P04/3-RS485

Weather Stations with RS485 Interface

Technical specifications and installation instructions

Item numbers 30152 (P04/3-RS485-GPS), 30153 (P04/3-RS485-CET), 30154 (P04/3-RS485 basic)

1.   Description

The **P04/3-RS485 Weather Station** measures temperature, wind speed, brightness and it recognizes precipitation.

The weather station sends the currently recorded weather data once every second. This data flow can be received and analyzed by an end device such as SPS, PC or MC.

The **P04/3-RS485** has four connections. Data output is at terminals A and B. Terminals 1 and 2 are for the power supply (24 V DC). **The connections are not resistant to pole reversal.** Connecting them incorrectly will destroy the interface components.

Functions:
* **Brightness measurement** with 3 separate sensors for east, south and west. Recognition of twilight/dawn
* **Wind measurement:** The wind strength measurement takes place electronically and thus noiselessly and reliably, even during hail, snow and sub-zero temperatures. Even turbulent air and anabatic winds in the vicinity of the weather station are recorded
* **Temperature measurement**
* Heated **precipitation sensor**: No false reports as a result of fog or dew. Dries quickly after precipitation has stopped

Models:
* **P04/3-RS485-GPS:** With integrated **GPS receiver**. Output of UTC (Universal Time Coordinated), position (degree of longitude, latitude) and solar position (azimut, elevation)
* **P04/3-RS485-CET:** With integrated **GPS receiver**. Output of Central European Time (CET), automatic summer/winter time switch-over
* **P04/3-RS485 basic:** without time reception

1.1.   Technical specifications

Housing	Plastic material
Colour	White / translucent
Mounting	On-wall
Protection category	IP 44
Dimensions	approx. 62 × 71 × 145 (W × H × D, mm)
Weight	approx. 80 g
Ambient temperature	Operation -30…+50°C, Storage -30…+70°C
Operating voltage	24 V DC
Cable cross-section	Massive conductors of up to 0.8 mm²
Current	max. 100 mA
Data output	RS485
Measurement range temperature	-40…+70°C

Resolution (temperature)	0.1°C
Accuracy (temperature)	±1.5°C at -25…+70°C
Measurement range wind	0…35 m/s
Resolution (wind)	0.1 m/s
Accuracy (wind)	at ambient temperature -20…+50°C: ±15% of the measurement value when incident flow is from 45…315° (Frontal incident flow corresponds to 180°)
Measurement range brightness	0...99.000 lux
Resolution (brightness)	1 lux at 0…290 lux 16 lux at 291…3060 lux 155 lux at 3061…99000 lux
Accuracy (brightness)	±20% at 0...10 kL ±15% at 11...99 kL

2.   Installation and commissioning

2.1. Installation notes

Installation, testing, operational start-up and troubleshooting should only be performed by an electrician.

CAUTION!
Live voltage!
There are unprotected live components inside the device.
- National legal regulations are to be followed.
- Ensure that all lines to be assembled are free of voltage and take precautions against accidental switching on.
- Do not use the device if it is damaged.
- Take the device or system out of service and secure it against unintentional use, if it can be assumed, that risk-free operation is no longer guaranteed.

The device is only to be used for its intended purpose. Any improper modification or failure to follow the operating instructions voids any and all warranty and guarantee claims.

After unpacking the device, check it immediately for possible mechanical damage. If it has been damaged in transport, inform the supplier immediately.

The device may only be used as a fixed-site installation; that means only when assembled and after conclusion of all installation and operational start-up tasks and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

2.2. Installation location

Select an installation position on the building where the sensors can measure wind, rain and sunshine without hindrance. No structural elements should be mounted above the weather station, from which water could continue to drop on the precipitation sensor even after it has stopped raining or snowing. The weather station should not be shaded by structures or, for example, trees.

At least 60 cm of clearance must be left around the device. This facilitates correct wind speed measurement without eddies. At the same time, this prevents spray (raindrops hitting the device) or snow (snow penetration) from impairing the measurement. This also prevents birds from biting it.

Please ensure that the extended awning does not cast shade on the unit, and that it is protected from the wind.

Temperature measurements can also be distorted by external influences such as warming or cooling of the building structure on which the sensor is mounted (sunlight, heating or cold water pipes). Temperature variations from such sources of interference must be corrected in the ETS in order to ensure the specified accuracy of the sensor (temperature offset).

Magnetic fields, transmitters and interference fields from electrical consumers (e.g. fluorescent lamps, neon signs, switch mode power supplies etc.) can block or interfere with the reception of the GPS signal.
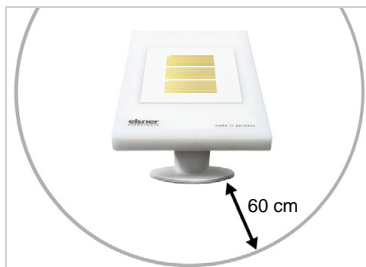
Fig. 1
There must be at least 60 cm clearance to other elements (structures, construction parts, etc.) below, to the sides and in front of the device.
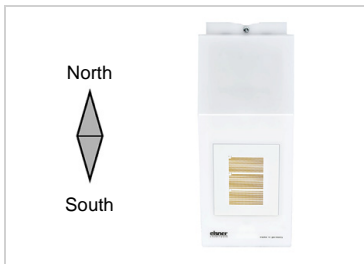
60 cm
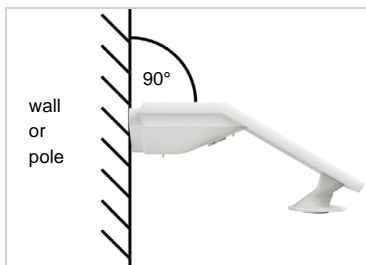
Fig. 2
The device must be attached to a vertical wall (or a pole).

90°

wall
or
pole

Horizontal

Fig. 3
The device must be mounted in the horizontal
(transverse) direction.

North

South

Fig. 4
For installation in the northern hemisphere,
the device must be aligned to face south.

For installation in the southern hemisphere,
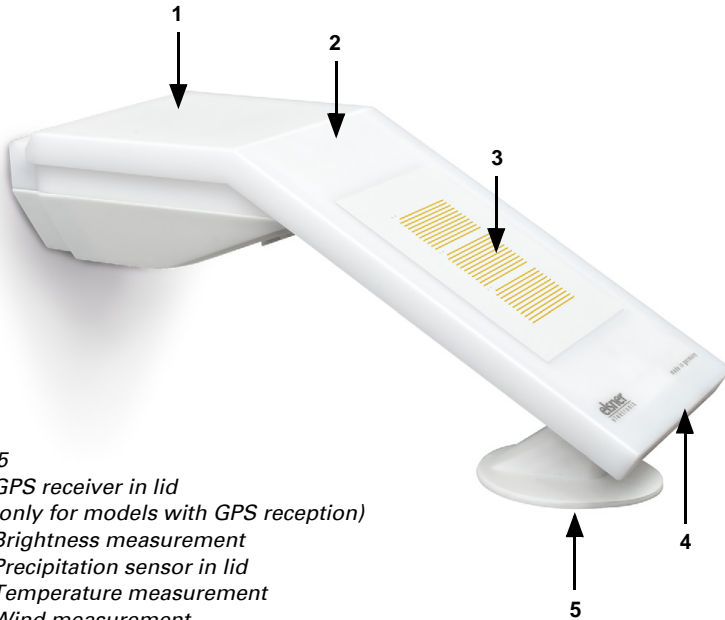*the device must be aligned to face north.*

2.3. Device design

Fig. 5
1   *GPS receiver in lid*
    (only for models with GPS reception)
2   *Brightness measurement*
3   *Precipitation sensor in lid*
4   *Temperature measurement*
5   *Wind measurement*

🛑 **STOP**   **ATTENTION!**
Sensitive wind sensor.
- Remove the protective transport sticker after installation.
- Do not touch the sensor on the wind measuring element (no. 5).

🚫   **ATTENTION!**
Even a few drops of water can damage the device electronics.
- Do not open the device if water (e.g. rain) can get into it.

2.3.1. Preparation for installation

Fig. 6
*Slacken both screws on the lid (top) and lower part (bottom) with a size 6 Torx screwdriver.*

Fig. 7
Pull the lid and lower part completely apart. This also releases the plug-in connection between the board in the lid and the socket in the lower part.

2.3.2. Fitting the lower part with mounting

Now, first of all, assemble the lower part of the housing with the integrated mounting for wall or pole installation.

Wall installation

Use fixing materials (dowels, screws) that are suitable for the base.
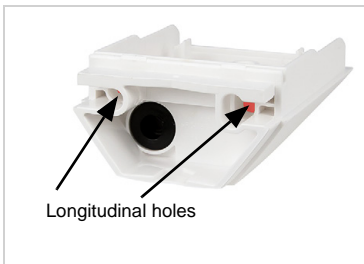
Fig. 8
The device is installed with two screws. Break off the two longitudinal holes in the lower part of the housing.
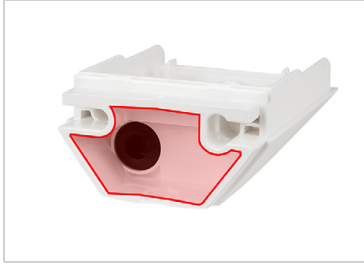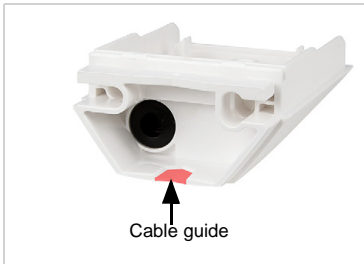
Longitudinal holes

Fig. 9 a+b
a) If the power lead is to be hidden when in-
    stalled, it must emerge from the wall in
    the vicinity of the rear of the housing
    (marked area).

Cable guide

b) If the power lead is to be surface-mount-
    ed, the cable guide is broken off. The lead
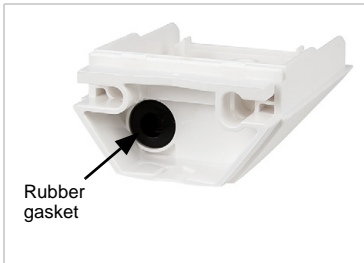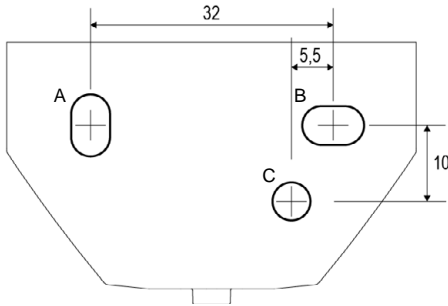   is then fed into the device at the under-
    side of the housing.

Rubber
gasket

Fig. 10
Feed the power lead through the rubber gas-
ket.

Drilling plan

ATTENTION! The printout of the data sheet does not have original size! A separate, di-
mensionally correct drilling plan is included ex works and this can be used as a tem-
plate.

Fig. 11
Dimensions in mm. Variations are possible for technical reasons
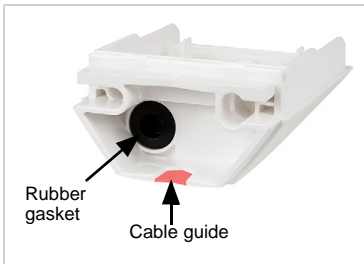
A/B 2× longitudinal holes 8 mm × 5.5 mm
C   Position of the cable outlet (rubber gasket) in the housing

Pole installation

The device is installed on the pole with the enclosed stainless steel mounting band.

Fig. 12
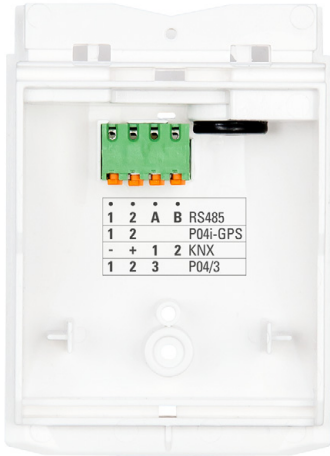*Feed the mounting band through the eyelets in the lower part of the housing.*

Fig. 13
Break the cable guide off.

Feed the power lead through the rubber gasket.

Rubber gasket
Cable guide

2.3.3. Connection
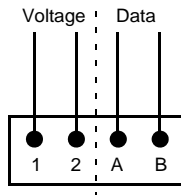
The connector is in the lower part of the housing.

The connection is by typical, UV resistant telephone cable (J-Y(ST)Y 2 × 2 × 0.8).

Fig. 14
Connect power supply +24 V DC/GND
to the connectors 1/2 RS485
(terminal assignment polarity-independent).

Connect data
to the connectors A/B RS485
(take care of correct polarity).

1	2	A	B	RS485
1	2			P04i-GPS
-	+	1	2	KNX
1	2	3		P04/3

Voltage   Data

1   2   A   B

2.3.4. Closing the installation

Fig. 15
Push the lid on the lower part. This also
makes the plug-in connection between the
board in the lid and the socket in the lower
part.

Fig. 16
Screw the lid (top) and lower part (bottom) to-
gether.

2.4.   Notes on mounting and commissioning

Remove all existing protection labels after installation.

The correct wind value may only be supplied about 30 seconds after the supply voltage has been connected.

2.5. Maintenance of the weather station

⚠️ **WARNING!**
Risk of injury caused by components moved automatically!
The automatic control can start system components and place people in danger (e.g. moving windows/awnings if a rain/wind alarm has been triggered while cleaning).
• Always isolate the device from the mains for servicing and cleaning.

The device must regularly be checked for dirt twice a year and cleaned if necessary. In case of severe dirt, the sensor may not work properly anymore.

🛑 **ATTENTION**
The device can be damaged if water penetrates the housing.
• Do not clean with high pressure cleaners or steam jets.

3. Transfer protocol

All characters and/or digits are based on the ASCII standard, i.e. every reading processed internally as an integer or float value will always be broken down into and transferred in its individual ASCII format characters. They must then be reassembled in the reverse process by the receiver.

Transfer rate: 19200 Baud
Data bits: 8
Stop bit: 1
Parity: none

The checksum is calculated by adding all transferred bytes (without checksum).

Units:
Temperatures in degrees Celsius
Sun intensity in kilolux
Daylight in Lux
Wind in metres per second

3.1. Protocol P04/3-RS485-GPS

Byte No	Char	Description
1	G	Start of string
2	+ / -	Outdoor temperature in °C, sign
3	0 … 9	Outdoor temperature in °C, tens digit
4	0 … 9	Outdoor temperature in °C, units digit

Byte No	Char	Description
5	.	Outdoor temperature in °C, decimal point
6	0 … 9	Outdoor temperature in °C, tenths digit
7	0 … 9	Sun south in kLux, tens digit
8	0 … 9	Sun south in kLux, units digit
9	0 … 9	Sun west in kLux, tens digit
10	0 … 9	Sun west in kLux, units digit
11	0 … 9	Sun east in kLux, tens digit
12	0 … 9	Sun east in kLux, units digit
13	J / N	Lux twilight indication
14	0 … 9	Daylight in Lux, hundreds digit
15	0 … 9	Daylight in Lux, tens digit
16	0 … 9	Daylight in Lux, units digit
17	0 … 9	Wind in m/s, tens digit
18	0 … 9	Wind in m/s, units digit
19	.	Wind in m/s, decimal point
20	0 … 9	Wind in m/s, tenths digit
21	J / N	Rain indication
22	? / 1 … 7	UTC weekday (1 = mondy ... 7 = sunday | ? = UTC not OK)
23	0 … 9	UTC date day, tens digit
24	0 … 9	UTC date day, units digit
25	0 … 9	UTC date month, tens digit
26	0 … 9	UTC date month, units digit
27	0 … 9	UTC date year, tens digit
28	0 … 9	UTC date year, units digit
29	0 … 9	UTC time hour, tens digit
30	0 … 9	UTC time hour, units digit
31	0 … 9	UTC time minute, tens digit
32	0 … 9	UTC time minute, units digit
33	0 … 9	UTC time second, tens digit
34	0 … 9	UTC time second, units digit
35	0 / 1	GPS report azimuth/elevation/longitude/latitude (1 = OK, 0 = not OK)
36	0 … 3	Azimuth in °, hundreds digit
37	0 … 9	Azimuth in °, tens digit
38	0 … 9	Azimuth in °, units digit
39	.	Azimuth in °, decimal point
40	0 … 9	Azimuth in °, tenths digit
41	+ / -	Elevation in °, sign
42	0 … 9	Elevation in °, tens digit

Byte No	Char	Description
43	0 … 9	Elevation in °, units digit
44	.	Elevation in °, decimal point
45	0 … 9	Elevation in °, tenths digit
46	O / W	Longitude in ° (O = east, W = west)
47	0 / 1	Longitude in °, hundreds digit
48	0 … 9	Longitude in °, tens digit
49	0 … 9	Longitude in °, units digit
50	.	Longitude in °, decimal point
51	0 … 9	Longitude in °, tenths digit
52	N / S	Latitude in ° (N = north, S = south)
53	0 … 9	Latitude in °, tens digit
54	0 … 9	Latitude in °, units digit
55	.	Latitude in °, decimal point
56	0 … 9	Latitude in °, tenths digit
57	0 … 9	Checksum thousands digit
58	0 … 9	Checksum hundreds digit
59	0 … 9	Checksum tens digit
60	0 … 9	Checksum units digit
61	0x03	end identifier

3.2. Protocol P04/3-RS485-CET

Byte No	Char	Description
1	W	Start of string
2	+ / -	Outdoor temperature in °C, sign
3	0 … 9	Outdoor temperature in °C, tens digit
4	0 … 9	Outdoor temperature in °C, units digit
5	.	Outdoor temperature in °C, decimal point
6	0 … 9	Outdoor temperature in °C, tenths digit
7	0 … 9	Sun south in kLux, tens digit
8	0 … 9	Sun south in kLux, units digit
9	0 … 9	Sun west in kLux, tens digit
10	0 … 9	Sun west in kLux, units digit
11	0 … 9	Sun east in kLux, tens digit
12	0 … 9	Sun east in kLux, units digit
13	J / N	Lux twilight indication
14	0 … 9	Daylight in Lux, hundreds digit
15	0 … 9	Daylight in Lux, tens digit
16	0 … 9	Daylight in Lux, units digit

Byte No	Char	Description
17	0 … 9	Wind in m/s, tens digit
18	0 … 9	Wind in m/s, units digit
19	.	Wind in m/s, decimal point
20	0 … 9	Wind in m/s, tenths digit
21	J / N	Rain indication
22	? / 1 … 7	CET weekday (1 = mondy ... 7 = sunday | ? = UTC not OK)
23	0 … 9	CET date day, tens digit
24	0 … 9	CET date day, units digit
25	0 … 9	CET date month, tens digit
26	0 … 9	CET date month, units digit
27	0 … 9	CET date year, tens digit
28	0 … 9	CET date year, units digit
29	0 … 9	CET time hour, tens digit
30	0 … 9	CET time hour, units digit
31	0 … 9	CET time minute, tens digit
32	0 … 9	CET time minute, units digit
33	0 … 9	CET time second, tens digit
34	0 … 9	CET time second, units digit
35	J / N	Summertime (daylight saving time) J = Yes, N = No
36	0 … 9	Checksum thousands digit
37	0 … 9	Checksum hundreds digit
38	0 … 9	Checksum tens digit
39	0 … 9	Checksum units digit
40	0x03	end identifier

3.3. Protocol P04/3-RS485 basic

Byte No	Char	Description
1	W	Start of string
2	+ / -	Outdoor temperature in °C, sign
3	0 … 9	Outdoor temperature in °C, tens digit
4	0 … 9	Outdoor temperature in °C, units digit
5	.	Outdoor temperature in °C, decimal point
6	0 … 9	Outdoor temperature in °C, tenths digit
7	0 … 9	Sun south in kLux, tens digit
8	0 … 9	Sun south in kLux, units digit
9	0 … 9	Sun west in kLux, tens digit
10	0 … 9	Sun west in kLux, units digit
11	0 … 9	Sun east in kLux, tens digit

Byte No	Char	Description
12	0 … 9	Sun east in kLux, units digit
13	J / N	Lux twilight indication
14	0 … 9	Daylight in Lux, hundreds digit
15	0 … 9	Daylight in Lux, tens digit
16	0 … 9	Daylight in Lux, units digit
17	0 … 9	Wind in m/s, tens digit
18	0 … 9	Wind in m/s, units digit
19	.	Wind in m/s, decimal point
20	0 … 9	Wind in m/s, tenths digit
21	J / N	Rain indication
22	0 … 9	Checksum thousands digit
23	0 … 9	Checksum hundreds digit
24	0 … 9	Checksum tens digit
25	0 … 9	Checksum units digit
26	0x03	end identifier