Interface Card, Interface Box, Datalogger & Interface

(D) Bedienungsanleitung

Kommunikationsprotokoll

(GB) Operating Instructions

Communications protocol

42,0410,1318 022005

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General remarks

General remarks

These operating instructions describe the communications protocol which is transferred to the devices interface card, interface box and data logger & interface via the serial port. Further details of the data communication system used in the FRONIUS inverter can be found in the operating instructions entitled „FRONIUS IG DatCom Detail“.

General hardware data

The serial „data“ interface complies with RS 232 and is a 9-pin sub-D plug.
The pins for the serial „data“ interface are assigned as follows:

- Pin 2: RxD
- Pin 3: TxD
- Pin 5: GND

The „Baud“ adjuster allows the speed of the interface to be set on the devices interface card, interface box, datalogger and interface:

Value adjuster	Interface speed (baud)
0	2400
1	4800
2	9600
3	14400
4	19200
5	2400
6	2400
7	2400
8	2400
9	2400

Basic data structure

All data input and output over the serial interface has the following structure:

Start	Length	Device / option	Number	Command	Data field	Checksum

Field	Explanatory note
Start (3 bytes)	Start sequence (3 times 0x80)
Length	Number of bytes in data field (1 byte)
Device / option	Type, e.g. inverter, sensor box etc. (1 byte)
Number	Number of the device in question (1 byte)
Command	Queries the command to be executed (1 byte)
Data field	Contains the value of the checked command (max. 127 bytes)
Checksum	Calculated using 8-bit addition of all byes in the data structure except „start sequence“ and „checksum“ fields.Overflows are not taken into account (1 byte)

Data from networked devices and options

To enable particular values for a device or option to be queried, the data structure contains:
- a field for addressing the device or option from which the data is to be retrieved,
- the correct command byte for the desired data.

Addressing the device or option:
1. Set „Device / option“ byte to the correct value for the type of device or option (inverter, sensor card etc.)
2. Set „Number“ byte to the value which
   - for inverters has been entered at the display unit (IG no.)
   - for sensor cards of other DatCom components has been set at the BCD switch

If a command is sent to a device or option which does not support that command, then the interface card or interface box will output an error message.

For certain commands the query data structures may be different from the normal data structure. These commands are explained elsewhere.

Possible values for the „Device / option“ byte

Value	Device / option
0x00	Interface card or general data (if the value 0x00 is set, then the „Number“ byte is ignored)
0x01	Inverter
0x02	Sensor card

Commands for the interface card

Commands for the interface card

Value	Command / query
0x01	Get version (software version)
0x02	Get device type (device or option)
0x03	Get time
0x04	Get active inverter numbers
0x05	Get active sensor card numbers
0x06	Get LocalNet status

0x01 - Get version

The command „Get version“ shows the current software version of the interface card or interface box and the type of interface card.

Query:

Start	Length	Device / option	Number	Command	Checksum
	0x00	0x00	Ignore	0x01	

Response:

Start	Length	Device / option	Number	Command	IFC type	Version information	Checksum
	0x04	0x00	Ignore	0x01	(1 byte)	(3 bytes; major, minor, release)	

The version information is 3 bytes in length:
- major (1 byte for higher-level version information),
- minor (1 byte for lower-level version information),
- release (1 byte for information on the release of the software version in question).

The field „IFC type“ contains information on the type of interface card and thus on the available commands. The value 0x01 represents the interface card.

The values for IFC type and version information are of data type „unsigned“ char.

NOTE! Always take note of the value in the „IFC type“ field!

0x02 - Get device type

The command „Get device type“ indicates the type of device or option being addressed. The command „Get device type“ can be sent to inverters and to optional sensor cards or sensor boxes. „Get device type“ determines the commands that are available for the device or option concerned.
To identify a device unambiguously, the „Device / option“ byte must be combined with the „Type identification“ byte.

Query:

Start	Length	Device / option	Number	Command	Checksum
	0x00	0x01 / 0x02		0x02	

Response:

Start	Length	Device / option	Number	Command	Type identification	Checksum
	0x01	0x01 / 0x02		0x02	(1 byte)	

0x02 - Get device type
(continued)

Meaning of the identification byte:

Identification byte	Device / option	Type
0xfe	FRONIUS IG 15	Inverter
0xfd	FRONIUS IG 20	Inverter
0xfc	FRONIUS IG 30	Inverter
0xfb	FRONIUS IG 30 Dummy	Inverter
0xfa	FRONIUS IG 40	Inverter
0xf9	FRONIUS IG 60 / IG 60 HV	Inverter
0xf6	FRONIUS IG 300	3-phase inverter
0xf5	FRONIUS IG 400	3-phase inverter
0xf4	FRONIUS IG 500	3-phase inverter
0xf3	FRONIUS IG 60 / IG 60 HV	Inverter
0xee	FRONIUS IG 2000	Inverter
0xed	FRONIUS IG 3000	Inverter
0xeb	FRONIUS IG 4000	Inverter
0xea	FRONIUS IG 5100	Inverter
0xe5	FRONIUS IG 2500-LV	Inverter
0xe3	FRONIUS IG 4500-LV	Inverter
0xfe	Sensor card Sensor box	DatCom component
0xff	Unknown device or option, device or option not active	

0x03 - Get time

The command „Get time“ displays the current time in the LocalNet ring. One byte in the data field is used to display each value.

Query:

Start	Length	Device / option	Number	Com-mand	Checksum
	0x00	0x00	Ignore	0x03	

Response:

Start	Length	Device/option	Number	Com-mand	Day	Month	Year	Hour	Minute	Second	Checksum
	0x06	0x00	Ignore	0x03	(1)	(1)	(1)	(1)	(1)	(1)	

(1) 1 byte

Values:
- Day: 1 - 31
- Month: 1 - 12
- Year: 0 - 99
- Hour: 0 - 23
- Minute, second: 0 - 59

0x04 - Get active inverter numbers

The command „Get active inverter numbers“ shows which inverters are active in a LocalNet ring. One byte is output for each active inverter. The output byte corresponds to the device number configured on the display unit.
The maximum size of data field is 100 bytes.

Query:

Start	Length	Device / option	Number	Com-mand	Checksum
	0x00	0x00	Ignore	0x04	

Response:

Start	Length	Device / option	Number	Com-mand	Active inverter	Checksum
	0x01	0x00	Ignore	0x04	(0 -100 bytes)	

0x05 - Get active sensor card numbers

The command „Get active sensor card numbers“ shows which sensor cards are active in a LocalNet ring. One byte is output for each active sensor card. The output byte corresponds to the number of the sensor card configured using the BCD switch.
The maximum size of data field is 10 bytes.

Query:

Start	Length	Device / option	Number	Com-mand	Checksum
	0x00	0x00	Ignore	0x05	

Response:

Start	Length	Device / option	Number	Com-mand	Active sensor card	Checksum
	0x01	0x00	Ignore	0x05	(0 - 10 bytes)	

0x06 - Get LocalNet status

The command „Get LocalNet status“ displays the current LocalNet status of the interface card.

Important! The command „Get LocalNet status“ displays the current LocalNet status of only the interface card, not of the complete system.

The LocalNet status of the interface card is output as a 1-byte value of data type „unsigned“ char.

One possible cause of an error message when querying the LocalNet status is an open LocalNet ring. An open LocalNet ring can be caused by a faulty network cable or a missing terminator.
An open LocalNet ring is indicated by the red LED on the datalogger.

Query:

Start	Length	Device / option	Number	Com-mand	Checksum
	0x00	0x00	Ignore	0x06	

Response:

Start	Length	Device / option	Number	Com-mand	LocalNet status	Checksum
	0x01	0x00	Ignore	0x06	(1 byte, 1 = LocalNet OK 0 = LocalNet error)	

Commands for inverters, 3-phase inverters and sensor card / sensor box: Querying measured values

Explanatory note on querying measured values

Measured value queries are structured in accordance with a consistent data pattern:
- With the exception of the „Length“ field the data structure remains the same.
- 3 bytes are used to display the measured value in the data field: 2 bytes for the value itself and 1 byte for an exponent.
- The measured value is always of data type integer („signed“ or „unsigned“ as shown in the table)
- The exponent is of data type „signed“ char, and lies in the range between -3 and +10.
- The actual measured value is obtained by multiplying the value by 10 to the power of exponent (measured value = value x $10^{exponent}$)
- Units for measured values are as shown in the table or settings on sensor card or sensor box; the unit for a measured value is not transferred.

Query:

Start	Length	Device / option	Number	Command as shown in list	Checksum
	0x00	0x01 / 0x02			

Response:

Start	Length	Device / option	Number	Command as shown in list	Measured value	Checksum
	0x03	0x01 / 0x02			(3 bytes; MSB, LSB, exponent)	

Data field for the measured value query:

Value MSB	Value LSB	Exponent

MSB = Most significant byte
LSB = Less significant byte

The exponent is transferred as a value of data type „signed“ char in the range -3 to +10. Values falling outside this range are known as ‘underflow’ and ‘overflow’.

0B	0A	09	08	07	06	05	04	03	02	01	00	FF	FE	FD	FC
Over-flow	+10	+9	+8	+7	+6	+5	+4	+3	+2	+1	0	-1	-2	-3	Under-flow

Commands for inverters: Querying measured values

Value	Command / query	Unit	Data type
0x10	Get power - NOW (Current output)	W	unsigned
0x11	Get energy - TOTAL (Energy total)	kWh	unsigned
0x12	Get energy - DAY (Energy today)	kWh	unsigned
0x13	Get energy - YEAR (Energy for the year)	kWh	unsigned
0x14	Get AC current - NOW (AC current now)	A	unsigned
0x15	Get AC voltage - NOW (Current AC voltage)	V	unsigned
0x16	Get AC frequency - NOW (Current AC frequency)	Hz	unsigned
0x17	Get DC current - NOW (DC current now)	A	unsigned

Commands for inverters: Querying measured values (continued)

Value	Command / query	Unit	Data type
0x18	Get DC voltage - NOW (Current DC voltage)	V	unsigned
0x19	Get yield - DAY (Yield today)	Curr.[1]	unsigned
0x1a	Get maximum power - DAY (Max. power today)	W	unsigned
0x1b	Get maximum AC voltage - DAY (Max. AC voltage today)	V	unsigned
0x1c	Get minimum AC voltage - DAY (Min. AC voltage today)	V	unsigned
0x1d	Get maximum DC voltage - DAY (Max. DC voltage today)	V	unsigned
0x1e	Get operating hours - DAY (Operating hours today)	Minutes	unsigned
0x1f	Get yield - YEAR (Yield for the year)	Curr.[1]	unsigned
0x20	Get maximum power - YEAR (Max. power for year)	W	unsigned
0x21	Get maximum AC voltage - YEAR (Max. AC voltage this year)	V	unsigned
0x22	Get minimum AC voltage - YEAR (Min. AC voltage this year)	V	unsigned
0x23	Get maximum DC voltage - YEAR (Max. DC voltage this year)	V	unsigned
0x24	Get operating hours - YEAR (Operating hours this year)	Minutes	unsigned
0x25	Get yield - TOTAL (Total yield)	Curr.[1]	unsigned
0x26	Get maximum power - TOTAL (Max. total power)	W	unsigned
0x27	Get maximum AC voltage - TOTAL (Max. AC voltage total)	V	unsigned
0x28	Get minimum AC voltage - TOTAL (Min. total AC voltage)	V	unsigned
0x29	Get maximum DC voltage - TOTAL (Max. total DC voltage)	V	unsigned
0x2a	Get operating hours - TOTAL (Total operating hours)	Minutes	unsigned

[1] Curr. (= currency), depending on the settings on the device

Commands for 3-phase inverters: Querying measured values

Value	Command / query	Unit	Data type
0x2b	Get phase current for phase 1 (Phase current for phase 1)	A	unsigned
0x2c	Get phase current for phase 2 (Phase current for phase 2)	A	unsigned
0x2d	Get phase current for phase 3 (Phase current for phase 3)	A	unsigned
0x2e	Get phase voltage for phase 1 (Phase voltage for phase 1)	V	unsigned

Commands for 3-phase inverters: Querying measured values (continued)

Value	Command / query	Unit	Data type
0x2f	Get phase voltage for phase 2 (Phase voltage for phase 2)	V	unsigned
0x30	Get phase voltage for phase 3 (Phase voltage for phase 3)	V	unsigned
0x31	Ambient temperature (Ambient temperature)	° C	signed
0x32	Front left fan rotation speed (Front left fan speed)	rpm	unsigned
0x33	Front right fan rotation speed (Front right fan speed)	rpm	unsigned
0x34	Rear left fan rotation speed (Rear left fan speed)	rpm	unsigned
0x35	Rear right fan rotation speed (Rear right fan speed)	rpm	unsigned

Commands for sensor card / sensor box: Querying measured values

Value	Command / query	Unit	Data type
0xe0	Get temperature channel 1 - NOW (Current temperature channel 1)	(2)	signed
0xe1	Get temperature channel 2 - NOW (Current temperature channel 2)	(2)	signed
0xe2	Get insolation - NOW (Current insolation)	W/m²	unsigned
0xe3	Get minimal temperature channel 1 - DAY (Minimum temperature channel 1 today)	(2)	signed
0xe4	Get maximum temperature channel 1 - DAY (Maximum temperature channel 1 today)	(2)	signed
0xe5	Get minimal temperature channel 1 - YEAR (Minimum temperature channel 1 for the year)	(2)	signed
0xe6	Get maximum temperature channel 1 - YEAR (Maximum temperature channel 1 for the year)	(2)	signed
0xe7	Get minimal temperature channel 1 - TOTAL (Total minimum temperature channel 1)	(2)	signed
0xe8	Get maximum temperature channel 1 - TOTAL (Total maximum temperature channel 1)	(2)	signed
0xe9	Get minimal temperature channel 2 - DAY (Minimum temperature channel 2 today)	(2)	signed
0xea	Get maximum temperature channel 2 - DAY (Maximum temperature channel 2 today)	(2)	signed
0xeb	Get minimal temperature channel 2 - YEAR (Minimum temperature channel 2 for the year)	(2)	signed
0xec	Get maximum temperature channel 2 - YEAR (Maximum temperature channel 2 for the year)	(2)	signed
0xed	Get minimal temperature channel 2 - TOTAL (Total minimum temperature channel 2)	(2)	signed
0xee	Get maximum temperature channel 2 - TOTAL (Total maximum temperature channel 2)	(2)	signed
0xef	Get maximum insolation - DAY (Maximum insolation today)	W/m²	unsigned
0xf0	Get maximum insolation - YEAR (Maximum insolation for the year)	W/m²	unsigned

Commands for sensor card / sensor box: Querying measured values (continued)

Value	Command / query	Unit	Data type
0xf1	Get maximum insolation - TOTAL (Total maximum insolation)	W/m²	unsigned
0xf2	Get value of digital channel 1 - NOW (Current value for digital channel 1)	(2)	unsigned
0xf3	Get value of digital channel 2 - NOW (Current value for digital channel 2)	(2)	unsigned
0xf4	Get maximum of digital channel 1 - DAY (Maximum value for digital channel 1 today)	(2)	unsigned
0xf5	Get maximum of digital channel 1 - YEAR (Maximum value for digital channel 1 for the year)	(2)	unsigned
0xf6	Get maximum of digital channel 1 - TOTAL (Total maximum value for digital channel 1)	(2)	unsigned
0xf7	Get maximum of digital channel 2 - DAY (Maximum value for digital channel 2 today)	(2)	unsigned
0xf8	Get maximum of digital channel 2 - YEAR (Maximum value for digital channel 2 for the year)	(2)	unsigned
0xf9	Get maximum of digital channel 2 - TOTAL (Total maximum value for digital channel 2)	(2)	unsigned

(2) Depending on the settings on the device (e.g. °C or °F)

Error messages

General remarks

The interface card outputs an error message if:
- a command or measured value query has not been executed within a specified period of time in the LocalNet ring
- an error occurs whilst a command is being executed

The error message
- describes the command that has caused the error
- provides details of the nature of the error

Error message structure

Error message structure

Start	Length	Device/option	Number	Error	Command which caused the error	Error information	Checksum
	0x02	(unchanged)	(unchanged)	(0x0E)	(1 byte)	(1 byte)	

The value of the command byte is always 0x0E.
The command which has caused the error is shown as the first byte in the data field.

Details of error

Value	Explanatory note
0x01	Unknown command
0x02	Timeout A command or measured value query has not been executed within a specified period of time in the LocalNet ring
0x03	Incorrect data structure
0x04	Queue of commands awaiting execution is full Wait until the last command has been executed
0x05	Device or option not present The device or option to which the command was directed is not present in the LocalNet ring
0x06	No response from device or option The device or option to which the command was directed is not responding
0x07	Sensor error The device or option to which the command was directed is reporting a sensor error
0x08	Sensor not active This is output when the selected channel is not active
0x09	Incorrect command for device or option The command cannot be executed in conjunction with the selected device or option

Fronius Worldwide - www.fronius.com/addresses

(A) **Fronius International GmbH**
4600 Wels-Thalheim, Günter-Fronius-Straße 1, Austria
E-Mail: pv@fronius.com
http://www.fronius.com

(USA) **Fronius USA LLC** Solar Electronic Division
5266 Hollister Ave., #117, Santa Barbara, California 93111
E-Mail: pv-us@fronius.com
http://www.fronius-usa.com

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