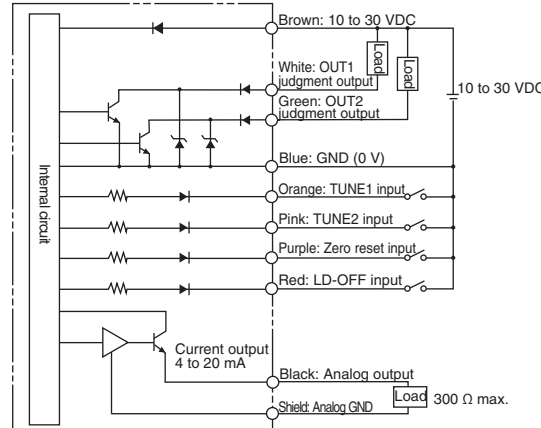
The table below shows individual external I/O wires and their roles.

Wire color	Name	Role
Brown	Power supply	Connect to 10 to 30 VDC (including 10% ripple (p-p)). Used as the common I/Os terminal for all I/O except monitor output for a PNP output type.
Blue	GND	0-V power supply terminal. Used as the common I/Os terminal for all I/O except monitor output for an NPN output type.
White	OUT1 Judgment output	Outputs the CH1 judgment result.
Green	OUT2 Judgment output	Outputs the CH2 judgment result.
Black	Analog output	Outputs the current value according to the measurement result. (4 to 20 mA)
Shield	Analog GND	0-V ground line for analog output. Connect this line separately from the blue (0 V) GND. [Important] When analog output is not used, be sure to connect to blue (0 V).
Orange	TUNE1 input	Inputs tuning to CH1.
Pink	TUNE2 input	Inputs tuning to CH2.
Purple	Zero reset input	Used to execute or cancel zero reset.
Red	LD-OFF input	ON: Laser turns OFF (radiation stop). In this state, analog output, digital display, judgment output and judgment output display are output based on keep function settings. The digital display shows [L OFF].

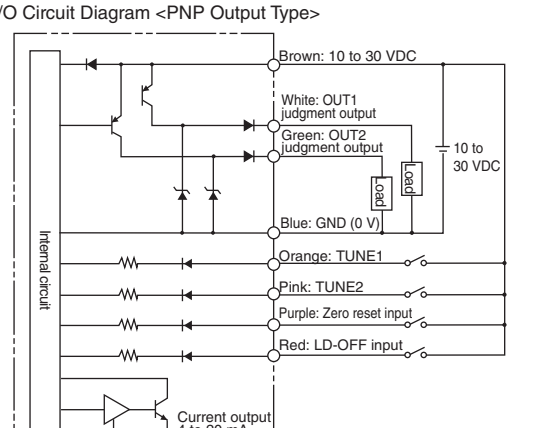
The individual wire colors and roles are the same between pre-wired and connector joint models.

Wiring the Sensor correctly. Unused wires must be insulated. Incorrect wiring may result in damage to the Sensor.

■ I/O Circuit Diagram <NPN Output Type>



■ I/O Circuit Diagram <PNP Output Type>

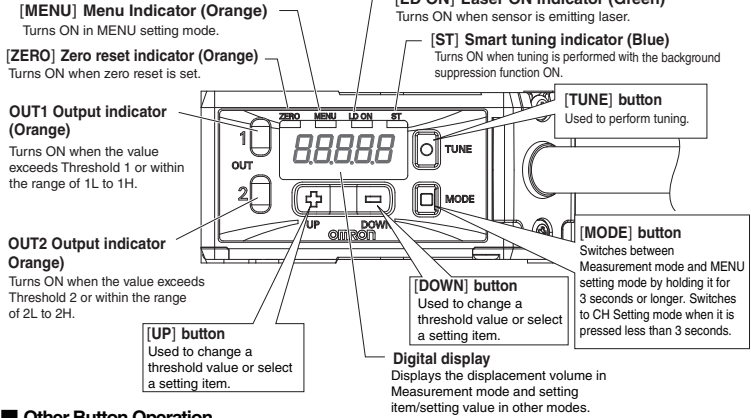




2 Settings

2-1 Setting and Display Overview

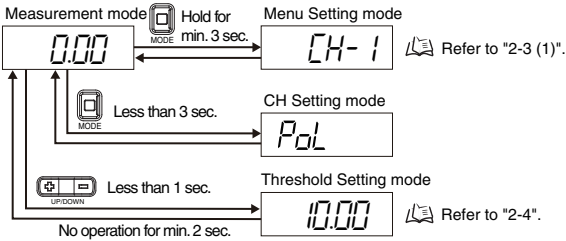
■ Nomenclature and Function



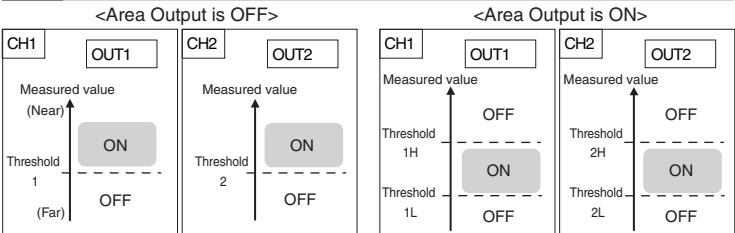
■ Other Button Operation

Tuning		Refer to "2-3"
Zero reset setting	+ simultaneously for less than 3 sec.	Refer to "③ (1)"
Zero reset cancel	+ simultaneously for min. 3 sec.	Refer to "③ (1)"
Key lock setting/cancel	+ simultaneously for min. 3 sec.	Refer to "③ (2)"

■ Switching to Individual Modes



2-2 Output and Threshold Value



● The above figures represent the behaviors when the output polarity [POL] is set to normally-open [NO] (initial value). If the polarity is set to normally-closed [NC], the ON/OFF polarities in the figures are reversed.

2-3 Tuning

■ Quick Reference for Tuning Operation (Perform tuning after selecting a CH)

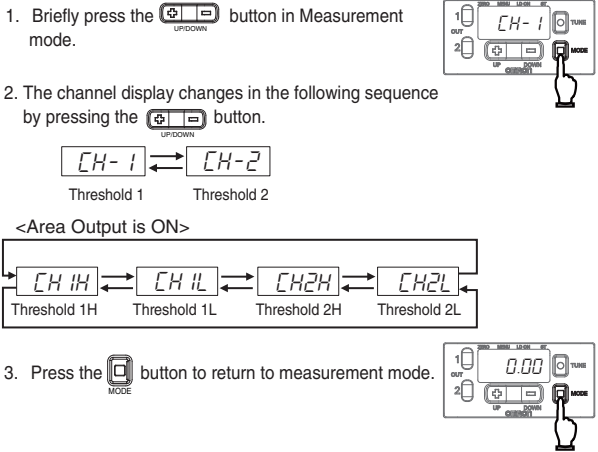
CH setting mode	Press button to enter CH setting mode, and then press or button to select a CH.
1-point tuning Refer to "2-3 (3)", "2-3 (5)"	Press button for 3 to 5 seconds.
2-point tuning Refer to "2-3 (2)", "2-3 (4)"	Press button once for the 1st point. Press button once for the 2nd point.
Tuning mode without workpiece Refer to "2-3 (6)"	Press button for 5 seconds.

● TUNE1 input (external input terminal) can also replace the button operations for tuning to CH1. Tuning can be performed for TUNE2 to CH2.

- The allocation of button and external input terminals can be fixed by changing the tuning type. Refer to "2. Tuning Type, ④ Detailed Settings"
- When setting the background suppression function to ON and performing tuning, the measurement value and sensitivity level can be limited according to the sensitivity. Use it when abnormal distance is detected due to diffuse reflection caused by surrounding walls, etc. Refer to "5. Background suppression function, ④ Detailed Settings"
- When performing tuning, threshold values are recorded in EEPROM (non-volatile memory) in the sensor. The writing life of EEPROM is 100,000 times. Be careful of writing life when performing measurement-by-measurement tuning.

(1) Switch Channel to Set Threshold

● CH Setting Mode

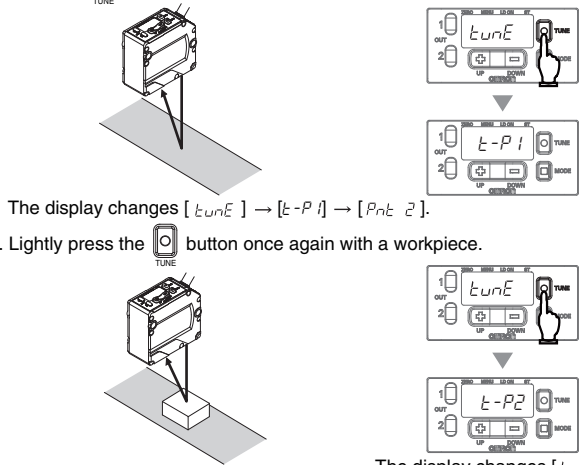


(2) Detect for Workpiece Presence/Absence

● 2-point Tuning

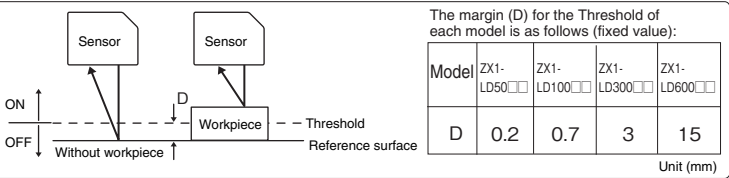
Used to distinguish between two objects with different height from the Sensor e.g. OK and NG, workpiece and background (reference surface) or workpieces A and B.

1. Press the button (within 1 sec.) once without a workpiece.



The display changes [t-unE] → [Pnt 2] and 2-point tuning is completed. The measured value display returns.

➡ Setting is Completed



● The order of the workpiece does not matter. Refer to "⑤ Error Messages".

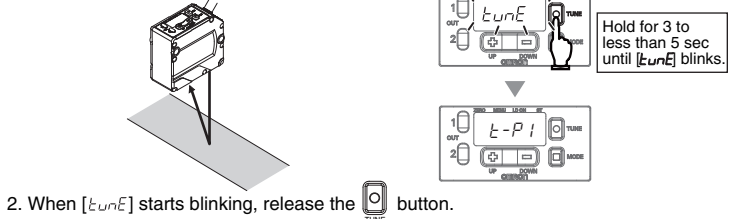
(3) Detect for Workpiece Presence/Absence

(Tuning Only Using Reference Surface)

● 1-point Tuning

Used to judge the presence/absence of a workpiece by referring to the pre-determined background (reference surface).

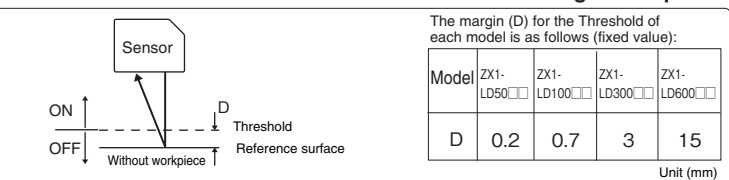
1. Hold the button (minimum 3 and less than 5 seconds) until [t-unE] blinks without a workpiece.



2. When [t-unE] starts blinking, release the button.

The display changes [t-unE] → [t-P1] and 1-point tuning is completed. The measured value display returns.

➡ Setting is Completed



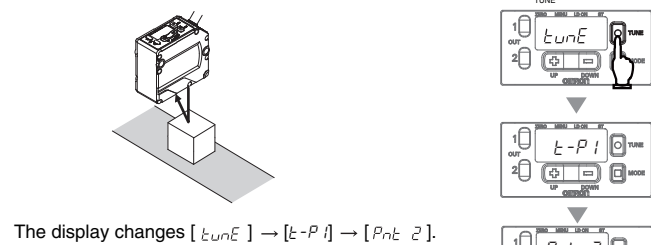
(4) Set Upper Limit and Lower Limit (Using Area Output)

● 2-point Area Tuning

Refer to "7. Area Output, ④ Detailed Settings"

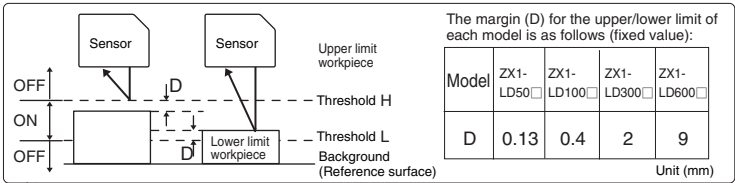
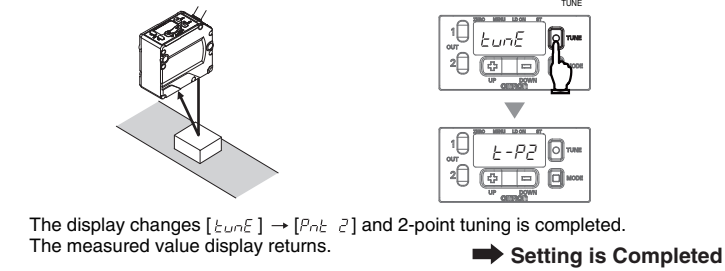
Used to judge if the workpiece is within the range by using the upper limit and lower limit workpieces.

1. Select "ON" for area output in menu setting mode to return to measurement mode.
2. Set the workpiece at the desired upper limit and lightly press the button.



The display changes [t-unE] → [t-P1] → [Pnt 2].

3. Set the workpiece at the desired lower limit and lightly press the button.



● The order of the workpiece does not matter.

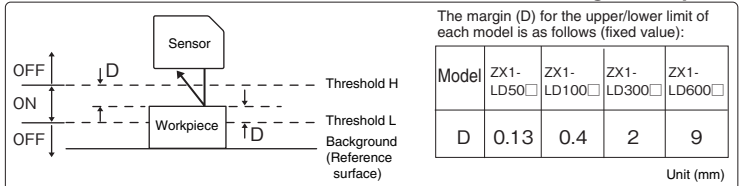
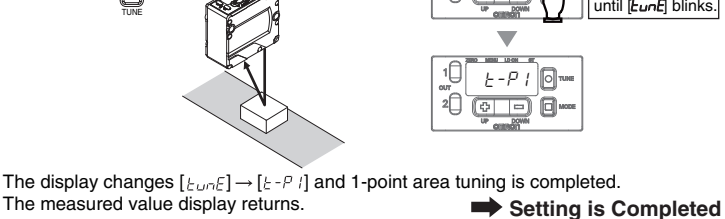
(5) Set Plus/Minus (±) Tolerance

● 1-point Area Tuning

Refer to "7. Area Output, ④ Detailed Settings"

Used to assign the upper and lower limits to one actual workpiece and judge if the workpiece is within the range.

1. Set the AREA item in the menu to "ON" and return to the measured value display.
2. Hold the button (3 to less than 5 seconds) until [t-unE] blinks with a workpiece to detect on the reference surface.
3. When [t-unE] starts blinking on the display, release the button.



● To set plus and minus threshold values using "0" as the background, use the zero reset function to reset the distance to "0". Then, perform 1-point area tuning. Refer to "③ Convenient Setting Features (1)"

(6) When (2) to (5) Methods Failed

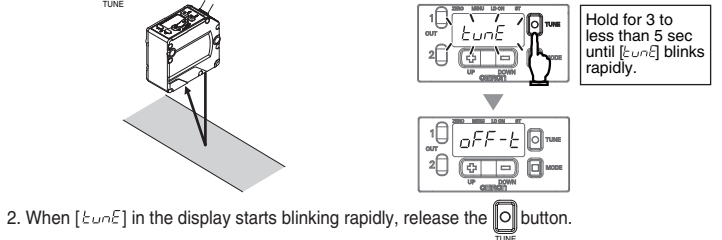
● Tuning mode without Workpiece (Area Output is OFF)

Used to judge the presence/absence of a workpiece using the pre-determined background (reference surface) as the reference. Unlike 1-point tuning, this method focuses on the detection of the absence of workpiece. Insufficient light level or outside-range errors caused by complicated workpiece appearance are judged as "the presence of the workpiece".

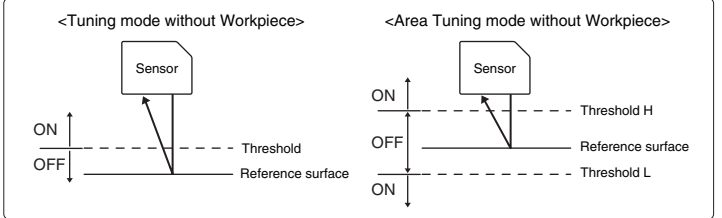
● Tuning mode without Workpiece (Area Output is ON)

Used to assign the upper and lower limits to the distance from the reference surface and judge if a workpiece is within the range. Unlike 2-point tuning, this method focuses on the detection of the absence of workpiece. Insufficient light level or outside-range errors caused by complicated workpiece appearance are judged as "the presence of the workpiece".

1. Hold the button (5 sec. or longer) until [t-unE] blinks rapidly without a workpiece.



➡ Setting is Completed



2-4 Fine Adjustment of Threshold Value

● Threshold Value Setting

To loosen or tighten the ON/OFF switching conditions, use the buttons for minute adjustment of the threshold values.

Increase threshold
 Decrease threshold

● The OUT1 indicator keeps blinking while "Threshold 1/ Threshold 1H/ Threshold 1L" is being changed. The OUT2 indicator keeps blinking while "Threshold 2/ Threshold 2H/ Threshold 2L" is being changed.

2-5 Fine Adjustment of Hysteresis Width

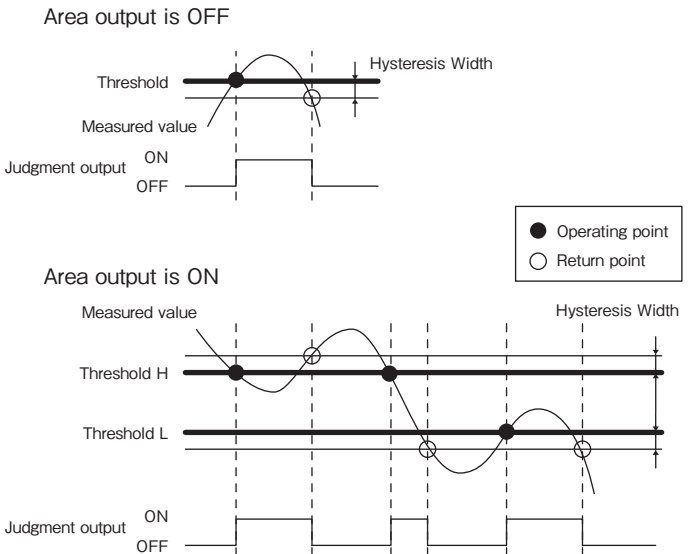
● Hysteresis Width Setting

A minute step can be judged by adjusting the hysteresis width according to the workpiece. However, note that the judgment output varies if lowering the hysteresis width while the displacement value is varying due to moving workpiece or low reflection light intensity.

● What is Hysteresis Width?

A point in which a judgment output turns from OFF to ON is called an operating point, and a point in which a judgment output turns from ON to OFF is called a return point. On this sensor, threshold means operating point, and a distance to the return point can be set based on the hysteresis width.

● Note that the direction where the hysteresis width is set for the threshold differs depending on ON/OFF of the area output.



3 Convenient Setting Features

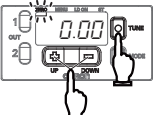
(1) Reset the Present Distance to "0"

- Zero Reset

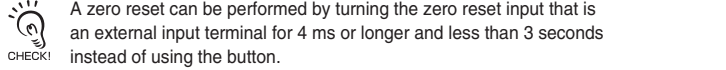
The present distance value can be reset to "0".

1. Simultaneously press the and buttons, or the and buttons, once for a short time.

The present value changes to "0" and zero reset is completed. The zero reset indicator turns ON.

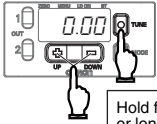


➡ Setting is Completed

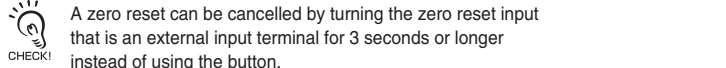


● Zero Reset Cancel

1. To cancel zero reset function, simultaneously press the  and  buttons, or the  and  buttons, for at least 3 seconds.



➡ Zero Reset is Cancelled

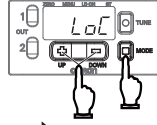


(2) Avoid Mis-operation

- Key Lock Function

Used to disable the button operations in Measurement mode.

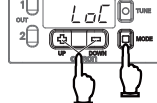
1. Simultaneously press the  and  buttons, or the and buttons, for at least 3 seconds.



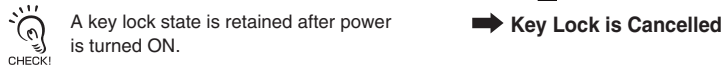
➔ **Setting is Completed**

- Key Lock Cancel

1. To unlock the key operation after key lock setting, simultaneously press the  and  buttons, or the  and  buttons, for at least 3 seconds.



➡ Key Lock is Cancelled



4 Detailed Settings

To enter the Menu Setting mode, hold button for at least 3 seconds.

The Menu Setting mode provides the following function settings.

Pressing the button from the item setting moves to the next item menu.

All the settings^{MODE} are common to CH1 and CH2.

Function Setting	Description
<Measurement Mode> Hold for 3 sec. After 1 sec. After 1 sec. <Menu Setting Mode>	The following indication is displayed during key lock is engaged. Setting mode cannot be entered. To unlock the keys, simultaneously hold the button and either of the buttons for 3 second or longer.

Initial value

1. Output Polarity

PoL (MODE) [UP/DOWN]

- no**: Normally-open: Output terminal opens when the Sensor output is OFF
- nc**: Normally-closed: Output terminal closes when the Sensor output is OFF
- ON/OFF output is reversed at NC.** (CHECK! icon) "2-2 Output and Threshold Value"

2. Tuning Type

tune (MODE) [UP/DOWN]

- LINE**: Select the tuning method. When you select other than "type discrimination by time", the tuning method is fixed to the selected tuning type. Type discrimination by time: Set by input time (Refer to "② Settings 2-3".)
- 2PTS**: 2-point tuning
- OFF-t**: Tuning mode without workpiece
- 1PT**: 1-point tuning

3. Response Time

SPd (MODE) [UP/DOWN]

- Stnd**: Set the response time. Standard mode: 100 ms
- HS**: High-speed mode: 10 ms
- SHS**: Super high-speed mode: 1 ms
- It is recommended that you set the response speed long enough for stable detection.** (CHECK! icon)

4. Keep Function

KEEP (MODE) [UP/DOWN]

- OFF**: Set the output content at a measurement error (E-drE, E-brE, E-our) or of pre-configured measurement.
- ON**

Output content	
OUT1/OUT2 output	Monitor output
Both outputs OFF	Outputs the clamp value (22 mA)
Outputs the immediately previous value when distance detection is judged to be impossible	

Function Setting

Description

5. Scaling Function

The range of analog outputs for measured values can be arbitrarily configured.

Standard setting:

Set an initial value to measured value according to an output.

User setting:

Arbitrarily set a measurement value corresponding to the output.

When setting the 1st point of the measurement value for 4mA and 20mA outputs, the measurement value cannot be set in the area indicated by x because the 2nd point is the minimum set value.

To reverse the set values of 4mA and 20mA, set one of the measurement values near the CENTER before setting the both values due to the minimum set value.

6. Background Suppression Function

Set the Sensor only to be sensitive to the workpiece condition in tuning.

Sensitivity is not restricted.

Post-tuning measured value and sensitivity are restricted according to the sensitivity in tuning.

CHECK! The background suppression function becomes effective by performing tuning after changing the setting to ON.

When shifted from the limited range of the sensitivity, the display shows $E - d - L$ or $E - b - L$.

The function is ready after the smart tuning indicator (blue) turns ON.

7. Hysteresis width

Set a hysteresis width.

The hysteresis width has been set to the threshold so that the judgment output does not become unstable near the boundary.

Standard setting:

Set an initial value to the hysteresis width.

User setting:

Set an arbitrary hysteresis width.

	Initial value	Setting range
LD50	0.05mm	0.00~10.00mm
LD100	0.1mm	0.00~35.00mm
LD300	0.75mm	0.0~150.0mm
LD600	3.5mm	0.0~400.0mm

CHECK! A minute step can be judged by lowering the hysteresis width. However, note that the reflection output may become unstable when the reflection light intensity is low.

Function Setting	Description
8. Timer Function The diagram shows a vertical flow starting from a 'C' icon. It leads to a box with 't nEr' and a 'MODE' button. An arrow points to a box with 'UP/DOWN' and 'tOFF'. From 'tOFF', an arrow points to a box with 'OFFd'. From 'OFFd', an arrow points to a box with 'on-d'. From 'on-d', an arrow points to a box with 'Shot'. From 'Shot', an arrow points to a box with 'onOFF'. An arrow from 'onOFF' points to a box with 'Unit: M Sec' and a display showing '1' and '9999'.	Specify the timer operation time. The timer function is not used. Off-delay timer Holds output ON if the detection time is short and unable to detect with PLC. On-delay timer Delays output ON after detection. One shot timer Outputs for a certain period of time even if the workpiece size varies. On/Off-delay timer Delays both outputs ON/OFF. Unit: M Sec T = Timer value *1: If OFF time < Timer value, the output does not turn OFF. *2: If ON Time < Timer value, the output does not turn ON. *3: If OFF → ON condition is satisfied during output, the timer is ignored.
9. Area Output The diagram shows a vertical flow starting from a 'C' icon. It leads to a box with 'ArEA' and a 'MODE' button. An arrow points to a box with 'UP/DOWN' and 'oFF'. From 'oFF', an arrow points to a box with 'on'.	Specify whether the area output function is used or not used. Area output is not used. Area output is used. The output turns ON when the measured value enters the Threshold L to Threshold H range. OFF Sensor ON Sensor OFF Sensor Workpiece Workpiece Workpiece Threshold H Threshold L
10. Zero Reset Memory The diagram shows a vertical flow starting from a 'C' icon. It leads to a box with 'SR' and a 'MODE' button. An arrow points to a box with 'UP/DOWN' and 'oFF'. From 'oFF', an arrow points to a box with 'on'.	Set whether the measured value at the time of zero reset is held even after power is turned OFF. Zero reset memory disabled Zero reset memory enabled • ON and OFF are reversed after area tuning mode without workpiece is performed. • For area output setting, CH1 and CH2 are automatically switched. If the zero reset memory is kept "ON", values are written to EEPROM (nonvolatile memory) inside the sensor unit every time the zero reset is performed. The EEPROM can be written up to 100,000 times. Writing for each measurement may result in malfunction. Be careful of the writing life when using the sensor with eco function ON.
11. Eco Function The diagram shows a vertical flow starting from a 'C' icon. It leads to a box with 'Eco' and a 'MODE' button. An arrow points to a box with 'UP/DOWN' and 'oFF'. From 'oFF', an arrow points to a box with 'on'.	Use this function when the power consumption should be saved or detailed values should not be displayed. Eco function disabled Eco function enabled When the eco function is enabled, the display changes to the eco display, turning OFF the digital display, if any operation is not performed for 30 seconds in RUN mode. The normal display returns by pressing any button when the eco function is engaged.
112 Setting Reset The diagram shows a vertical flow starting from a 'C' icon. It leads to a box with 'rSt' and a 'MODE' button. An arrow points to a box with 'UP/DOWN' and 'noP'. From 'noP', an arrow points to a box with 'YES'.	All the settings are reset to the factory default settings. Setting reset cancel Press the button while this message is shown to execute setting reset.

5

Error Messages

Error Name/ Display	Cause (Described in Operation Manual)	Remedy
LD malfunction error E-Ld	Laser diode is deteriorated.	Turn OFF the power and check if the Sensor is correctly wired; and turn ON the power again. If the error persists, the Sensor is faulty. Replace it with a new Sensor.
System error E-545	Sensor is faulty	
EEPROM error 1 E-āE1	Sensor setting memory error	Turn OFF the power and check if the Sensor is correctly wired; and turn ON the power again. If the error persists, the Sensor is faulty. Replace it with a new Sensor.
EEPROM error 2 E-āE2	Sensor setting memory error	Hold the  key for 3 sec. or longer to reset the settings. If the error is not solved, the Sensor is faulty. Replace it with a new Sensor.
Load short-circuit detection error E-ShL	Judgment output short-circuit	Turn OFF the power and check if OUT1/OUT2 lines are not short-circuited; then, turn ON the power again.
Tuning execution error E-tun	Tuning failure	Set the response time to a slower value and retry tuning. Check if the distance between the Sensor and the workpiece is within the measurement range; then retry tuning.
Insufficient incident light level error E-drL	Insufficient incident light level	Delay response time or adjust the distance between Sensor and workpiece so that the S ensor can detect it. The light reception level is equal to or less than the limited sensitivity during background suppression function operation.
Incident light level saturation error E-brL	Measurement error due to saturated incident light level	Avoid regular reflected light from entering into the sensor. The light reception level is equal to or more than the limited sensitivity during background suppression function operation.
Measurement out-of-range error E-our	Measurement value outside the measurement range	Set the distance between the Sensor and workpiece within the measurement range.

6

Ratings and Specifications

Model	NPN output	Pre-wire model	ZX1-LD 50A61	ZX1-LD 50A61L	ZX1-LD 100A61	ZX1-LD 100A61L	ZX1-LD 300A61	ZX1-LD 300A61L	ZX1-LD 600A61	ZX1-LD 600A61L
		Connector joint model	ZX1-LD 50A66	—	ZX1-LD 100A66	—	ZX1-LD 300A66	—	ZX1-LD 600A66	—
	PNP output	Pre-wire model	ZX1-LD 50A81	ZX1-LD 50A81L	ZX1-LD 100A81	ZX1-LD 100A81L	ZX1-LD 300A81	ZX1-LD 300A81L	ZX1-LD 600A81	ZX1-LD 600A81L
		Connector joint model	ZX1-LD 50A86	—	ZX1-LD 100A86	—	ZX1-LD 300A86	—	ZX1-LD 600A86	—
Dimensions			52.5mm x 47mm x 24.1mm				66mm x 50.1mm x 27.2mm			
Measurement range			50 ± 10 mm		100 ± 35 mm		300 ± 150 mm		600 ± 400 mm	
Light source (wavelength)			Visible-light semiconductor laser (660 nm)							
FDA class			class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)
JIS standard IEC/EN class			class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)
Spot diameter (Typical) (Defined at the center of the sensing distance) *1			Dia. 0.17 mm		Dia. 0.33 mm		Dia. 0.52 mm		Dia. 0.56 mm	
Power supply voltage			10 to 30 VDC, including 10% ripple (p-p) Class 2							
Current consumption			250 mA max. (Power supply voltage: 10 VDC)							
Analog output			Current output: 4 to 20 mA, max. load resistance: 300 Ω							
Indications			Digital display (Red), Output indicators (OUT1, OUT2) (Orange), Zero reset indicator (Orange), Menu indicator (Orange), Laser ON indicator (Green), and Smart tuning indicator (Blue)							
Response time	Judgment output	Super high-speed (SHS) mode: 1 ms, High-speed (HS) mode: 10 ms, Standard (STND) mode: 100 ms								
	Laser OFF input	200 ms max.								
	ZERO input	200 ms max.								
Ambient Illumination			Incandescent lamp: 7,500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 7,500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 2,500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 2,500 lux max.
Warming up			30 min. after power ON; analog output fluctuation ± 0.1% F.S. max.							
Linearity *2			±0.15%F.S.		±0.15%F.S.		±0.25%F.S.		±0.25%F.S (Near side) ±0.5%F.S. (All ranges)	
Temperature characteristics *3			±0.03%F.S./°C		±0.03%F.S./°C		±0.03%F.S./°C		±0.04%F.S./°C	
Static resolution *4			2 μm		7 μm		30 μm		80 μm	
Surrounding air temperature			Operating: -10 to +55°C, Storage: -15 to +70°C (with no icing or condensation)							
Ambient humidity			Operating and storage: 35% to 85% (with no condensation)							
Dielectric strength			1,000 VAC, 50/60 Hz for 1 min.							
Vibration resistance			10 to 150 Hz, 1.5-mm double amplitude, 2 hours, each in X, Y, and Z directions							
Shock resistance			500 m/s², 3 times each in X, Y, and Z directions							
Standard cable length *5			2 m (Pre-wired model), 5 m (Pre-wired model)		*7, 0.5 m (Connector-joint model) *7					
Degree of protection *6			IEC 60529, IP67							
Connection method										
Weight (packed state/main unit only)	Pre-wired model (2 m)	Approx. 240 g/Approx. 180 g				Approx. 270 g/Approx. 210 g				
	Connector joint model (0.5 m)	Approx. 170 g/Approx. 110 g				Approx. 200 g/Approx. 140 g				
Materials			Case and cover: PBT (polybutylene terephthalate), Optical window: Glass, Cable: PVC							
Standards			EC standard conformity, RoHS compliance, UL standard conformity							

*1. Spot size: Defined at the 1/e² (13.5%) of the central intensity at the measurement center distance. Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object. Correct measured values may not be obtained if a workpiece with smaller diameter than the spot size is detected.

*2. It shows the error in relation to the ideal curve of the displacement output when measuring OMRON's standard physical object (white ceramic) under the environment at 25°C.

*3. Temperature characteristics at the center of sensing distance when the space between the sensor and workpiece is locked with aluminum jig.

*4. Static definition with the background suppression function ON for tuning with STND mode and standard white ceramic.

*5. Connector-joint model cable: Use it together with a 10 m or 20 m extension cable.

*6. The connector joint model connector section can achieve IP67 if it is connected via an extension cable.

*7. Only 2 m (Pre-wired type) is available for ZX1-LD□□□L.

Judgment outputs	NPN open-collector outputs		PNP open-collector outputs	
	Rated output	30 VDC, 100 mA max resistive.	Rated output	30 VDC, 100 mA max resistive.
External inputs	Residual voltage	1 V max. (Load current ≤10 mA)	Residual voltage	1 V max. (Load current ≤ 10 mA)
	ON	2 V max. (10 mA < Load current ≤ 100 mA)	ON	2 V max. (10 mA < Load current ≤ 100 mA)
External inputs	OFF	Short-circuited with 0-V terminal or 1.5 V or less	OFF	Supply voltage short-circuited or within supply voltage -1.5 V max.
	OFF	Open (Leakage current: 0.1 mA max.)	OFF	Open (Leakage current: 0.1 mA max.)

7

Maintenance: Troubleshooting

The table below describes non permanent hardware errors and their troubleshooting.

Phenomena	Cause	Remedy
No digital display.	Is the Eco function not turned ON?	Turn OFF the Eco function.  Refer to "④ Detailed Settings".
Display is blank.	Is the power supply ON? Are the cables not broken?	Check the wiring, the power supply voltage and capacity.  Refer to "① Installation 1-3".
The Sensor restarts during operation.		
Laser is not emitted.	Is LD OFF input not short-circuited?	Check the wiring.  Refer to "① Installation 1-3".
[LdoFF] appears in the display.		
Input signal is not received.	Individual wires may not be correctly connected; or there may be a broken line.	Check the wiring.  Refer to "① Installation 1-3".
Measured value is not stable, fluctuating depending on the day or time.	Temperature characteristic may be the cause.	Perform warming up at least for 30 minutes. Periodically zero-reset the value using a standard target object for compensation.
[E-drL] appears in the display.	Is the detection distance not too long and out of the measurement range? Is the emitter surface not blocked by dust, dirt or a jig?	Check the Sensor installation environment.
OUT1 indicator/OUT2 indicator blinks.	There may be mutual interference with other sensors.	Check the installation environment and take measures to prevent the interference by other sensors such as laser beam path or reflected stray lights.
OUT1 indicator/OUT2 indicator keeps turning ON even when the values are outside the measurement range.	The Keep function may be set: [KEEP] = [on], and reception light level may be insufficient: [E-drL] or the value may be outside the measurement range: [E-our].	Set the Keep function to: [KEEP] = [on].
An abnormal distance is detected in an area apparently out of the measurement range.	A characteristic phenomenon that can sometimes occur with sensors.	Set the Background Suppression function to: [SbRL] = [on] and perform smart tuning.  Refer to "④ Detailed Settings". Check the measurement distance between the target object and the Sensor.
Want to reset to the initial setting.	—	Reset the settings.  Refer to "④ Detailed Settings".

■ **Serial number**
The serial number "SSSSMYYA" on the label on the product indicates the date of manufacture.
SSSS: identification number
M: Months of production 1-9 for Jan.-Sep., X for Oct., Y for Nov., Z for Dec.
YY: Year of manufacture (last 2 digits of A.D.)
A: Our control number

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.

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