TECHNISCHE INFORMATION

TiM310-1030000S01
Messender und detektierender Laserscanner

Montage, Elektroinstallation, Messwert-ausgabeformat, Lizenztexte

SICK
Sensor Intelligence.

Warenzeichen

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1 Zu diesem Dokument

In diesem Dokument sind ergänzende Informationen zur **Montage** und **Elektroinstallation,** zum **Datenausgabeformat der Messwerte** des TiM310-1030000S01 sowie **Lizenztexte** zusammengefaßt. Die Informationen richten sich an ausreichend qualifiziertes Personal für die Installation, Inbetriebnahme und Datenweiterverarbeitung.

Hinweise zur Inbetriebnahme, Konfiguration und Wartung enthält die Betriebsanleitung des TiM310-1030000S01.

Informationen zum TiM310-1030000S01 finden Sie auch im Internet auf der Produktseite des TiM3xx unter **www.mysick.com/de/tim3xx**:

- Technische Daten im Online-Datenblatt (PDF)
- Maßzeichnung und 3D-CAD-Maßmodelle in verschiedenen elektronischen Formaten
- Reichweitendiagramm (PDF)
- EG-Konformitätserklärung (PDF)
- Konfigurationsoftware SOPAS ET
- Produktinformation mit Übersicht des lieferbaren Zubehörs (PDF)
- Betriebsanleitung TiM3xx (PDF), ggf. in weiteren Sprachen
- Diese Technische Information (PDF)

Unterstützung erhalten Sie auch bei Ihrem Vertriebspartner unter **www.sick.com/weltweit**.

Wichtig **Im Weiteren wird der TiM310-1030000S01 vereinfachend als TiM3xx bezeichnet.**

Verwendete Symbole

Einige Informationen in dieser Dokumentation sind wie folgt hervorgehoben, um den schnellen Zugriff auf diese Informationen zu erleichtern.

HINWEIS

Hinweis!

Ein Hinweis weist auf potenzielle Beschädigungsgefahren oder Funktionsbeeinträchtigungen des TiM3xx oder der daran angeschlossenen Geräte hin.

WARNUNG

Warnhinweis!

Ein Warnhinweis weist auf konkrete oder potentielle Gefahren für die körperliche Unversehrtheit des Anwenders hin. Er soll den Anwender vor Unfällen schützen.

Das Sicherheitszeichen links neben dem Wahrhinweis weist auf die Art der Unfallgefahr, z.B. aufgrund von Elektrizität, hin. Die ansteigenden Warnstufen (VORSICHT, WARNUNG, GEFAHR) weisen auf die Schwere der möglichen Gefahr hin.

➢ Warnhinweise immer aufmerksam lesen und sorgfältig befolgen.

Wichtig Dieser wichtige Hinweis informiert über Besonderheiten.

Dieses Symbol verweist auf ergänzende technische Dokumentationen.

Zu Ihrer Sicherheit

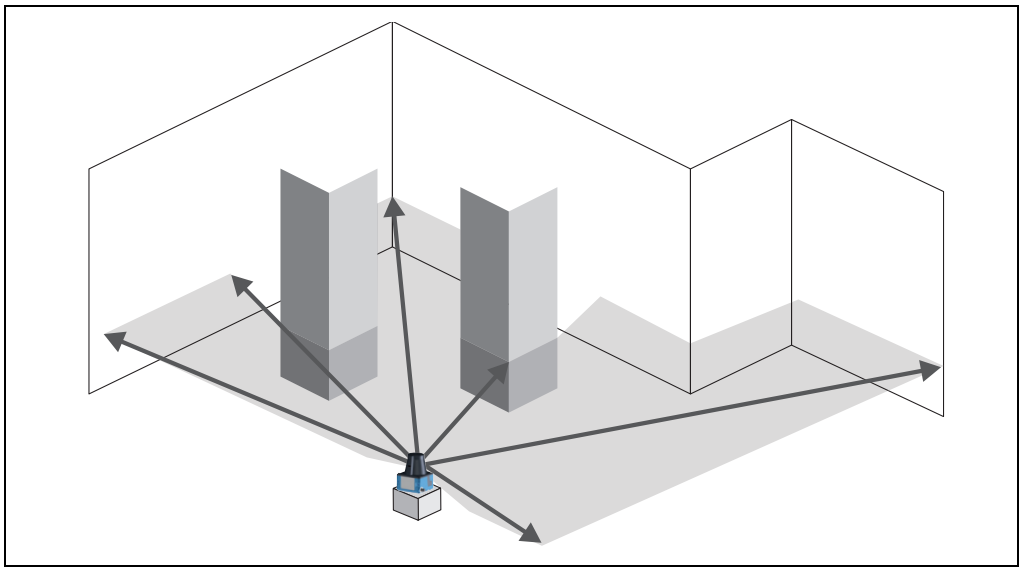
- Lesen Sie die Hinweise zur Montage und Elektroinstallation vor Durchführung der Arbeiten
- Lesen Sie ergänzend die Betriebsanleitung des TiM310-1030000S01 um mit dem Gerät und seinen Funktionen vertraut zu werden.
- Der TiM310-1030000S01 entspricht der Laserklasse 1, siehe Laserwarnhinweis in der Betriebsanleitung.
- Das Gerät nur in zulässigen Umgebungsbedingungen (z.B. Temperatur, Erdpotential) einsetzen. Ggf. sind behördliche und gesetzliche Vorschriften beim Betrieb einzuhalten.
- Das verschraubte Gehäuse des TiM3xx nicht öffnen, da sonst ein Gewährleistungsanspruch gegenüber der SICK AG erlischt.
- Reparaturen am TiM3xx dürfen nur von ausgebildetem und autorisiertem Servicepersonal der SICK AG durchgeführt werden.
- Der TiM3xx ist keine Einrichtung für Personenschutz im Sinne der jeweils gültigen Sicherheitsnormen für Maschinen.

Inhalt

2 Arbeitsweise des TiM3xx

2.1 Messprinzip

Der TiM3xx ist ein opto-elektronischer Laserscanner, der mit Hilfe von Laserstrahlen berührungslos den Umriss seiner Umgebung in einer Ebene abtastet. Der TiM3xx vermisst seine Umgebung in zweidimensionalen Polarkoordinaten, bezogen auf seinen Messursprung. Dieser ist auf der Haube in der Mitte durch einen runde Vertiefung gekennzeichnet. Trifft ein Laserstrahl auf ein Objekt, wird die Position in Form von Strecke und Richtung ermittelt.



Die Abtastung findet in einem Sektor von 270° statt. Die Reichweite beträgt beim TiM3xx maximal 4 m auf helle, natürliche Oberflächen mit einer Objektremission > 50 % (z. B. eine weiße Wand).

2.2 Entfernungsmessung

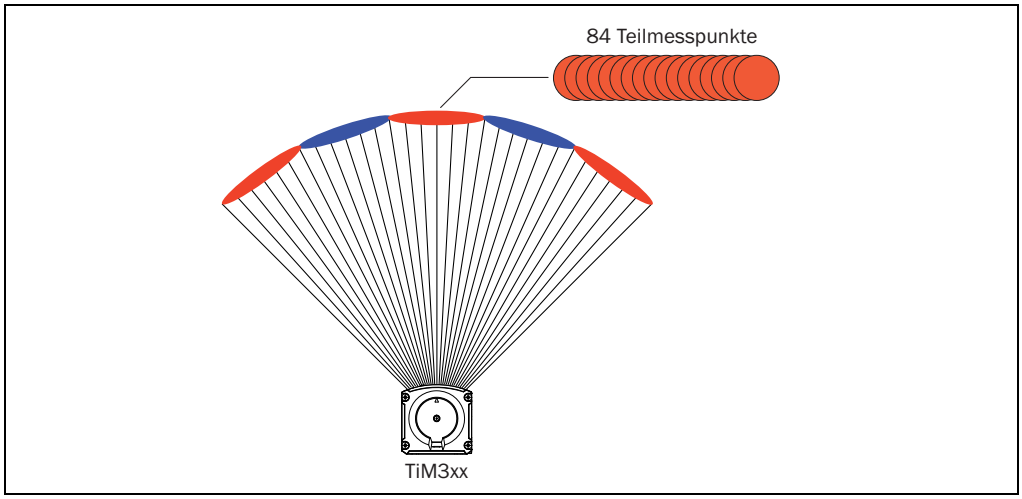
Der TiM3xx sendet mit einer Laserdiode gepulste Laserstrahlen aus. Trifft ein solcher Laserpuls auf ein Objekt oder eine Person, wird er an dessen Oberfläche reflektiert. Die Reflexion wird im Empfänger des TiM3xx von einer Fotodiode registriert. Der TiM3xx nutzt die SICK-eigene HDDM-Technologie (**H**igh **D**efinition **D**istance **M**easurement). Bei diesem Meßverfahren wird ein Messwert durch die Mittelwertbildung mehrerer Einzelpulse gebildet. Aus der Laufzeit, die das Licht von der Aussendung des Strahls bis zum Empfang der Reflexion benötigt, berechnet der TiM3xx die Entfernung zum Objekt. Dieses Prinzip der „Pulslaufzeitmessung“ wird in ähnlicher Form von Radarsystemen benutzt.

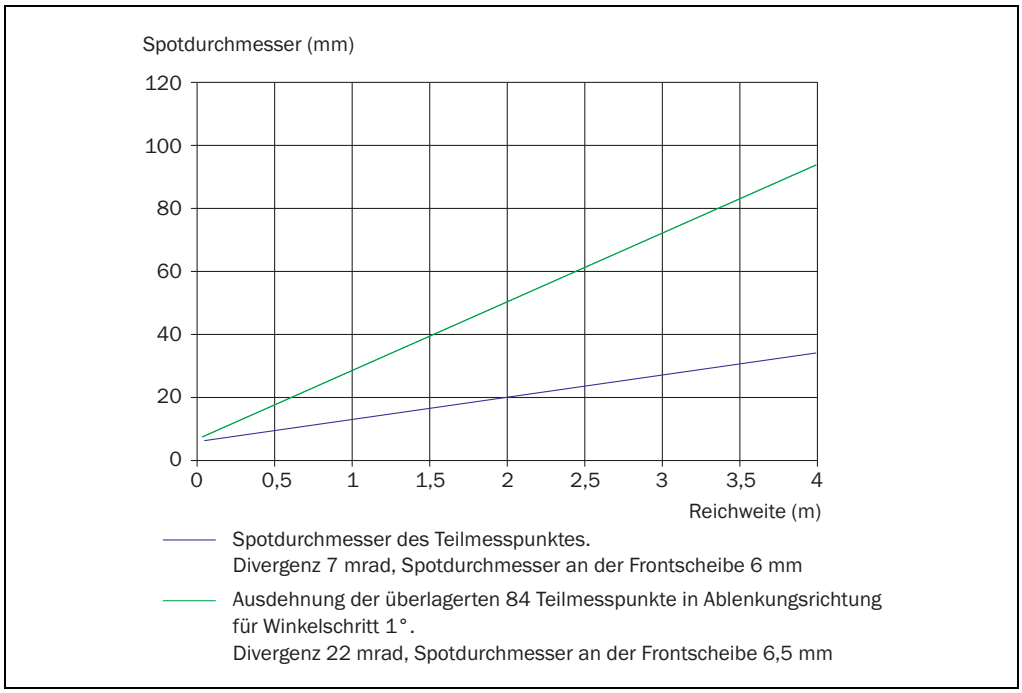
2.3 Richtungsmessung

Mit einem rotierenden Spiegel lenkt der TiM3xx die ausgesendeten Laserstrahlen ab und tastet damit die Umgebung radial ab. Die Messungen werden intern von einem Winkelkodierer in regelmäßigen Winkelschritten ausgelöst. Eine komplette Rotation stellt einen Messvorgang (Scan) dar.

Der TiM3xx arbeitet mit einer Scanfrequenz von 15 Hz, d.h. er durchläuft 15 Messvorgänge pro Sekunde und stellt die Messergebnisse fortlaufend in Echtzeit über die USB-Schnittstelle zur Verfügung.

Das Messverfahren nutzt die Mittelwertbildung aus mehreren Pulsen zur Bestimmung von Einzelmesswerten. Bei einer Winkelauflösung von 1° setzt sich ein Messpunkt aus der Mittelung von 84 Messungen zusammen. Die Spotgeometrie der Teilmesspunkte ist nahezu rund, wobei sich ein Messpunkt durch die Überlagerung als schmales Rechteck ausprägt.





3 Montage

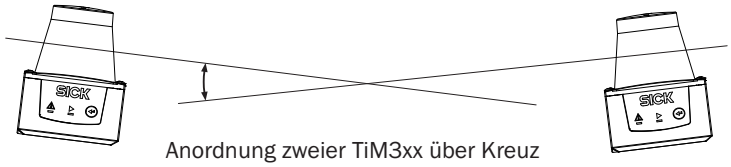
3.1 Hinweise zur Montage

- Der TiM3xx kann, vom Anwendungszweck abhängig, in beliebiger Lage montiert werden.
- Den TiM3xx möglichst erschütterungs- und schwingungsfrei befestigen.
- Den TiM3xx so montieren, dass er keiner direkten Sonnenbestrahlung (Fenster, Oberlicht) oder anderen Wärmequellen ausgesetzt ist. Damit wird ein unzulässiger Temperaturanstieg im Inneren des Geräts verhindert.

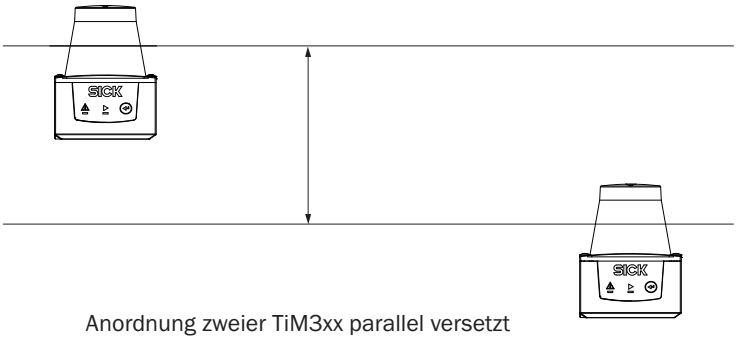
Verwendung mehrerer TiM3xx

Der TiM3xx ist so konstruiert, dass die gegenseitige Beeinflussung gleicher Sensortypen sehr unwahrscheinlich ist. Um auch geringste Einflüsse auf die Messgenauigkeit auszuschließen, empfehlen wir, die TiM3xx wie in den folgenden Beispielen zu montieren.

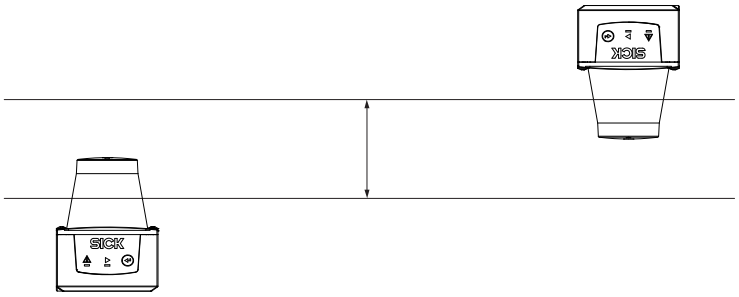
Anordnung zweier TiM3xx gegenüberliegend



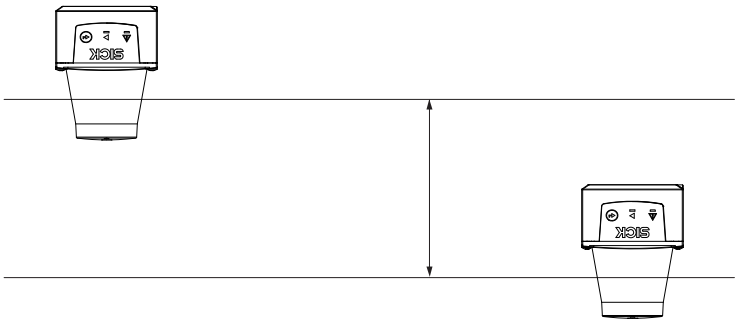
Anordnung zweier TiM3xx über Kreuz



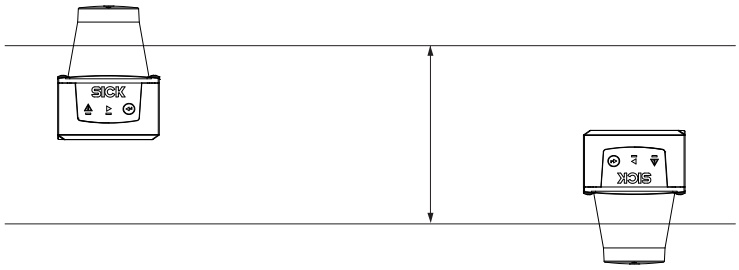
Anordnung zweier TiM3xx parallel versetzt



Anordnung zweier TiM3xx parallel versetzt, einer über Kopf



Anordnung zweier TiM3xx über Kopf, parallel versetzt

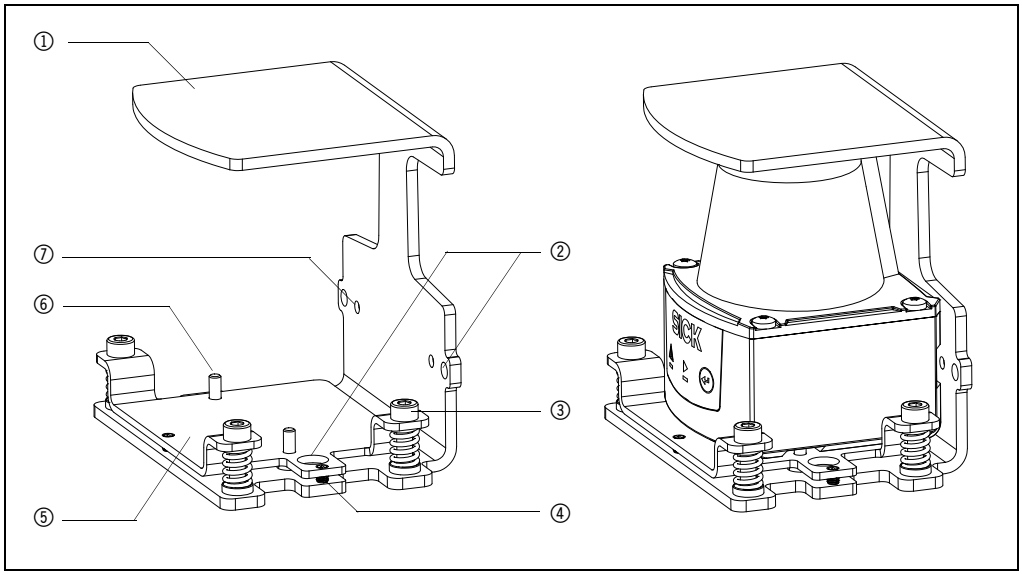


Anordnung zweier TiM3xx parallel versetzt, einer über Kopf

3.2 Optionales Zubehör

3.2.1 Befestigungssatz 2 (Artikel-Nr. 2061776) am TiM3xx montieren

Der Befestigungssatz 2 in Bügelform dient als Halterung mit Feinjustagemöglichkeit der Scanebene sowie als Rammschutz. Der TiM3xx kann ohne die Adapterplatte auch direkt an der Halterung befestigt werden (nur Rammschutz).



① Haltewinkel

② Bohrung ∅ 4,3 mm zur waagrechten oder senkrechten Befestigung des Haltewinkels auf einer Unterlage, 2 x 2

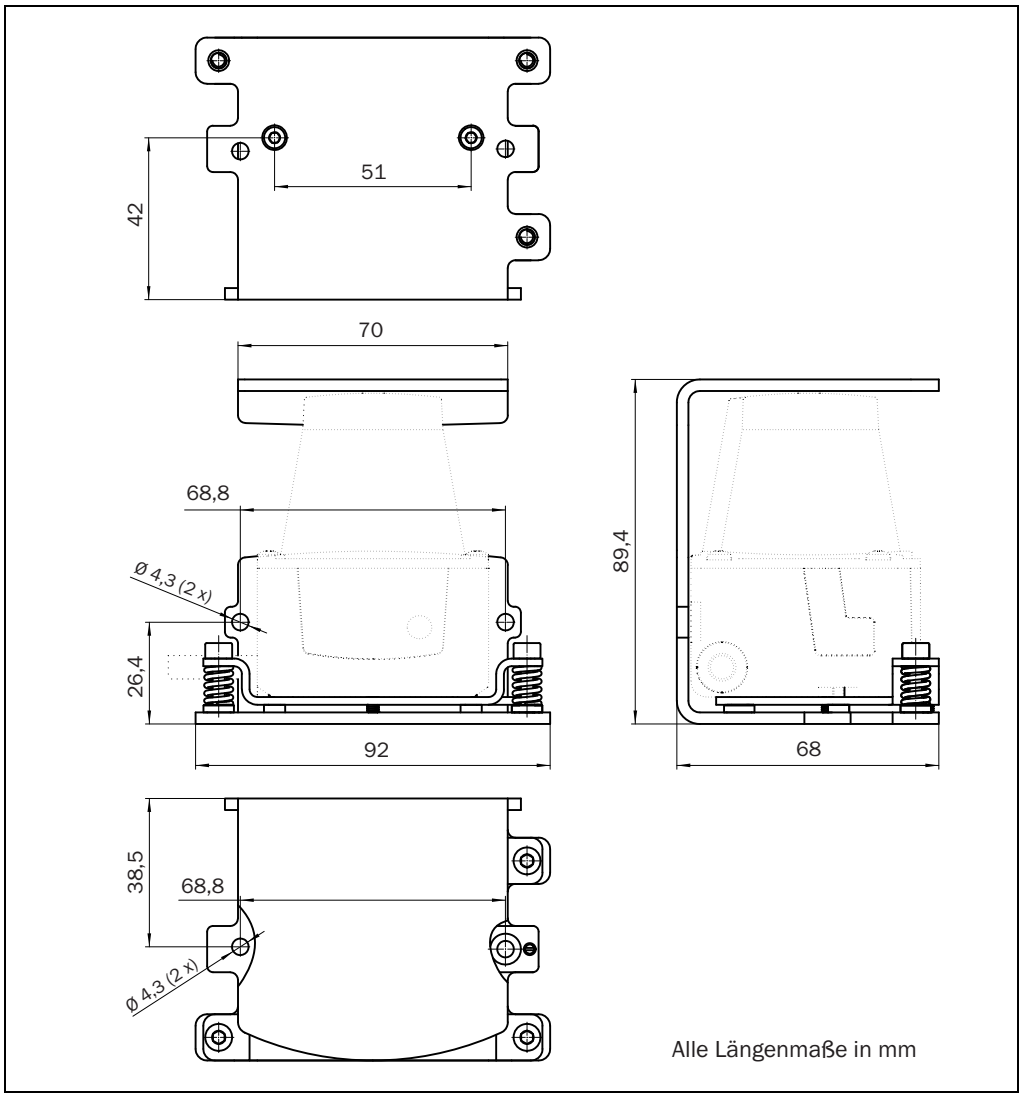
③ Zylinderkopfschraube M4 x 16 (Innensechskant) und Druckfeder zur Ausrichtung des TiM3xx, 3 x

④ Stiftschraube zur Arretierung der Adapterplatte nach Ausrichtung, 2 x

⑤ Adapterplatte

⑥ Zylinderkopfschraube M3 x 8 in Bohrung ∅ 3,2 mm zur Befestigung des TiM3xx an der Adapterplatte, 2 x

⑦ Bohrung ∅ 3,2 mm zur Befestigung des TiM3xx direkt am Haltewinkel, 2 x (alternativ, ohne Justagemöglichkeit der Scanebene)



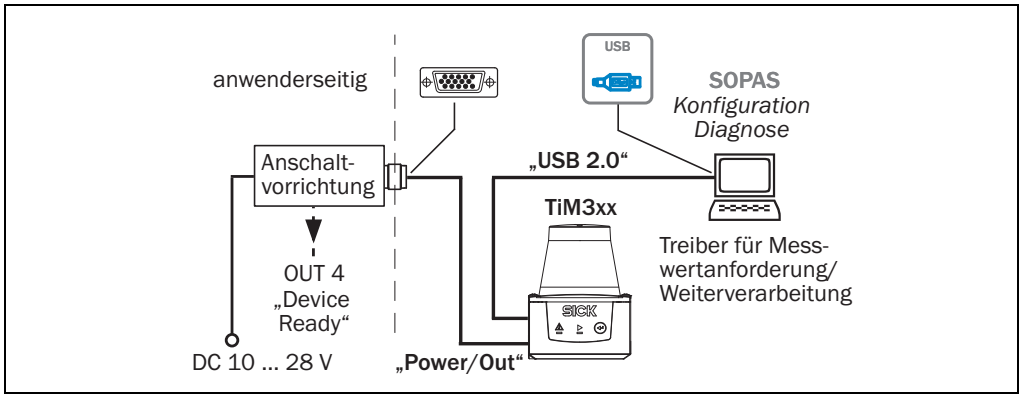
Vorgehensweise für den Anbau des TiM3xx

1. TiM3xx mit Hilfe der zwei beiliegenden Schrauben M3 x 8 an der Adapterplatte befestigen. Hierzu die Schrauben von unten durch die Bohrung im Haltewinkel und die Bohrung in der Adapterplatte einführen.
2. Scanebene des TiM3xx mit Hilfe der drei Zylinderkopfschrauben ③ ausrichten.
3. Nach der Justage die Adapterplatte mit Hilfe der beiden Stiftschrauben ④ gegen den Haltewinkel verriegeln (arretieren).

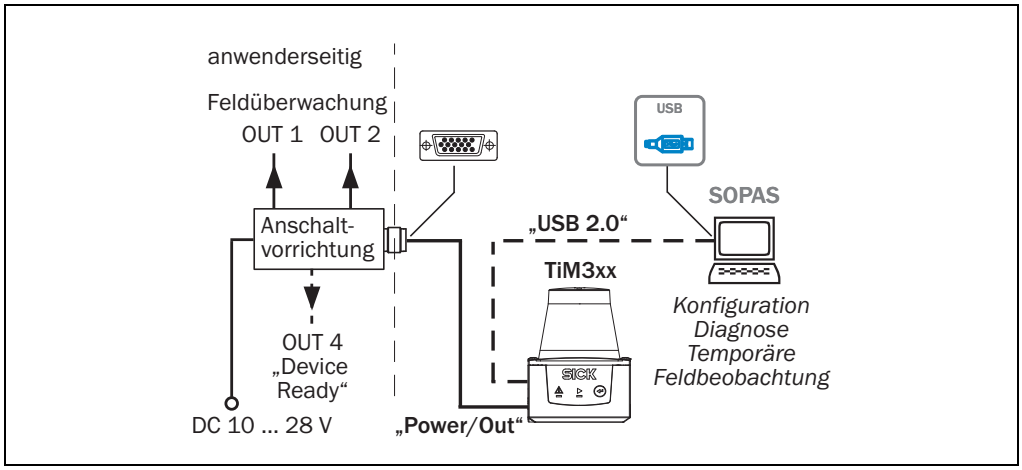
4 Elektroinstallation

4.1 Übersicht aller Schnittstellen

Messender Betrieb

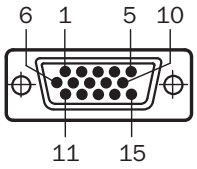


Feldüberwachung



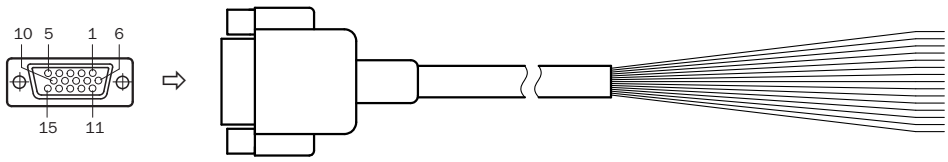
4.2 Pin- und Aderfarbelegungen

15-pol. D-Sub-HD-Leitungsstecker



Pin	Signal	Aderfarbe	Funktion
1	DC 10 ...28 V	rot	Versorgungsspannung
2	n.c.	violett	–
3	n.c.	gelb	–
4	OUT 4	rot + schwarz	Schaltausgang 4 (Device Ready/Index/Fehler)
5	GND	schwarz	Ground (Masse)
6	n.c.	hellblau	–
7	n.c.	dunkelblau	–
8	Reserviert	türkis oder hellgrau	–
9	Reserviert	grün	–
10	Reserviert	grau	–
11	Reserviert	rosa	–
12	OUT 1	braun	Schaltausgang 1 (Feldverletzung)
13	OUT 2	orange	Schaltausgang 2 (Feldverletzung)
14	Reserviert	weiß	–
15	Reserviert	weiß + schwarz	–
–	–	metall	Schirm
Reservierte Pins nicht beschalten!			

4.2.1 Adpaterleitung Nr. 2043413 mit 15-pol. D-Sub-HD-Buchse und offenem Ende (optionales Zubehör)



D-Sub-HD-Buchse
Ansicht von vorne

Pin	Signal	Aderfarbe	Funktion
1	DC 10 ... 28 V	rot	Versorgungsspannung
2	n.c.	violett	–
3	n.c.	gelb	–
4	OUT 4	rot + schwarz	Schaltausgang 4 (Device Ready/Index/Fehler)
5	GND	schwarz	Ground (Masse)
6	n.c.	hellblau	–
7	n.c.	dunkelblau	–
8	Reserviert	türkis oder hellgrau	–
9	Reserviert	grün	–
10	Reserviert	grau	–
11	Reserviert	rosa	–
12	OUT 1	braun	Schaltausgang 1 (Feldverletzung)
13	OUT 2	orange	Schaltausgang 2 (Feldverletzung)
14	Reserviert	weiß	–
15	Reserviert	weiß + schwarz	–
–	–	metall	Schirm
Reservierte Pins/Adern nicht beschalten!			

4.3 Hinweise zur Elektroinstallation

- Den TiM3xx bei geöffneter Abdeckung der USB-Buchse oder angeschlossener USB-Leitung vor Feuchtigkeit und Staub schützen. Der TiM3xx entspricht in diesem Zustand keiner spezifizierten Schutzart IP.
  Die mitgelieferten Dichtung für den USB-Anschluss als vorbeugenden Schutz gegen Feuchtigkeit und Staub verwenden!
- Beim Betrieb der USB-Schnittstelle darauf achten, dass es durch äußere ESD-/EMV-Einflüsse zu Störungen der Datenübertragung kommen kann.
- Elektrische Verbindungen zwischen dem TiM3xx und anderen Geräten nur im spannungsfreien Zustand herstellen oder lösen. Ansonsten kann es zu Beschädigungen der Geräte kommen.
- Alle Anschlussleitungen am TiM3xx dürfen jeweils eine Länge von 3 m nicht überschreiten, um die CE-Konformität zu gewährleisten.
- Aderquerschnitte der kundenseitig zuführenden Versorgungsleitung gemäß gültiger Normen wählen und ausführen.
- Den TiM3xx mit einer externen Sicherung von 0,8 A träge am Anfang der Versorgungsleitung aus Sicht der Stromversorgung absichern.
- Sämtliche am TiM3xx angeschlossene Stromkreise müssen als SELV- oder PELV-Stromkreise ausgeführt werden (SELV = **S**afety **E**xtra **L**ow **V**oltage = Sicherheitskleinspannung, PELV = **P**rotective **E**xtra **L**ow **V**oltage = Schutzkleinspannung).
- Bei Anfertigung einer Anschaltvorrichtung mit einer 15-pol. D-Sub-HD-Buchse die reservierten Pins nicht beschalten (z.B. als Lötstützpunkt)!
- Versorgungsspannung für den TiM3xx erst nach Abschluss der Anschlussarbeiten und sorgfältiger Prüfung der Verdrahtungsarbeiten einschalten.

4.4 Voraussetzungen für den sicheren Betrieb des TiM3xx in einer Anlage

Der TiM3xx ist auf elektrische Sicherheit gemäß EN 60950-1 (2006-04)/A11 (2009-03) ausgelegt und geprüft.

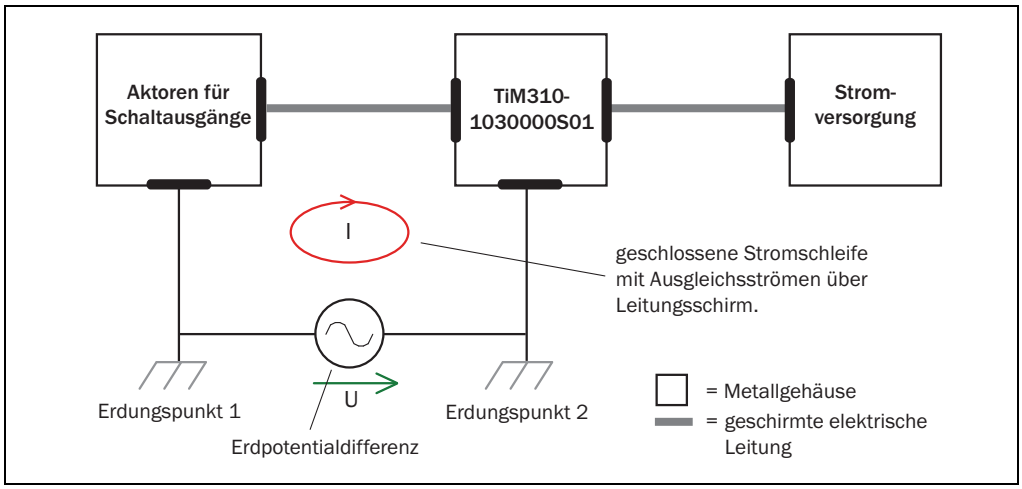
Er wird über geschirmte Leitungen an die Peripheriegeräte (Stromversorgung, EDV, Aktoren) angeschlossenen. Der Leitungsschirm z.B. der Versorgungsleitung liegt dabei an dem Metallgehäuse des TiM3xx auf. Das Gerät kann entweder über den Leitungsschirm oder über die beiden Befestigungslaschen geerdet werden.

Falls die Peripheriegeräte Metallgehäuse besitzen und die Leitungsschirme ebenfalls an deren Gehäuse aufliegen, wird davon ausgegangen, dass alle beteiligten Geräte in der Installation das **gleiche Erdpotential** haben.

Dies erfolgt durch die Einhaltung z.B. der folgenen Bedingungen:

- Montage der Geräte auf leitende Metallflächen
- Fachgerechte Erdung der Geräte/Metallflächen in der Anlage
- Niederimpedanter und stromtragfähiger Potentialausgleich zwischen Bereichen mit unterschiedlichen Erdpotentialen, falls erforderlich.

Sind diese Bedingungen nicht erfüllt, z.B. bei Geräten innerhalb eines weit verteilten Systems über mehrere Gebäude, können Potentialausgleichströme über die Leitungsschirme zwischen den Geräten aufgrund unterschiedlicher Erdpotentiale fließen und zu Gefahren führen.



Aufgrund des unzureichenden Erdpotentailausgleichs entstehen Spannungsdifferenzen zwischen den Erdungspunkten 1 und 2. Über die geschirmten Leitungen/Metallgehäuse schließt sich die Stromschleife.

GEFAHR

Verletzungsgefahr/Beschädigungsgefahr durch elektrischen Strom!

Potentialausgleichsströme zwischen dem TiM3xx und anderen geerdeten Geräten in der Anlage können ggf. folgende Auswirkungen haben:

- Gefährliche Spannungen am Metallgehäuse z.B. des TiM3xx
- Fehlverhalten oder die Zerstörung der Geräte
- Schädigung/Zerstörung des Leitungsschirms durch Erhitzung sowie Leitungsbrände

➢ Wo die örtlichen, ungünstigen Gegebenheiten ein sicheres Erdungskonzept (gleiches Erdpotential in allen Erdungspunkten) nicht erfüllen, Maßnahmen gemäß den nachfolgenden Ausführungen durchführen.

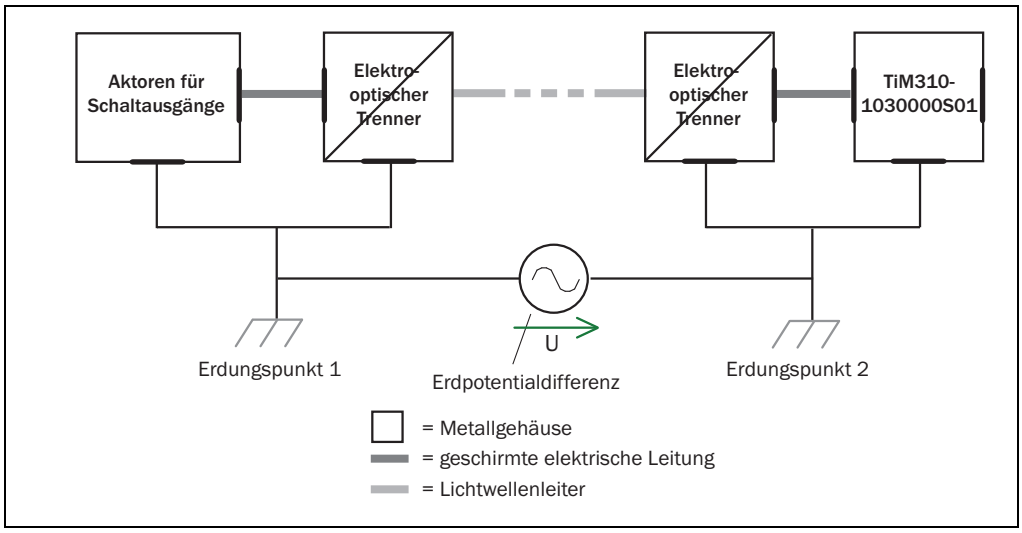
Abhilfemaßnahmen

Die vorrangige Lösung für das Vermeiden von Potentialausgleichsströmen auf den Leitungsschirmen ist die Sicherstellung eines niederimpedanten und stromtragfähigen Potentialausgleichs. Ist dieser nicht realisierbar, dienen die folgenden beiden Lösungsansätze als Vorschlag.

Wichtig Es wird ausdrücklich davon abgeraten, die Leitungsschirme aufzutrennen. Mit dieser Maßnahme kann die Einhaltung der EMV-Grenzwerte der Geräte nicht mehr gewährleistet werden.

a) Massnahmen bei räumlich weitverteilten Systeminstallationen

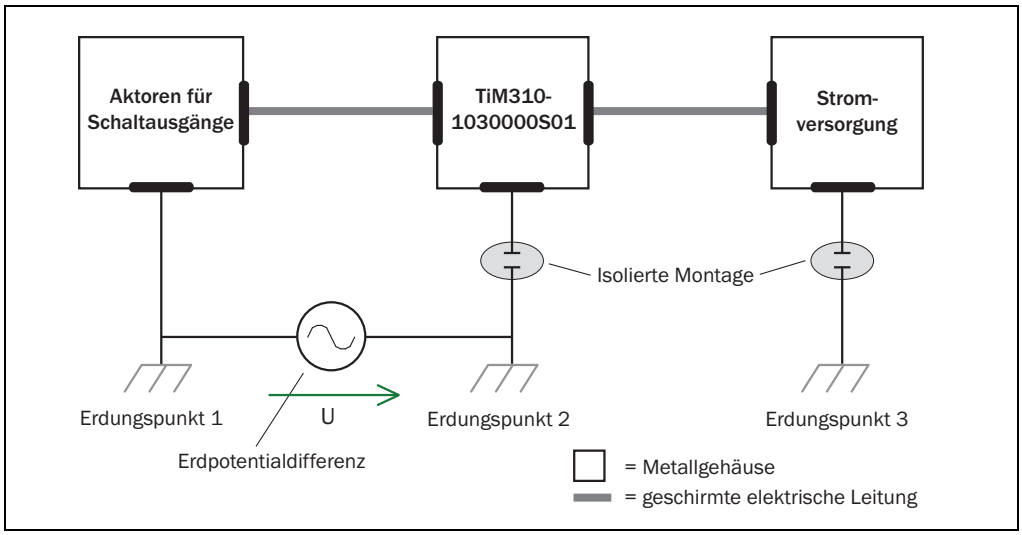
Bei räumlich weit verteilten Systeminstallationen, mit entsprechend großen Potentialunterschieden, wird der Aufbau lokaler Inseln und die Verbindung dieser Inseln über kommerziell erhältliche **elektro-optische Signaltrenner** empfohlen. Mit dieser Maßnahme wird ein Höchstmaß an Robustheit gegenüber elektromagnetischen Störungen erreicht, bei gleichzeitiger Einhaltung sämtlicher Anforderungen der EN 60950-1.



Durch den Einsatz der elektro-optischen Signaltrenner zwischen den Inseln wird die Erdschleife aufgetrennt. Innerhalb der Inseln werden durch einen tragfähigen Potentialausgleich Ausgleichsströme auf den Leitungsschirmen verhindert.

b) Massnahmen bei kleinen Systeminstallationen

Bei kleineren Installationen mit nur geringen Potentialunterschieden kann die isolierte Montage des TiM3xx und der Peripheriegeräte eine hinreichende Lösung sein.



Erdschleifen werden, selbst bei hohen Erdpotentialdifferenzen wirksam verhindert. Dadurch fließen keine Ausgleichsströme mehr über die Leitungsschirme und Metallgehäuse.

Wichtig Die Stromversorgung für den TiM3xx sowie die angeschlossene Peripherie müssen dann ebenfalls die erforderliche Isolation gewährleisten.

Unter Umständen kann zwischen den isoliert montierten Metallgehäusen und dem örtlichen Erdpotential ein berührbares Potential entstehen.

4.5 Installationsschritte

4.5.1 Anschluss der Versorgungsspannung

Der TiM3xx benötigt eine Versorgungsspannung DC 10 ... 28 V (stabilisierte Funktionskleinspannung [SELV oder PELV] nach der Norm IEC 60364-4-41 [VDE 0100 Teil 410]).
Die Stromquelle muss mind. 5 W Leistung abgeben können.

GEFAHR

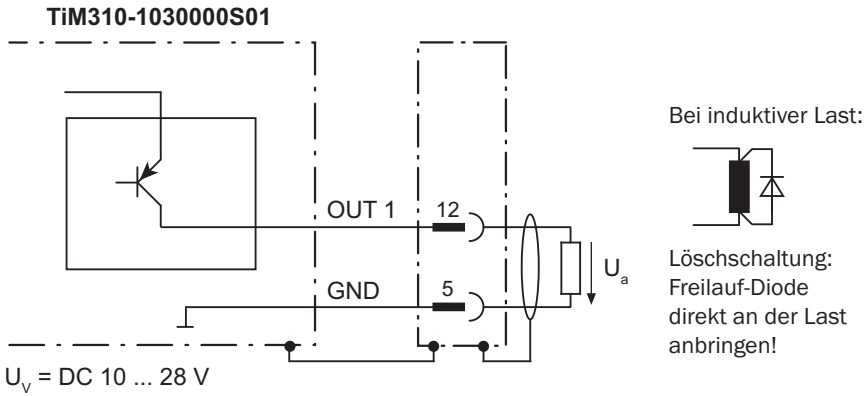
Verletzungsgefahr durch elektrischen Strom!

Wird die Versorgungsspannung durch Entnahme und Wandlung von Strom aus dem Wechelstromnetz mit Hilfe eines stabilisierten Netzgerät erzeugt, kann mangelhafte elektrische Trennung zwischen Eingangs- und Ausgangskreis zu einem Stromschlag führen.

➢ Nur ein Netzgerät verwenden, dessen Ausgangskreis gegenüber dem Eingangskreis eine sichere elektrische Trennung durch Doppelisolation und Sicherheitstransformator nach IEC 742 (VDE 0551) besitzt.

4.5.2 Beschaltung der Schaltausgänge OUT 1, OUT 2 und Out 4

Die Schaltausgänge OUT 1 und OUT 2 signalisieren in Kombination die Verletzung der beiden Felder. Der Ausgang OUT 4 dient der Ausgabe des Signals „Device Ready“, eines Fehlers und eines regelmäßigen Indeximpulses.



Aufbau und Beschaltungsprinzip der Ausgänge
OUT 2 (Pin 13) und OUT 4 (Pin 4) wie Ausgang OUT 1

Die Kenndaten der Schaltausgänge sind identisch.

Schaltverhalten	PNP-schaltend gegen die Versorgungsspannung U_V. • OUT 1 und OUT 2: Ruhepegel: High (keine Feldverletzung), Arbeitspegel: Low (Feldverletzung) Ansprechzeit: 134 ms ... 30 s (über SOPAS ET einstellbar) Haltezeit: 0 ms ... 10 s (über SOPAS ET einstellbar) • OUT 4: Ruhepegel: High (Device Ready), Arbeitspegel: Low (Fehler), Low-Impuls (15 Hz, Index, entspricht Messung bei 90°)
Eigenschaften	– Kurzschlussfest und temperaturgeschützt – Galvanisch nicht getrennt von der Versorgungsspannung U_V
Elektrische Werte	$0\ V \leq U_a \leq U_V$ Garantiert: $(U_V - 1{,}5\ V) \leq U_a \leq U_V$ bei $I_a \leq 100$ mA

Wichtig Längere Anschlussleitungen an den Schaltausgängen des TiM3xx sind aufgrund des auftretenden Spannungsfalls zu vermeiden. Dieser berechnet sich wie folgt:

$$\Delta U = \frac{2 \times \text{Länge} \times \text{Strom}}{\text{Leitwert} \times \text{Querschnitt}}$$

Leitwert für Kupfer: 56 $m/\Omega\ mm^2$.

5 Messwertausgabe

5.1 Telegramme

Notation

Die einzelnen Teile in der Syntax der Telegramme des TiM3xx sind jeweils durch ein Leerzeichen (ASCII-Code 32, 20h) getrennt, wie auch in der Anfrage an denTiM3xx erforderlich.

Der TiM3xx sendet Messwerte wie folgt aufbereitet:

- Werte mit vorangestelltem Vorzeichen „+“ oder „–“ als Dezimalwert (ASCII-Notation)
- Werte ohne vorangestelltes Vorzeichen „+“ oder „–“ als Hexadezimal-Wert (ASCII-Notation)
- Die verschiedenen Notationen können innerhalb des Telegramms gemischt sein
- Alle folgende Telegrammbeispiele beziehen sich auf das CoLa-A-Protokoll

Variablentypen

In der Beschreibung des Messwertausgabetelegramms sind die Variablentypen angegeben, folgende Variablentypen sind möglich:

Variablentyp	Länge (Byte)	Wertebereich	Vorzeichen
uint_8	1	0 ... 255	Nein
uint_16	2	0 ... 65.535	Nein
uint_32	4	0 ... 4.294.967.295	Nein
int_32	4	–2.147.483.648 ... +2.147.483.647	Ja
float_32	4	$-10^{-44,85}$ ... $+10^{38,53}$	Ja
string	Kontextabhängig	Wichtig: Strings werden nicht nullterminiert	

Wichtig

- Die Angaben in der Tabellenspalte „Länge“ beziehen sich auf die binäre Übertragung der numerischen Werte.
- Die Angaben in der Tabellenspalte „Wertebereich“ beziehen sich auf den für den Variablentyp mathematisch möglichen Wertebereich. Die tatsächlich Wertebereiche der Parameter können davon abweichen, siehe auch *Kapitel 5.3 Messwertausgabefomat, Seite 23*.

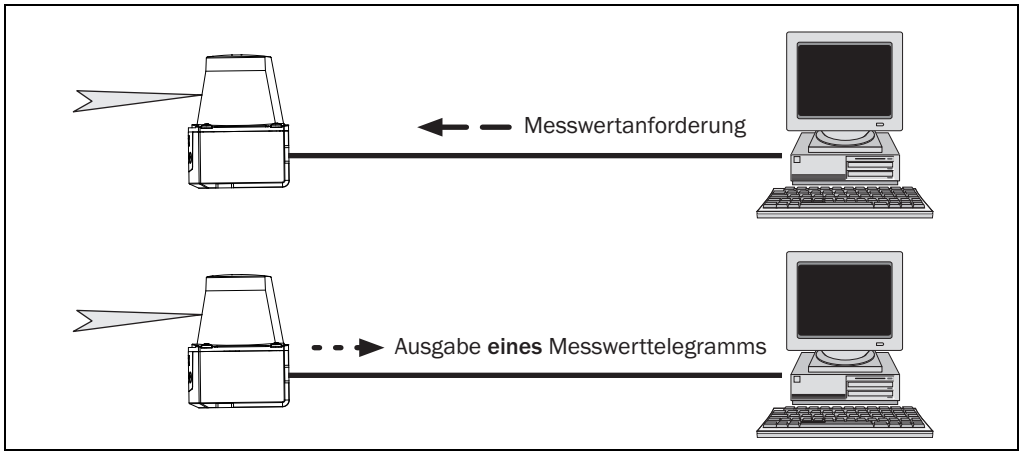
5.2 Messwertanforderung

Nach dem Einschalten der Versorgungsspannung initialisiert sich der TiM3xx und zeigt danach seine Betriebsbereitschaft mit dem Leuchten der grünen LED ▶ an.
Der TiM3xx startet seine Messbereitschaft automatisch. Mit einer Frequenz von 15 Hz scannt er fortlaufend die Umgebungskontur in seinem Sichtbereich. Die ermittelten Werte pro Messvorgang (Scan) legt er in seinem Messwertspeicher fortlaufend ab, in dem er die vorherigen Werte überschreibt.

5.2.1 Einmalige Messwertausgabe

Bei Anforderung der Daten eines Messvorganges sendet der TiM3xx die Messwerte des zuletzt ausgeführten Scans.

Beispiel für einmalige Messwertausgabe



Anforderung:

<STX>sRN LMDscandata<ETX>

Antwort des TiM3xx:

<STX>sRA LMDscandata (Inhalt siehe *Kapitel 5.3 Messwertausgabefomat, Seite 23*)
<ETX>

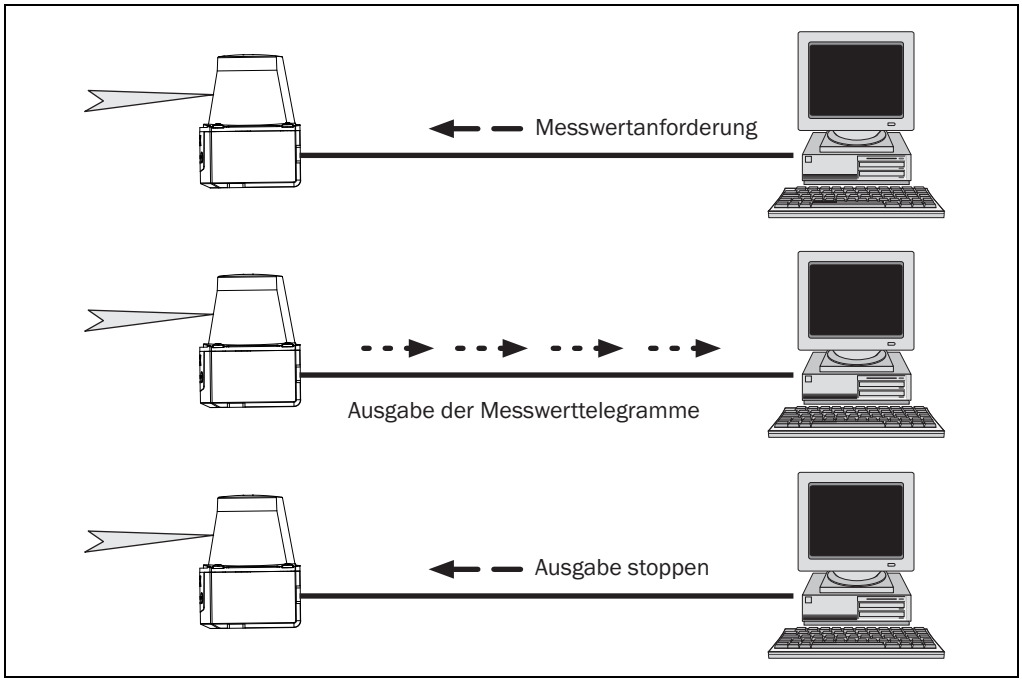
Telegrammaufbau: **sRN LMDscandata**

Telegrammteil	Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
Kommandoart	Anfrage (SOPAS read by name)	string	3	**sRN**
Kommando	Anforderung von Daten	string	11	**LMDscandata**

5.2.2 Fortlaufende Messwertausgabe

Bei Anforderung der Daten von fortlaufenden Messvorgängen sendet der TiM3xx solange Messwerte von aufeinanderfolgenen Scans, bis die Messwertausgabe mit dem gleichen Telegramm wieder gestoppt wird.

Beispiel für fortlaufende Messwertausgabe



1. Messwertausgabe starten

Anforderung:

<STX>sEN LMDscandata 1<ETX>

Antwort des TiM3xx (Bestätigung der Anforderung):

<STX>sEA LMDscandata 1<ETX>

Antwort des TiM3xx (Messdatenausgabe):

<STX>sSN LMDscandata (Inhalt siehe *Kapitel 5.3 Messwertausgabefomat, Seite 23*) <ETX>

2. Messwertausgabe stoppen

Anforderung:

<STX>sEN LMDscandata 0<ETX>

Antwort des TiM3xx (Bestätigung der Anforderung):

<STX>sEA LMDscandata 0<ETX>

Telegrammaufbau: **sEN LMDscandata** MessungStartStopp

Telegrammteil	Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
Kommandoart	Anfrage (SOPAS event by name)	string	3	**sEN**
Kommando	Anforderung von Daten	string	11	**LMDscandata**
MessungStartStopp		Enum8	1	**0** Messwertausgabe stoppen **1** Messwertausgabe starten

5.3 Messwertausgabefomat

Wichtig In der folgenden Tabelle ausgraute Informationen gibt der TiM3xx nicht aus.

Telegrammteil		Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
	Kommandoart	Anfrage (**S**OPAS **r**ead **a**nswer/ **S**OPAS **s**ent **e**vent)	string	3	**sRA**/**sSN**
	Kommando	Anforderung von Daten	string	11	**LMDscandata**
	Versionsnummer	Versionsinformation der Firmware	uint_16	2	**0000h ... FFFFh**
Geräteinformation	Gerätenummer	Geräte-ID wie mit SOPAS ET konfiguriert	uint_16	2	**0000h ... FFFFh**
	Seriennummer	Seriennummer ab Werk	uint_32	4	**00000000h ... FFFFFFFFh**
	Gerätestatus	Status des TiM3xx	uint_x	2 x 1	**00 00h** Gerät OK **00 01h** Gerätefehler
Statusinformation	Telegrammzähler	Zähler, beginnend mit dem ersten Messwerttelegramm (zyklische Daten) nach Bestätigung der Messwertanforderung. Bei Erreichen der oberen Grenze beginnt der Zähler wieder bei 0 (= 1. Telegramm).	uint_16	2	**0000h** 0 **FFFFFh** 65.535
	Scanzähler	Zähler, beginnend mit dem ersten Scan nach Bestätigung der Messwertanforderung. Bei Erreichen der oberen Grenze beginnt der Zähler wieder bei 0 (= 1. Scan).	uint_16	2	**0000h** 0 **FFFFFh** 65.535
	Einschaltdauer	Zeitdauer seit dem Einschalten des TiM3xx bis zum Zeitpunkt des Scanendes; in Mikrosekunden (µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 4.294.967.295
	Übertragungsdauer	Zeitdauer seit dem Einschalten des TiM3xx bis zum Zeitpunkt der Telegrammaussendung; in Mikrosekunden (µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 4.294.967.295
	Eingangsstatus	Das niederwertigste Byte gibt bitweise den Zustand der digitalen Schalteingänge wieder. Das niederwertigste Bit entspricht dem Eingang 1.	uint_x	2 x 1	**00 00h** alle Schalteingänge aus
	Ausgangsstatus	Das niederwertigste Byte gibt bitweise den Zustand der digitalen Schaltausgänge wieder. Das niederwertigste Bit entspricht dem Ausgang 1.	uint_x	2 x 1	**00 00h** alle Schaltausgänge aus **00 0Bh** alle Schaltausgänge ein
	Reserviertes Byte A	Reserviert	uint_16	2	–
Messparameter	Scanfrequenz	Angabe in 1/100 Hz	uint_32	4	**1500** 15 Hz
	Messfrequenz	Frequenz zwischen zwei einzelnen Messungen in 100 Hz	uint_32	4	**00000000h ... FFFFFFFFh**

Telegrammteil		Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
Anzahl Drehgeber		Gibt an, wieviele Drehgeber Daten ausgeben	uint_16	2	**0** kein Drehgeber (kann nicht geändert werden)
Dregeber	Drehgeberposition	Angabe in Ticks	uint_32	4	**00000000h ... FFFFFFFFh**
	Drehgebergeschwind-digkeit	Angabe in Ticks/mm	uint_16	2	**0000h ... FFFFh**
Anzahl Kanäle 16 Bit		Gibt an, in wievielen 16-Bit-Ausgabekanälen der TiM3xx Messdaten ausgibt. Wird „0 Ausgabekanäle“ gewählt, gibt der TiM3xx keine Daten aus.	uint_16	2	**1** Der TiM3xx gibt die Abstands-werte als 16-bit-Wert über einen Kanal aus
Ausgabekanäle 1 ... 4 (16 Bit)	Messdateninhalt	Der Telegrammteil bestimmt den Inhalt des Ausgabeka-nals.	string	5	**DIST1** Radialer Abstand des ersten Reflexionsimpulses
	Skalierungsfaktor	Multiplikator für die Werte in den Telegrammteilen Daten_1 bis Daten_n	float_32	4	**00000000h ... FFFFFFFFh**
	Skalierungsoffset	Bei TiM3xx immer 0	float_32	4	**00000000h ... FFFFFFFFh**
	Startwinkel	Angabe in 1/10.000 Grad	Int_32	4	–450.000 ... + 2.250.000
	Winkelschrittweite	Angabe in 1/10.000 Grad	uint_16	2	10.000 (1 Grad)
	Anzahl Daten	Gibt an, wieviele Messdaten der TiM3xx ausgibt	uint_16	2	271
	Daten_1 ... Daten_n	Ausgabe der Messwerte 1 bis n. Der Inhalt und die Einheit ist abhängig vom Telegramm-teil „MessdatenInhalt“. DIST in mm	uint_16	2	**0000h ... FFFFh**
Anzahl Kanäle 8 Bit		Gibt an, in wievielen 8-Bit-Ausgabekanälen der TiM3xx Messdaten ausgibt. Wird „0 Ausgabekanäle“ gewählt, gibt der TiM3xx keine Daten aus.	uint_16	2	**1** Der TiM3xx gibt die RSSI-Werte als 8-bit-Wert über einen Kanal aus
Ausgabekanäle 1 ... 4 (8 Bit)	Messdateninhalt	Der Telegrammteil bestimmt den Inhalt des Ausgabeka-nals.	string	5	**RSSI1** Remissionswertes des ersten Reflexionsimpulses
	Skalierungsfaktor	Multiplikator für die Werte in den Telegrammteilen Daten_1 bis Daten_n	float_32	4	**00000000h ... FFFFFFFFh**
	Skalierungsoffset	Bei TiM3xx immer 0	float_32	4	**00000000h ... FFFFFFFFh**
	Startwinkel	Angabe in 1/10.000 Grad	Int_32	4	–450.000 ... + 2.250.000
	Winkelschrittweite	Angabe in 1/10.000 Grad	uint_16	2	10.000 (1 Grad)
	Anzahl Daten	Gibt an, wieviele Messdaten der TiM3xx ausgibt	uint_16	2	271
	Daten_1 ... Daten_n	Ausgabe der Messwerte 1 bis n. Der Inhalt und die Einheit ist abhängig vom Telegramm-teil „MessdatenInhalt“. DIST in mm, RSSI in digits	uint_8	1	**00h ... FFh**
RSSI = Received Signal Strength Indicator					

(Forts.)

Telegrammteil		Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
Position		Gibt an, ob der TiM3xx Positionsdaten ausgibt	uint_16	2	**0** keine Positionsdaten (kann nicht geändert werden)
Positionsinformationen	X-Position	XNKoordinate des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	Y-Position	YNKoordinate des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	Z-Position	ZNKoordinate des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	X-Rotation	XNRotation des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	Y-Rotation	YNRotation des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	Z-Rotation	ZNRotation des Sensors in einem Koordinatensystem	Real	4	**00000000h ... FFFFFFFFh**
	Rotationstyp	Art der Rotation	Enum8	1	**0** keine Rotation **1** Pitching **2** Rolling **3** freie Rotation
Name		Gibt an, ob der TiM3xx den mit SOPAS ET konfigurierten Gerätenamen ausgibt	uint_16	2	**0** kein Gerätename (kann nicht geändert werden)
	Gerätename	Flexibler Bereich von 0 bis 16 Zeichen (20h ... FFh)	string	0 ... 16	.....
Kommentar		Gibt an, ob der TiM3xx den mit SOPAS ET konfigurierten Kommentar ausgibt	uint_16	2	**0** kein Kommentar (kann nicht geändert werden)
	Kommentarinhalt	Konfigurierter Kommentar	string	0 ... 128	.....
Zeitangaben		Gibt an, ob der TiM3xx Zeitinformationen ausgibt	uint_16	2	**0** keine Zeitinformationen (kann nicht geändert werden)
Zeitinformationen	Jahr	Jahreszahl (4-stellig)	uint_16	2	**0000h ... 270Fh**
	Monat	Monat (1 bis 12)	uint_8	1	**00h ... 0Ch**
	Tag	Tag des Monats (1 bis 31)	uint_8	1	**00h ... 1Fh**
	Stunde	Stunde (0 bis 23)	uint_8	1	**00h ... 17h**
	Minute	Minute (0 bis 59)	uint_8	1	**00h ... 3Bh**
	Sekunde	Sekunde (0 bis 59)	uint_8	1	**00h ... 3Bh**
	Mikrosekunde	Mikrosekunden (0 bis 999.999)	uint_32	4	**00000000h ... 000F423Fh**

(Forts.)

Telegrammteil		Beschreibung	Variablentyp	Länge (Byte)	Wertebereich
Ereignisinformation		Gibt an, ob der TiM3xx Ereignisinformationen ausgibt	unit_16	2	**0** keine Ereignisinformationen (kann nicht geändert werden)
Ereignisinformationen	Ereignistyp	Fast digital input event	string	4	FDIN
	Drehgeberposition	Position des Drehgebers zum Zeitpunkt des Ereignisses, Angabe in Ticks	uint_32	4	**00000000h ... FFFFFFFFh**
	Ereigniszeitpunkt	Zeitdauer seit dem Einschalten des Sensors bis zum Zeitpunkt des Ereignisses, Angabe in Mikrosekunden (µs)	uint_32	4	**00000000h** 0 **FFFFFFFFh** 68.719.476.735
	Winkelposition	Winkelposition des Sensors zum Zeitpunkt des Ereignisses, Angabe in 1/10.000 Grad	int_32	4	–450.000 ... + 2.250.000

(Forts.)

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4. Dropbear - 0.52.tar.bz2

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- Simon Tatham

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5. OpenSSH - 5.1p1

5.1 Cryptographic attack detector for ssh - source code

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