

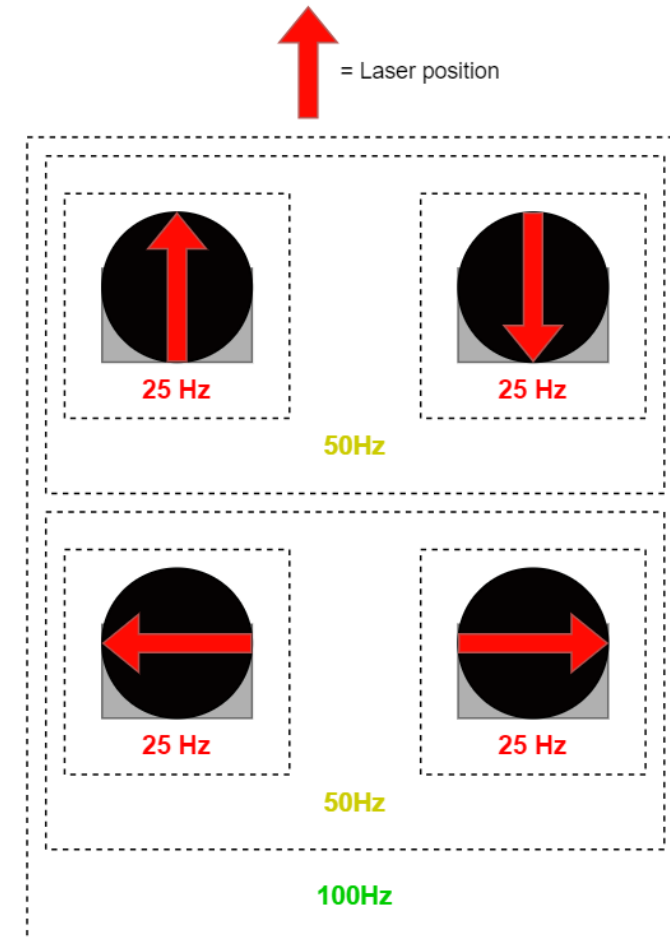
# LRS4000

Motor Synchronization



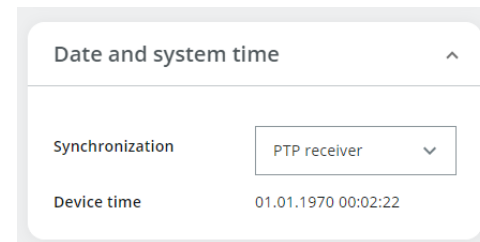
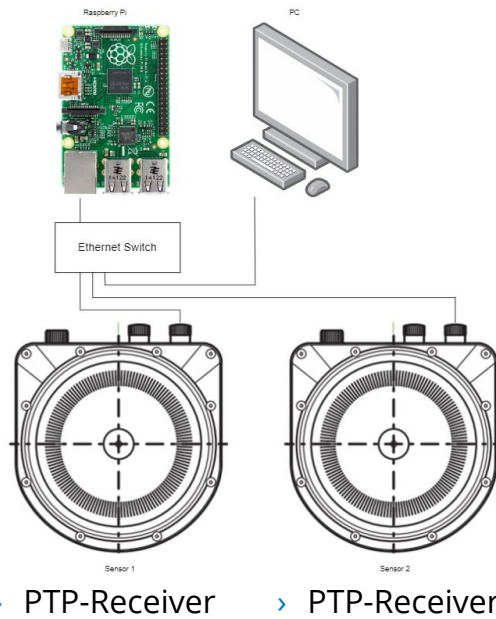
# Objective of motor synchronization

- Combine Multiple LRS4000 to improve scan frequency
  - Motors of Sensors are synchronized by PTP time source



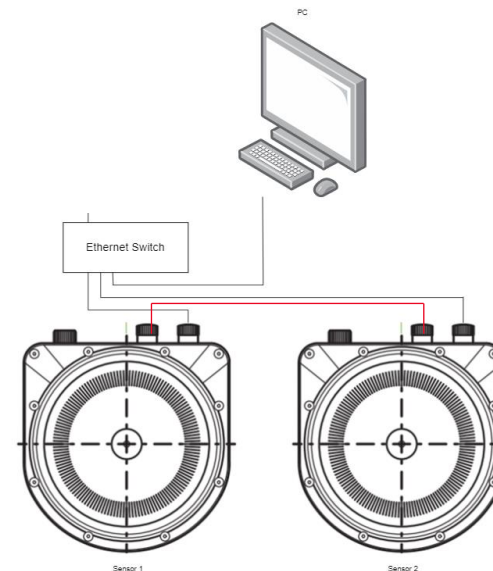
## External PTP-Transmitter

- PTP-Transmitter in local network provides time
- All LRS4000 in PTP-Receiver mode



## Sync by wire

- One LRS4000 is configured to output its index signal to digital out
- This signal is connected to IN1 (Encoder A) of the other Sensors.



# Sync by Wire

- Configuration of the Index Signal

The screenshot displays the SICK web interface for configuring inputs and outputs. The main content area is titled "Inputs and outputs" and contains three sections for InOut3 | Port3, InOut4 | Port4, and InOut5 | Port5. The InOut3 | Port3 section is highlighted with a red border and shows the following configuration:

- Port name: InOut3
- Input/Output: Output (selected)
- Sources: Index signal
- Buttons: Add source

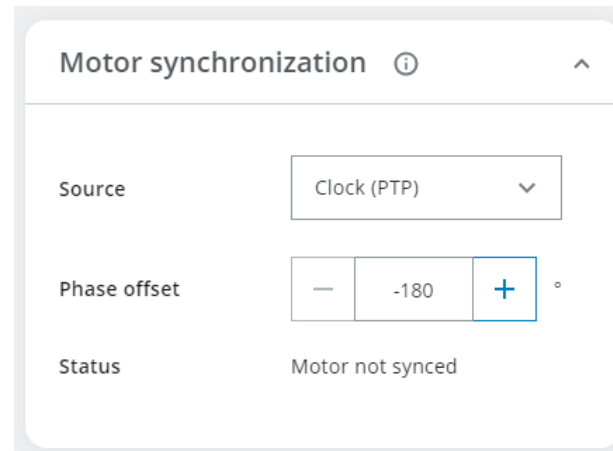
The InOut4 | Port4 and InOut5 | Port5 sections show more complex configurations with various settings like Inverted, Restart, Status (log.), Logic, Output mode, and Status (phys.).

On the right side of the interface, there are two panels:

- Counter values:** Includes a "Reset counters" button.
- Encoder:** Includes settings for Incremental input (Encoder), Encoder settings (Off), Encoder resolution (10,000), and Current speed (0.000).

# Settings and Status

- The phase offset for each Sensor needs to be set and saved permanently in the GUI (-180° to +180°)
- The following possible stati are possible
  - Sync source not present:
    - In ptp mode: PTP is not synced or the sync offset is higher than +-1ms
    - In encoder mode: No Signal at digital IN1
  - Motor not synced: The rotation is not synced to the internal device clock
  - Synced: Everything is fine and synced



# Synchronization of time stamp and motor synchronization

Selection for sync source of time stamp, PTP receiver or NTP client.  
PTP must be selected for motor synchronization by PTP.

**Date and system time** ^

Synchronization: PTP receiver v

Device time: Off, NTP client, PTP receiver

**Motor synchronization** ^

Source: Clock (PTP) v

Phase offset: - 90 + °

Status: Synced ●

Selection of sync source for the motor synchronization,  
PTP or hardwire method

**Motor synchronization** ⓘ ^

Source: Clock (PTP) v

Phase offset: - 90 + °

Status: Sync source not present ●

**LED display** v

# Indication of sync status by LED color

Date and system time ^

Synchronization PTP receiver ▼

Device time 02.04.2023 16:49:58

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Motor synchronization ⓘ ^

Source Clock (PTP) ▼

Phase offset - 180 + °

Status Synced ●

**Device synced**

Date and system time ^

Synchronization PTP receiver ▼

Device time 02.04.2023 18:30:34

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Motor synchronization ⓘ ^

Source Clock (PTP) ▼

Phase offset - 90 + °

Status Sync source not present ●

**Sync source not present**

Date and system time ^

Synchronization PTP receiver ▼

Device time 02.04.2023 18:31:44

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Motor synchronization ⓘ ^

Source Clock (PTP) ▼

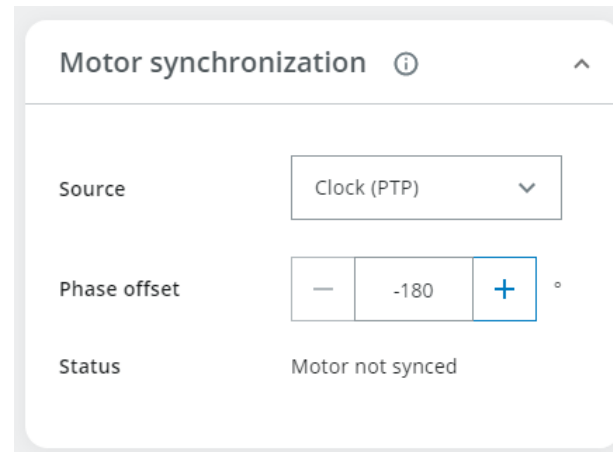
Phase offset - 90 + °

Status Motor not synced ●

**Motor not synced**

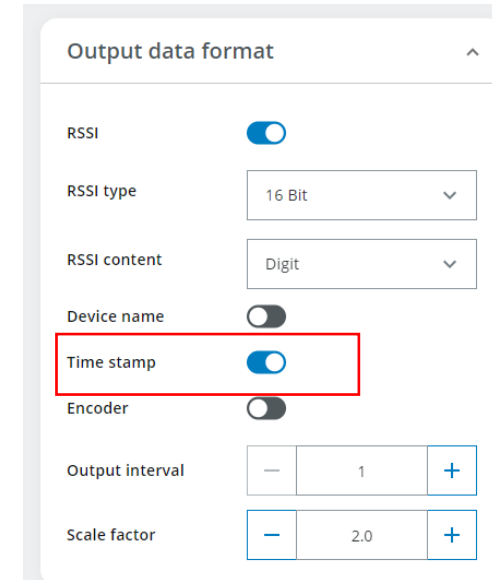
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- The following possible statuses is possible
  - Sync source not present:
    - In ptp mode: PTP is not synced or the sync offset is higher than +/-1ms
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# Scandata timestamps (PTP)

- When working with scandata from time-synced Sensors, it is important to work with the correct timestamps.
- Make sure the system timestamp is transmitted by enabling the „Time stamp“ toggle.
- „Time info“ in LMDscandata is calculated at transmission. Calculate the actual scan start timestamp with:  
„Time info“ - („Time of transmission in  $\mu$ s“ - „Time since start up in  $\mu$ s“)
- Be aware of integer overflows in long running scenarios



		scans were really done.					
Status Info	Time since start up in $\mu$ s	Counting the time since power up the device; starting with 0. In the output telegram this is the time at the zero index before the measurement itself starts.	Uint_32	4	All	0h ... FFFFFFFFh	00 00 00 00 ... FF FF FF FF
	Time of transmission in $\mu$ s	Time in $\mu$ s when the complete scan is transmitted to the buffer for data output; starting with 0 at scanner bootup.	Uint_32	4	All	0h ... FFFFFFFFh	00 00 00 00 ... FF FF FF FF

					4000		
Time Info	Year	1970 to 2037	Uint_16	2	All	7B2h ... 07F5h	07 B2 ... 07 F5
	Month	1 to 12	Uint_8	1	All	0h ... Ch	00 ... 0C
	Day	Day of month 1 to 31	Uint_8	1	All	0h ... 1Fh	00 ... 1F
	Hour	0 to 23	Uint_8	1	All	0h ... 17h	00 ... 17
	Minute	0 to 59	Uint_8	1	All	0h ... 3Bh	00 ... 3B
	Micro-second	0 to 999999	Uint_32	4	All	0h ... 000F423Fh	00 00 00 00 ... 00 0F 42 3F

# Accuracy

- Typical angular error for static application  $< 5^\circ$
- Maximum error for static application  $< 10^\circ$

## Recommended Accessoires

We recommend to use a cable (6050689, 6054491, 6054490) in combination with a configurable Connector (2097337)

Name	Part Number	Info
YM2A68-200UA7XLEAX	6050689	Cable M12 8-pin Cable Stainless Steel Connector - <b>20 m</b>
YM2A68-050UA7XLEAX	6054491	Cable M12 8-pin Cable Stainless Steel Connector - <b>5 m</b>
YM2A68-100UA7XLEAX	6054490	Cable M12 8-pin Cable Stainless Steel Connector - <b>10 m</b>
YM12ES8-0050S5586A	2097337	Plug Connector Stainless Steel

