



LMS4000 – HOW TO SYNCHRONIZE TWO OR MORE LMS4000

SICK
Sensor Intelligence.

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In this tutorial, we'll show you how to synchronize two or more LMS4000

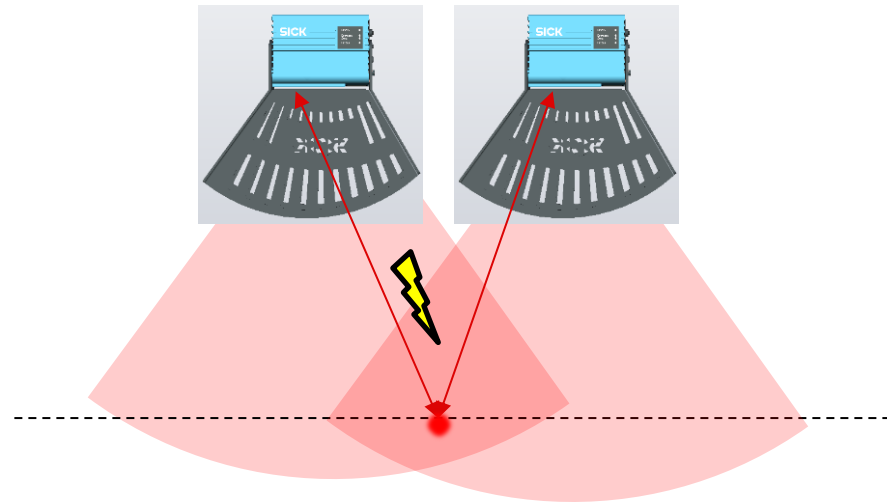
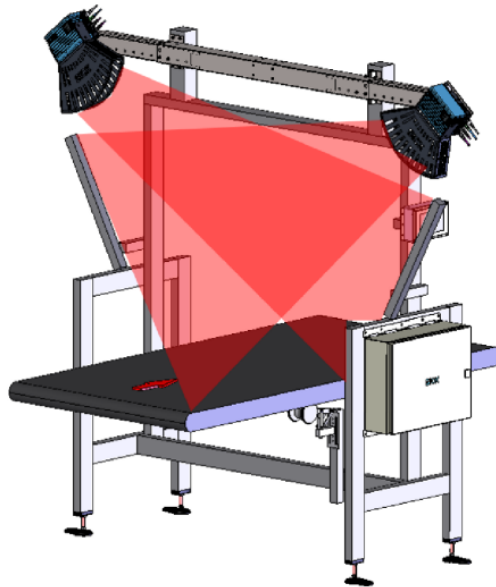
What you need:

- 2 x LMS4000 & Wiring cable ([Link](#))
 - SOPAS ET ([Link](#))
-

SYNCHRONIZE TWO OR MORE LMS4000

BASICS

The LMS4000 provides the possibility to synchronize the motors respectively the laser beam position to **minimize the mutual interference while using two or more LMS4000 in the same application.**



Also refer to the manual: **3.5.8 - Motor synchronization for measuring range extension**

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WIRING

- 1 Connect the motor-sync I/Os and the sensors to be synchronized using shielded cables.
- 2 Viewed from the front, define the device located furthest to the left as the master (set the corresponding parameter value in the Interfaces view in the SOPAS ET soft- ware)

Master

(configured by SOPAS ET)



Slave 1

(configured by SOPAS ET)



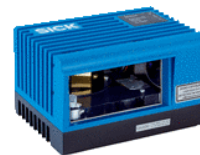
Slave 2

(configured by SOPAS ET)



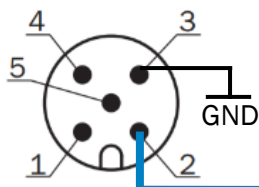
Slave n

(configured by SOPAS ET)

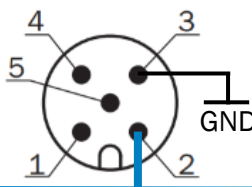


Pin	Description
1	Vs 24V DC $\pm 25\%$
2	Motor Sync
3	Ground
4	IN2/OUT2
5	OUT4

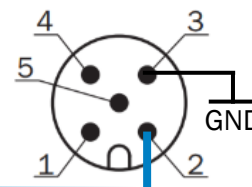
Power connection



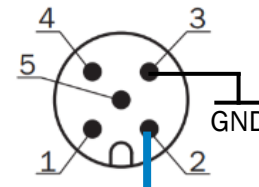
Power connection



Power connection



Power connection



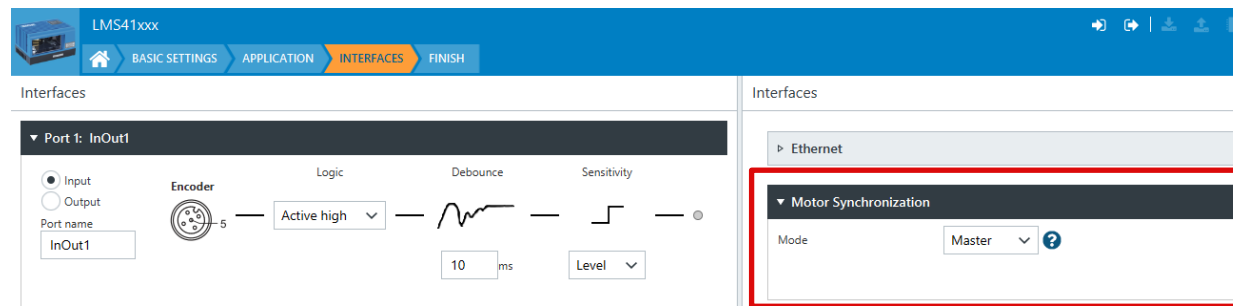
The master device distributes a rectangular signal with 600 Hz and very small tolerances.

The slaves receive the rectangular signal and steer their motors accordingly (depends on the SOPAS settings)

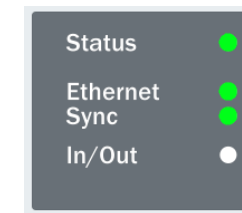
SYNCHRONIZE TWO OR MORE LMS4000 SOAPS ET

- 3 Configure all other connected devices as slaves and set the angle of rotation of each device relative to the master as the phase. After a few seconds, the Sync LED on the slave lights are permanently green. The devices are now synchronized.

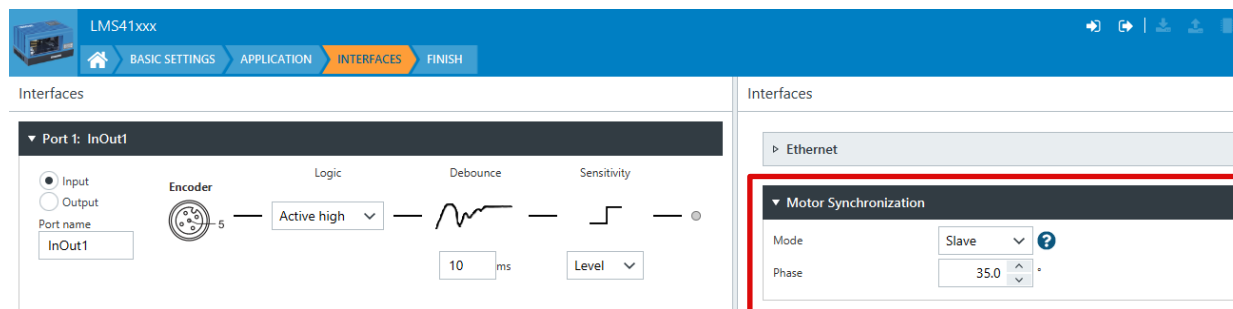
Master



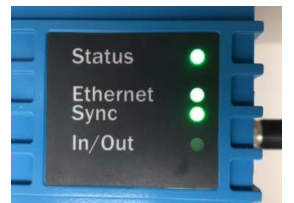
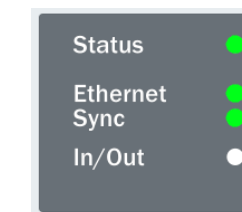
SOPAS ET / Device



Slaves



SOPAS ET / Device



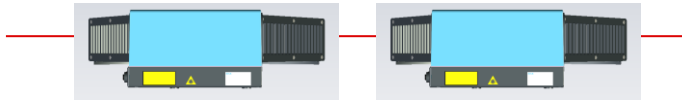
Note: The phase specifies the angular offset by which the slave motor lags behind the master motor

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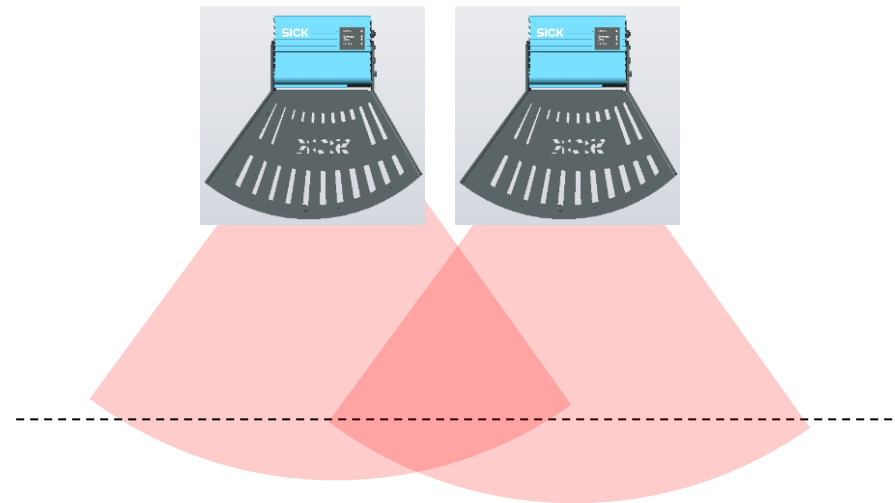
FURTHER NOTES

- The slave devices do not send feedback to the master. The Sync LED on the master lights up as soon as the sync signal is sent. The Sync LED on the slave starts flashing as soon as a sync signal is received and lights up permanently once the motors have been synchronized.
- If devices are mounted exactly in parallel (angle of rotation = 0°), the default setting for the phase at the slave can usually be left unchanged at 0° .

(top view)



(front view)



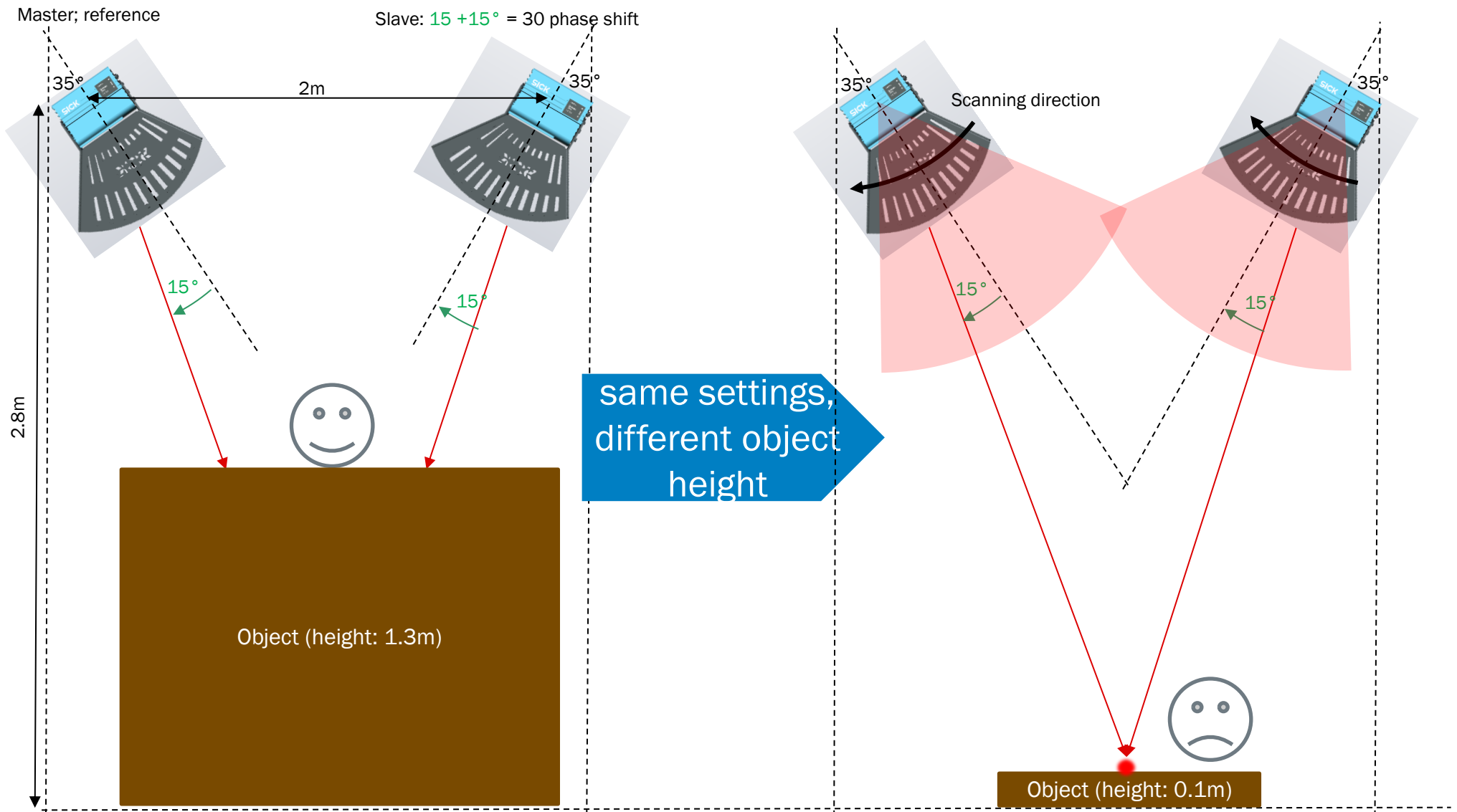
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FURTHER NOTES

- The maximum phase angle is 80° ; this is approximately equivalent to the angle at which the laser exits the device. Inside the device, the covered angle is 120° .
- For devices that are mounted at a specific angle of rotation in relation to each other, direct dazzle can be excluded through motor synchronization. Reflection can occur at certain angles depending on the distance between devices and the measuring distance to the object. Although these effects can be reduced by adjusting the phase, if the objects being scanned are of different heights they cannot be ruled out completely.
- See next slide for a better illustration

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FURTHER NOTES



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FURTHER NOTES

- There is no fixed upper limit on the number of devices that can be synchronized via the master signal. However, the total length of the transmission cables must not exceed 20 m.
- The same and a good ground connection is important.
- You can mix different device types. Therefore it is possible to synchronize LMS4111 and LMS4121, as well.
- There is no connection box or special connector to sync two or more devices.
- It is **not** possible to synchronize a LMS400 and a LMS4000.
- If you use multiple devices in one system and you don't want to use the motor synchronization feature we recommend a minimum laser line distance of 7cm.



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FURTHER NOTES

- The sync signal does not indicate the actual motor frequency. It's a stable signal provided by the masters FPGA.
- The sync pin of the master is a push-pull output with a maximum current of 100mA
- The sync pin of the slaves needs a minimum current of 1mA
- Avoid 2 master in one system

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WARNING

Device info

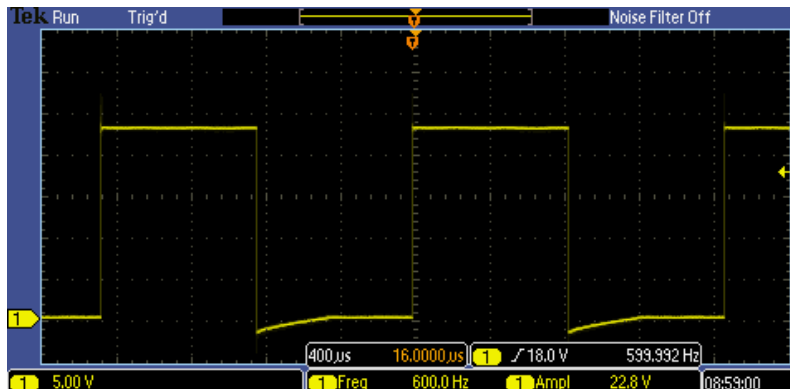
I/O

System state

Device not available

Date	Time of appearance	Message-ID	Description	State
01.01.1970	00:10:54	45	Warning No synchronisation signal. Please check wiring or master configuration	Active

- There will be a warning message if a slave can not sync itself to a master. The device will change to state “orange - Device not available”
 - Check connection
 - Check grounding; both devices need the same GND reference.
 - Check SOPAS ET settings
 - Check sync signal (we expect a signal like this)





For technical questions please use:

<https://supportportal.sick.com/>