

# Irinos IR-TFV

Digital data acquisition for inductive probes



- Interface for 8 inductive probes Tesa halfbridge, Knäbel IET, Solartron LVDT, Feinprüf / Mahr or Marposs. Others on request.
- Very high accuracy and stability
- Synchronous data acquisition up to 10.000 measurement values / s (all channels simultaneously)
- Expandable with other Irinos-Boxes via ILink-Interface
- Integrated XSync-Technology: synchronous sine-generation to avoid interference among inductive probes
- Available with integrated ethernet interface for direct connection to PC



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# Irinos IR-TFV

## Proven measurement technology

The measurement electronic of the Irinos-Box IR-TFV is based on more than 30 years of experience with conditioners for inductive probes. These are worldwide recognized for their high accuracy and measurement stability.

Each measurement channel has its own input amplifier, using high-class analogue components. Data acquisition is done synchronously (no multiplexing required).

The measurement method uses the whole sine signal of the inductive probe. Compared to the widely used 1- or 2-point measurement, this method provides superior noise immunity.

## Pre-calibration

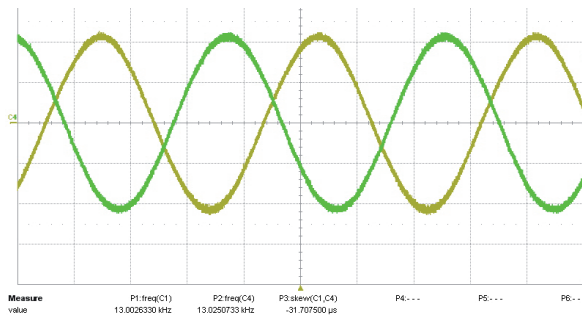
All measurement channels are pre-calibrated for the respective inductive probe type. Calibration of the Irinos-Box by the user is not required.

This enables an easy installation and a quick replacement of the Irinos-Box by an identical one.

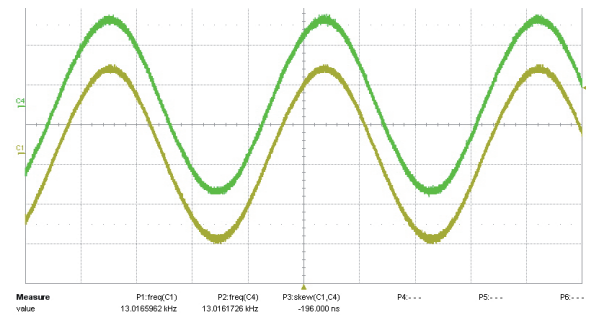
## XSync-Technology

If cabling is difficult, e.g. in miniature measurement devices, phase-shifted sine-signals can cause noise on the measurement signals.

The XSync-Technology ensures that the sine-signals of all Irinos-Boxes are in phase.



Without XSync-Technology



XSync-Technology active



# Irinos IR-TFV

## Expansion

Multiple Irinos-Boxes can be connected via the ILink-Interface. It does not matter, whether they are of the same type IR-TFV or for other measurement inputs (e.g. for incremental encoders).

The ILink-Interface contains three different functionalities:

- Data-exchange between Irinos-Boxes
- Synchronisation of multiple Irinos-Boxes
- Power-supply for the Irinos-Boxes

32 Irinos-Boxes at a maximum can be connected in line topology to build up a whole measurement system.

The amount of Irinos-Boxes has no influence on reading the measurement values from the PC, except that more channels are available. All measurement values are transferred via a single ethernet connection from the Irinos-System to the PC. This allows an easy integration into Windows based measurement software (DLL available).

## Synchronous HighSpeed-Measurement

Many measurement applications require the realtime acquisition of various measurement channels, allowing further calculations (e.g. concentricity measurement).

With the Irinos-Box IR-TFV, it is possible to get 10.000 measurement values / s. This value is independent of the number of channels. It is for example possible to have a realtime measurement with 32 channels acquiring  $32 * 10.000$  values/s = 320.000 measurement values / s in total.

All measurement values are acquired synchronously and buffered in the internal memory of the Irinos-Box before they are transferred to the PC.

## Galvanic Isolation

Each Irinos-Box has galvanic isolation.

The galvanic isolation from the power supply ensures that external noise will not influence the measurement electronics.

Additionally the ILink-Interface has galvanic isolation, which allows for a robust communication between multiple Irinos-Boxes. Further it avoids ground loops or similar negative effects.

The Irinos-Box IR-TFV has an additional galvanic isolation of the sine-oscillator in order to guarantee that there is no DC signal component.



# Irinos IR-TFV

## Labelling

Each measurement channel can be labelled via an optional label carrier. It is suitable for 8 plastic-labels, which are widely used in switch cabinet construction. They can be printed with many commercially available plastic-label printers.

## Application specific types

Special types are available for the connection of application specific devices, like for example plug gauges.

With the quick-change system TAS10, a spatial separation of measurement electronics and measurement inputs is possible via a single connection cable.

It is further possible to un-plug or plug multiple measurement probes simultaneously from/to the measurement electronics without requiring a power-off. This allows for quick exchange of different measurement devices.



Quick-change system TAS10



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# Irinos IR-TFV

## Specifications

### Inputs for inductive probes

Probe types	○ Depends on Box type
Number of channels	8 inductive probes, either directly connected (8 connectors M16 5pin 270°) or via quick-change system TAS10 (DSUB25)
Channel setup	8 independent input channels (no multiplexing -> no settling time)
Synchronisation	Simultaneous acquisition of all measurement channels (jitter using one Irinos-Box: 0ns; jitter using multiple Irinos-Boxes: < 250 ns)
Calibration	Pre-calibration of all measurement channels. No calibration of the measurement channels required by the customer.
Measurement method	Integrating for high noise immunity
Measurement speed	10.000 measurement values / s independent of the number of channels

### Inputs for inductive probes Tesa halfbridge and compatible, directly connected

Measurement range	± 2000 µm with Tesa GT21 / GT22 (if supported by probe) ± 5000 µm with Tesa GT61
Max. resolution	0,06 µm
Usable resolution	0,2 µm
Linearity	Linearity error < 0,001% of measurement range
Stability	0,2 µm typical with Tesa GT21
Input impedance	2 kOhm
Sine-oscillator	13 kHz 3 V <sub>eff</sub>

### Inputs for inductive probes Knäbel IET, directly connected

Measurement range	± 200 µm with Knäbel IET
Max. resolution	0,006 µm
Usable resolution	0,02 µm
Linearity	Linearity error < 0,001% of measurement range
Stability	0,06 µm typical with IET inductive probe
Input impedance	10 kOhm
Sine-oscillator	50 kHz 1,5 V <sub>eff</sub>



# Irinos IR-TFV

## Inputs for inductive probes **Solartron LVDT, directly connected**

Measurement range	$\pm 1000 \mu\text{m}$ with AX/1/S $\pm 1500 \mu\text{m}$ with AX/1.5/S $\pm 2500 \mu\text{m}$ with AX/2.5/S $\pm 5000 \mu\text{m}$ with AX/5/S $\pm 10000 \mu\text{m}$ with AX/10/S
Max. resolution	$0,3125 \mu\text{m}$ with AX/1/S
Linearity	Linearity error $< 0,001\%$ of measurement range
Stability	$0,2 \mu\text{m}$ typical with AX/1/S
Input impedance	2 kOhm
Sine-oscillator	5 kHz $3 V_{\text{eff}}$

## Inputs for inductive probes **Feinprüf / Mahr, directly connected**

Measurement range	$\pm 1000 \mu\text{m}$ with Mahr 1301
Max. resolution	$0,3125 \mu\text{m}$ with Mahr 1301
Linearity	Linearity error $< 0,001\%$ of measurement range
Stability	$0,1 \mu\text{m}$ typical with Mahr 1301
Sine-oscillator	20 kHz $3 V_{\text{eff}}$

## Sine oscillator

Coupling	AC (no DC components)
Short circuit protection	yes
Voltage-controlled	yes
Synchronisation	<ul style="list-style-type: none"><li>o No jitter within a single Irinos-Box IR-TFV</li><li>o Jitter <math>&lt; 500 \text{ ns}</math> using multiple Irinos-Boxes IR-TFV</li></ul>



# Irinos IR-TFV

## Power supply

Rated voltage	24 V DC $\pm$ 10 %
Reverse voltage protection	yes
Power consumption	$\leq$ 4.5 watt
Coupling	galvanic isolation
Forwarding	If multiple Irinos-Boxes are used, the power-supply is forwarded via the ILink-Interface to all Irinos-Boxes (no separate power supply required).

Use an Irinos power supply IR-PU.

## Ethernet-Interface (only available for types -ETHIL and -EPI)

Connector	M12 D-coded (industrial standard)
Speed	10 / 100 MBit/s (auto-negotiation)
Max. cable length	100 m
	Auto-Crossover

## Digital Inputs (only available for types IR-TFV-...-ETHIL)

Connector	M12 A-coded (industrial standard)
Number of inputs	2 (shared connector)
Voltage range	0 .. 26,4 V DC
Voltage levels	Similar to IEC61131-2: Low: 0 .. 5 V High: 10,8 .. 26,4 V
Input current	ca. 4 mA typical at 24V.
Coupling	galvanic isolation
Power supply	24V available for switches (e.g. push-button or foot pedal) via a high impedance resistor. No supply for external components (e.g. active sensors).



# Irinos IR-TFV

## Casing

	Aluminium designer housing, black anodized, rear plate clear anodized, front plate with cover foil
Dimensions	160 x 98 x 33 mm (H x W x D)
Protection class	Up to IP65 with the IP65 Irinos-Box type, using appropriate connectors
Mounting (standard)	2 tapped brushed M4 on the rear side
Mounting options	<ul style="list-style-type: none"><li>○ adaption for hat rail mounting</li><li>○ adaption for aluminium profile 40mm, Item or similar</li><li>○ adaption for front side mounting</li></ul>
Labelling	Optional via labelling carrier.

## Miscellaneous

Temperature range	operation: 0 - 50 °C / storage: 0 - 70 °C
Status indication	Numeric display (types -EPI and -IL) showing box-number and/or error. Status LED (type-ETHIL).
Expansion	System expansion up to 32 Irinos-Boxes via ILink-Interface (max. 256 probes possible). Combinable with other inputs, e.g. for incremental encoders, analog inputs, digital in/outputs, etc.
Connection to PC	Standard ethernet. DLL available for easy integration into PC software (Windows based).





# Irinos IR-TFV

## Ordering information

Three basic types are available. They differ in the connection of the power supply, the network cabling and the bus system. The measurement technology is always the same.



### Typ -EPI

**Master-Box** with Ethernet interface

- Exactly one Box with ethernet interface is allowed per system.
- Power supply 24V DC via M12 L-coded.
- For use with power supply: IR-PU-...-**CUS**-..
- Numeric status display
- Software compatible with type -ETHIL



### Typ -IL

**Slave-Box** for system expansion

- Max. 31 slave boxes are possible
- Power supply via bus system
- Numeric status display



### Typ -ETHIL

Master-Box with Ethernet interface

- Legacy Product:** This product remains available without any restrictions. However, using the new type -EPI is recommended.
- Exactly one Box with ethernet interface is allowed per system.
  - Power supply 24V DC via DSUB15
  - For use with power supply: IR-PU-...-**HWS**-..
  - 2 digital inputs
  - Software compatible with type -EPI



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# Irinos IR-TFV

## Overview of most common types

Typ	TESA halfbridge 13 kHz, e.g. GT21	Knäbel IET 50 kHz	Solartron LVDT 5 kHz, e.g. AX/1/S	Mahr / Feinprüf 20 kHz, e.g. 1301
-EPI Master	828-5045	828-5086	828-5087	828-5089
-IL Slave	828-5003	828-5007	828-5024	828-5036

## Complete overview

Irinos-Boxes IR-TFV for inductive probes Tesa and compatible		
Order-No.	Description	Status
828-5045	<b>IR-TFV-8-TESA-M16-EPI (*)</b> 8 channel <b>Tesa</b> and compatible, <b>directly connected</b> , measurement range $\pm 2000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, power supply via M12 L-coded, protection class <b>IP53</b> if appropriate connectors are used.	<b>Preferred type</b>
828-5003	<b>IR-TFV-8-TESA-M16-IL</b> 8 channel <b>Tesa</b> and compatible, <b>directly connected</b> , measurement range $\pm 2000 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP53</b> if appropriate connectors are used.	<b>Preferred type</b>
828-5002	<b>IR-TFV-8-TESA-M16-ETHIL (*)</b> 8 channel <b>Tesa</b> and compatible, <b>directly connected</b> , measurement range $\pm 2000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, including 2 digital Inputs, protection class <b>IP53</b> if appropriate connectors are used.	Legacy product: remains available
828-5004	<b>IR-TFV-8-TESA-KF27-IL</b> 8 channel <b>Tesa</b> and compatible, connection via <b>Quick-change system TAS10</b> , measurement range $\pm 2000 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP65</b> if appropriate connectors are used.	Special type
828-5005	<b>IR-TFV-8-TESA-M16IP-IL</b> 8 channel <b>Tesa</b> and compatible, <b>directly connected</b> , measurement range $\pm 2000 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP65</b> if appropriate connectors are used.	Special type

(\*) Exactly one Irinos-Box with ethernet interface allowed per Irinos-System.



# Irinos IR-TFV

Irinos-Boxes IR-TFV for inductive probes Knäbel IET		
Order-No.	Description	Status
828-5086	<b>IR-TFV-8-IET-M16-EPI (*)</b> 8 channel Knäbel IET, <b>directly connected</b> , measurement range $\pm 200 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, power supply via M12 L-coded, protection class <b>IP53</b> if appropriate connectors are used.	<b>Preferred type</b>
828-5007	<b>IR-TFV-8-IET-M16-IL</b> 8 channel Knäbel IET, <b>directly connected</b> , measurement range $\pm 200 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP53</b> if appropriate connectors are used.	<b>Preferred type</b>
828-5006	<b>IR-TFV-8-IET-M16-ETHIL (*)</b> 8 channel Knäbel IET, <b>directly connected</b> , measurement range $\pm 200 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, including 2 digital Inputs, protection class <b>IP53</b> if appropriate connectors are used.	Legacy product: remains available
828-5008	<b>IR-TFV-8-IET-KF27-IL</b> 8 channel Knäbel IET, connection via <b>Quick-change system TAS10</b> , measurement range $\pm 200 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP65</b> if appropriate connectors are used.	Special type
828-5009	<b>IR-TFV-8-IET-M16IP-IL</b> 8 channel Knäbel IET, <b>directly connected</b> , measurement range $\pm 200 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP65</b> if appropriate connectors are used.	Special type

(\*) Exactly one Irinos-Box with ethernet interface allowed per Irinos-System.



# Irinos IR-TFV

Irinos-Boxes IR-TFV for inductive probes Solartron LVDT		
Order-No.	Description	Status
828-5031	<b>IR-TFV-8-SOLVDT-M16-EPI (*)</b> 8 channel <b>Solartron LVDT, directly connected</b> , measurement range with AX/1/S $\pm 1000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, power supply via M12 L-coded, protection class <b>IP53</b> if appropriate connectors are used.	Available
828-5024	<b>IR-TFV-8-SOLVDT-M16-IL</b> 8 channel <b>Solartron LVDT, directly connected</b> , measurement range with AX/1/S $\pm 1000 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP53</b> if appropriate connectors are used.	Available
828-5031	<b>IR-TFV-8-SOLVDT-M16-ETHIL (*)</b> 8 channel <b>Solartron LVDT, directly connected</b> , measurement range with AX/1/S $\pm 1000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, including 2 digital Inputs, protection class <b>IP53</b> if appropriate connectors are used.	Legacy product: remains available

(\*) Exactly one Irinos-Box with ethernet interface allowed per Irinos-System.

Irinos-Boxes IR-TFV for inductive probes Feinprüf/Mahr halfbridge		
Order-No.	Description	Status
828-5089	<b>IR-TFV-8-FEINP-M16-EPI (*)</b> 8 channel <b>Feinprüf / Mahr halfbridge 20kHz, directly connected</b> , measurement range $\pm 1000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, power supply via M12 L-coded, protection class <b>IP53</b> if appropriate connectors are used.	Available
828-5028	<b>IR-TFV-8-FEINP-M16-IL</b> 8 channel <b>Feinprüf / Mahr halfbridge 20kHz, directly connected</b> , measurement range $\pm 1000 \mu\text{m}$ , <b>without Ethernet</b> -Interface (additional Irinos-Box), without digital inputs, protection class <b>IP53</b> if appropriate connectors are used.	Available
828-5028	<b>IR-TFV-8-FEINP-M16-ETHIL (*)</b> 8 channel <b>Feinprüf / Mahr halfbridge 20kHz, directly connected</b> , measurement range $\pm 1000 \mu\text{m}$ , <b>including Ethernet</b> -Interface for direct connection to a PC, including 2 digital Inputs, protection class <b>IP53</b> if appropriate connectors are used.	Legacy product: remains available

(\*) Exactly one Irinos-Box with ethernet interface allowed per Irinos-System.



# Irinos IR-TFV

Accessories labelling and mounting		
Order-No.	Description	Status
828-5040	<b>IR-MIPL-8-ABB179</b> Labelling carrier for 8 plastic labels	<b>Preferred type</b>
828-5081	<b>IR-MIPL-8-COLOR</b> Labelling carrier with 8 coloured labelling fields for engraving	Available
828-5041	<b>IR-MHRM-1</b> Adapter for DIN rail mounting	<b>Preferred type</b>
828-5042	<b>IR-MFFM-1</b> Front-side mounting kit	<b>Preferred type</b>
828-5043	<b>IR-MITEM-40</b> Mounting bracket for aluminium profile 40mm (Item or similar)	<b>Preferred type</b>
828-5044	<b>IR-MWIP-40</b> Stand for aluminium profile 40mm (Item or similar)	Available

Accessories quick-change system TAS10		
Order-No.	Description	Status
820-2212	Connection box <b>AB8F27 Tesa</b> for indirect connection of 8 inductive probes Tesa halfbridge and compatible	Special type
820-2210	Connection box <b>AB4F27 Tesa</b> for indirect connection of 4 inductive probes Tesa halfbridge and compatible	Special type
820-2232	Connection box <b>AB8F27 IET</b> for indirect connection of 8 inductive probes Knäbel IET	Special type
820-2230	Anschlussbox <b>AB4F27 IET</b> for indirect connection of 4 inductive probes Knäbel IET	Special type
828-5067	Connection cable <b>K8F27-D25-030</b> , length 3m, suitable for drag-chain	Special type
828-5068	Connection cable <b>K8F27-D25-050</b> , length 5m, suitable for drag-chain	Special type
828-5069	Connection cable <b>K8F27-D25-070</b> , length 7m, suitable for drag-chain	Special type
828-5070	Connection cable <b>K8F27-D25-100</b> , length 10m, suitable for drag-chain	Special type



# Irinos IR-TFV

Ethernet cables		
Order-No.	Description	Status
828-5050	Ethernet cable <b>IR-CETH-RJ45-M12-010</b> Length <b>1m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	<b>Preferred type</b>
828-5051	Ethernet cable <b>IR-CETH-RJ45-M12-020</b> Length <b>2m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	<b>Preferred type</b>
828-5052	Ethernet cable <b>IR-CETH-RJ45-M12-050</b> Length <b>5m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	<b>Preferred type</b>
828-5053	Ethernet cable <b>IR-CETH-RJ45-M12-100</b> Length <b>10m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	Available
828-5054	Ethernet cable <b>IR-CETH-RJ45-M12-150</b> Length <b>15m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	Available
828-5076	Ethernet cable <b>IR-CETH-RJ45-M12-200</b> Length <b>20m</b> , Cat5e, 1 x RJ45, 1 x M12 SpeedCon D-coded	Special type



# Irinos IR-TFV

Please note: the maximum bus length of each Irinos system is 20m.

Accessories ILink connection cable between multiple Irinos boxes		
Order-No.	Description	Status
828-5055	ILink connection cable <b>IR-ILINK-002-IP40</b> Length 0,2 m, protection class IP40	<b>Preferred type</b>
828-5056	ILink connection cable <b>IR-ILINK-010-IP40</b> Length 1 m, protection class IP40	<b>Preferred type</b>
828-5057	ILink connection cable <b>IR-ILINK-020-IP40</b> Length 2 m, protection class IP40	Available
828-5058	ILink connection cable <b>IR-ILINK-030-IP40</b> Length 3 m, protection class IP40	<b>Preferred type</b>
828-5059	ILink connection cable <b>IR-ILINK-050-IP40</b> Length 5 m, protection class IP40	Available
828-5060	ILink connection cable <b>IR-ILINK-100-IP40</b> Length 10 m, protection class IP40	Available
828-5061	ILink connection cable <b>IR-ILINK-002-IP65</b> Length 0,2 m, protection class IP65	<b>Preferred type</b>
828-5062	ILink connection cable <b>IR-ILINK-010-IP65</b> Length 1 m, protection class IP65	Available
828-5063	ILink connection cable <b>IR-ILINK-020-IP65</b> Length 2 m, protection class IP65	Available
828-5064	ILink connection cable <b>IR-ILINK-030-IP65</b> Length 3 m, protection class IP65	Available
828-5065	ILink connection cable <b>IR-ILINK-050-IP65</b> Length 5 m, protection class IP65	Available
828-5066	ILink connection cable <b>IR-ILINK-100-IP65</b> Length 10 m, protection class IP65	Available
828-5079	ILink connection cable <b>IR-ILINK-150-IP65</b> Length 15 m, protection class IP65	Special type
828-5077	ILink connection cable <b>IR-ILINK-200-IP65</b> Length 20 m, protection class IP65	Special type



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