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<p>SOMFY RS485 PROTOCOL</p> <p>User's Guide</p>



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1 Introduction

This document describes the SOMFY RS485-based open protocol.

The provided content brings all technical information allowing users, system integrators and software developers to establish a bi-directional communication with SOMFY RS485 products.


The following symbols can be found in the document:



Warning ⇨ Indicating a key point to be taken in consideration.
(Usually a common source of problems).



Example ⇨ Giving detailed help on how to implement a feature.

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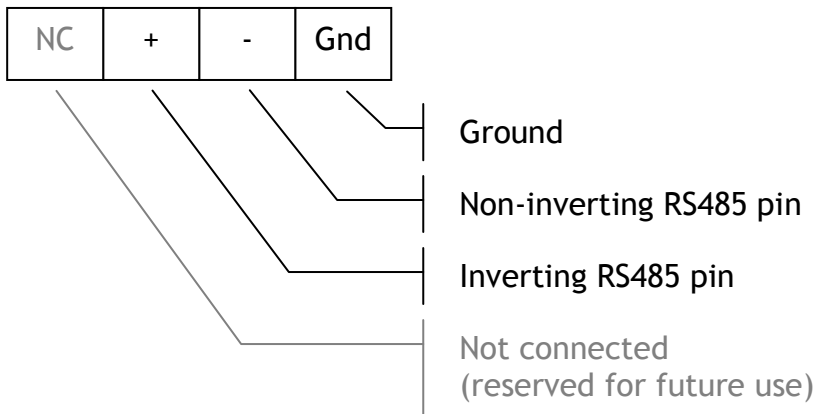
2 Installation

2.1 RS485 Connection and cable

SOMFY RS485 is fully compliant with TIA-485-A standard.

Recommended cable type: shielded twisted pair + ground (3 wires).

Every SOMFY RS485 product is equipped with a 3 or 4 pins connector:



The use of “A” and “B” naming convention is often used in RS485 products but is not really standardized. To avoid misunderstanding, “+” and “-“ are used.

2.2 Serial Number

The Serial Number is a 12-bytes ASCII string that can be used as a unique identifier for a given product.


The Serial Number is not needed for bus communications, but can be read from the product for identification purposes.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12
Node ID						Manufacturer ID			Year		Week

Node ID: Built-in address of the product (see §4.1.1)

Manufacturer ID: Identification of the supplier - Used for traceability only

Year / Week: Date of manufacturing - Used for traceability only

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3 Serial Communication

3.1 Characteristics

Data transmission is based on an asynchronous serial communication:

Bauds Rate	4800
Data bits	8
Parity	Odd
Start Bit	Logical level 0
Stop Bit	Logical level 1
Character coding	NRZ

3.2 Character Coding

“Character” refers to all bits including START bit, DATA bits, PARITY bit and STOP bits.

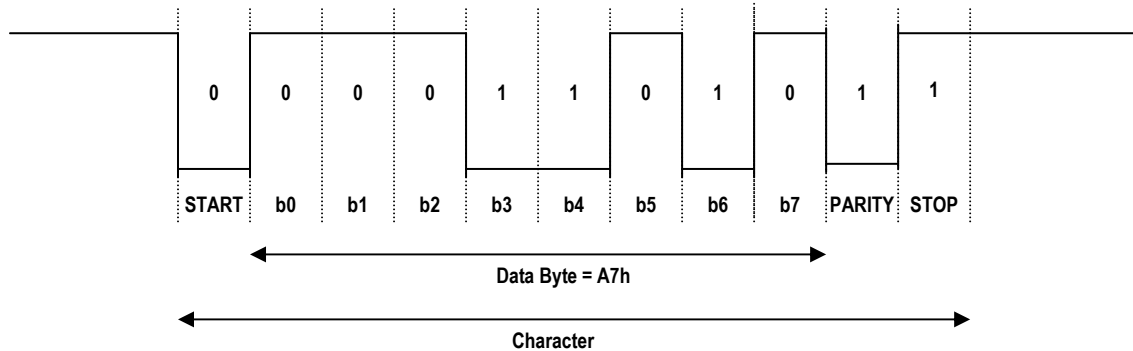


Warning

Every bit of the data part of a character is inverted before transmission.




⇒ If data = A7h, then the real value to send is NOT(A7h) = 58h:



In all examples given in this document, the following terms are used to refer to both data:

- “Raw” value is the original value before bit inversion: A7h
- “Actual” value is the real value that is sent on the bus after bit inversion: 58h

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4 Protocol Basics

The SOMFY RS485 protocol handles only half-duplex communication between a MASTER and SLAVES:

- MASTER nodes can send commands at any time to one or more SLAVES on the bus.
- SLAVE nodes can only execute commands or report status when requested by a MASTER.

4.1 Device Identification

4.1.1 NodeID

Every RS485 device has a built-in 3-bytes address called NodeID. It's programmed during product manufacturing and cannot be changed.

The NodeID is used in every communication to identify the transmitter and the receiver(s).

Addresses are recycled on a 3 to 5 years basis, depending on the product sales.

⇒ On a given installation, the NodeID can be considered as unique.

⇒ If a real unique ID is needed, then it's recommended to use the Serial Number.

The NodeID can be found on the device label in both plain text and barcode format.

NodeID ranges:


Starting NodeID	Ending NodeID	Description
00:00:00	00:00:00	Reserved for group addressing mode (see §4.3)
00:00:01	00:00:FF	Reserved for R&D prototypes
00:01:00	FF:FE:FF	Available for devices NodeID
FF:FF:00	FF:FF:FE	Reserved for 3 rd party MASTER node
FF:FF:FF	FF:FF:FF	Reserved for broadcast addressing mode (see §4.3)

4.1.2 Device Type

Every device has a built-in 4-bits value called NodeType, used to identify the product family.

The NodeType can be used in bus communication to send messages only to a selected range of products (see Addressing Modes), or to access application-specific messages (see NodeType Filtering).

Product Name	NodeType
ST30 RS485	02h
MOCO RS485	03h
RS485 4ILT interface	04h
RS485 RTS transmitter	05h
...	

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4.2 Groups

Every device can be part of up to 16 groups, defined by a GroupID.

A GroupID has the exact same format as the NodeID and can be:

- The NodeID of an existing device on the bus, acting as a controller
- A non-existing NodeID, representing a virtual group

In order to use group commands, every product belonging to a group has to be assigned to the corresponding GroupID: one of the 16 entries of the built-in group table should contain the GroupID.

4.3 Addressing Modes

The protocol provides 3 different addressing modes:

- o Point to point: communication from a transceiver to one and only one receiver
- o Group: communication from a transmitter to a group of devices
- o Broadcast: communication from a transmitter to all the devices

In addition, any of the above mentioned mode can be associated with NodeType filtering.

4.4 Message Types

All user messages are split into 3 categories:

- o Settings:
 - Name = SET_xxx
 - Change the configuration of the device
- o Controls:
 - Name = CTRL_xxx
 - Send a command to execute
- o Status:
 - Name = GET_xxx
 - Ask for information on the device configuration or its current status
 - SLAVE(s) will respond with the corresponding POST_xxx message


4.5 Acknowledgments

Every message sent by a MASTER can be associated with an acknowledgment request. This optional acknowledgment will give feedback on the message processing.

SLAVE(s) response will depend on the type of message, according to the following table:

	ACK	NACK
Settings	Parameters are saved in non volatile memory	Cannot execute
Controls	Execution is started, but not necessarily finished	
Status	N/a	

No ACK is sent after a status request, as the feedback is given by the status report itself. When a NACK is sent, an error code is given to indicate the reason of the failure.

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5 Frame Organization

The following table defines all fields required in the message frame.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	...	Byte n-1	Byte n	
MSG	ACK/LEN	NODE TYPE	SOURCE @			DEST @			DATA		CHECKSUM	

Minimum length = 11 bytes (i.e. without any DATA)

Maximum length = 32 bytes (i.e. maximum 21 bytes of DATA)

Every field is detailed in the following sections.

5.1 MSG

Byte 1							
B7	b6	b5	b4	b3	b2	b1	b0
MSG							

MSG = Message identifier

Messages are split in two groups:

- Standard messages, which are common to all protocol compliant products
- Application-specific messages which are specific to a particular type of product

Refer to the “Messages” section for a detailed description of available messages.

5.2 ACK/LEN

Byte 2							
B7	b6	b5	b4	b3	b2	b1	b0
ACK	EXT			LEN			

ACK = Acknowledge request

EXT = Always 0 (Reserved)

LEN = Frame length (0 to 31)



Warning

Be sure to always set EXT bits to 0, as they are reserved for future protocol extension.

5.3 NODE TYPE

Byte 3							
b7	b6	b5	b4	b3	b2	b1	b0
SRC Node Type				DEST Node Type			


SRC NodeType = NodeType of the transmitter

- ▶ Not needed for network communication.
- ▶ Given as information that may be used at application level.

DEST NodeType = NodeType of the receiver(s)

- ▶ Used to implement NodeType filtering

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5.4 SOURCE@ / DEST@

SOURCE@ = NodeID of the transmitter

DEST@ = NodeID of the receiver

Different addressing modes are available, depending on the values of SOURCE@ and DEST@ fields.

	Bytes 4 to 6	Bytes 7 to 9	Description
Point To Point	SOURCE@ = NodeID	DEST@ = NodeID	Only the device with NodeID = DEST@ will execute the message
Group	SOURCE@ = GroupID	000000h	All nodes belonging to the group will execute the message (i.e. all nodes with GroupID present in their group table)
Broadcast	SOURCE@ = NodeID	FFFFFFh	All nodes on the bus will execute the message



Warning:

SOURCE@ and DEST@ are LSBF in the frame



⇒ If a communication in Point To Point mode is made from NodeID = 05:04:03 (as shown on the device label) to NodeID = 00:01:02, then the SOURCE@ and DEST@ fields are coded as follow:

Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
SOURCE@			DEST@		
03h	04h	05h	02	01	00

5.5 DATA

The length of the DATA field depends on the message


Byte 10	...	Byte n-2
DATA 0	...	DATA x

5.6 CHECKSUM

The checksum is only a basic error detection algorithm, without any error correction capabilities. It's calculated by adding the complement of every byte in the frame.

Byte n-1	Byte n
CHECKSUM	

$$\text{CHECKSUM} = \overline{(\text{Byte } 1 + \dots + \text{Byte } n-2)}$$

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6 Standard Messages

The following chapters describe all messages that are implemented in every SOMFY RS485 products.

These messages are used for basic network management, network diagnosis and product identification.

6.1 Network management

6.1.1 GET_NODE_ADDR (40h)

- Ask all online nodes to send their NodeID

MSG	Name	DATA Length	FRAME Length	Addressing		
40h	GET_NODE_ADDR	0	11	P2P	GROUP	BROADCAST

Related messages	Reply		
		POST_NODE_ADDR	60h
	<i>Configuration</i>	N/a	

6.1.2 POST_NODE_ADDR (60h)

- Send built-in NodeID

MSG	Name	DATA Length	FRAME Length	Addressing		
60h	POST_NODE_ADDR	0	11	P2P	GROUP	BROADCAST

Related messages	Request		
		GET_NODE_ADDR	40h
	<i>Configuration</i>	N/a	

Remark

No data needed, address is included in frame header.


6.1.3 GET_GROUP_ADDR (41h)

- Read one entry of groups table

MSG	Name	DATA Length	FRAME Length	Addressing		
41h	GET_GROUP_ADDR	1	12	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
GroupIndex	8-bits	0	15	

Related messages	Reply		
		POST_GROUP_ADDR	61h
	<i>Configuration</i>	SET_GROUP_ADDR	51h

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6.1.4 POST_GROUP_ADDR (61h)

MSG	Name	DATA Length	FRAME Length	Addressing		
				P2P	GROUP	BROADCAST
61h	POST_GROUP_ADDR	4	15	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
GroupIndex	8-bits	0	15	
GroupID	24-bits	N/a	N/a	

Related messages	Request	GET_GROUP_ADDR	41h
	Configuration	SET_GROUP_ADDR	51h

- Send content of the requested groups table entry

MSG	Name	DATA Length	FRAME Length	Addressing		
				P2P	GROUP	BROADCAST
51h	SET_GROUP_ADDR	4	15	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
GroupIndex	8-bits	0	15	
GroupID	24-bits	N/a	N/a	

Related messages	Request	GET_GROUP_ADDR	41h
	Reply	POST_GROUP_ADDR	61h

6.1.5 SET_GROUP_ADDRESS (51h)

- Define one entry in the group address table

6.1.6 ACK (7Fh)

- Send an acknowledgment to a frame with ACK bit set


MSG	Name	DATA Length	FRAME Length	Addressing		
				P2P	GROUP	BROADCAST
7Fh	ACK	0	11	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
N/a				

Related messages	Request	All messages with ACK bit set	

Remark

This frame is only sent when ACK is requested and no error is detected during data analysis.

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6.1.7 NACK (6Fh)

- Send an acknowledgment with error code to a frame with ACK bit set

MSG	Name	DATA Length	FRAME Length	Addressing		
6Fh	NACK	1	12	P2P	GROUP	BROADCAST


DATA	TYPE	MIN	MAX	Description
Status	8-bits	01h	1Fh + FFh	Range 01h to 1Fh + FFh Others values used by applications

Status	Description	Remarks
00h	Action completed OK	Obsolete - ACK should be used
01h	Data out of range	Issued when checking data fields consistency
10h	Unknown message	
11h	Message Length Error	
FFh	Busy - Cannot process message	

Related messages	Request	All messages with ACK bit set

Remark

This frame is sent when ACK is requested but an error is detected during data analysis.

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6.2 Product Information

6.2.1 GET_NODE_STACK_VERSION (70h)

➤ Read protocol software information

MSG	Name	DATA Length	FRAME Length	Addressing		
70h	GET_NODE_STACK_VERSION	0	11	P2P	GROUP	BROADCAST

Related messages	<i>Reply</i>	POST_NODE_STACK_VERSION	71h
	<i>Configuration</i>	N/a	

6.2.2 POST_NODE_STACK_VERSION (71h)

➤ Send protocol software information

MSG	Name	DATA Length	FRAME Length	Addressing		
71h	POST_NODE_STACK_VERSION	6	17	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
Stack_Reference	24-bits (LSBF)	N/a	N/a	
Stack_IndexLetter	8-bits ASCII	41h	5Ah	ASCII code (letter from 'A' to 'Z')
Stack_IndexNumber	8-bits	N/a	N/a	
Stack_Standard	8-bits	N/a	N/a	Revision of the ILTv3 Standard Messages document (consistent with "Guideline" revision)

Related messages	<i>Request</i>	GET_NODE_STACK_VERSION	70h
	<i>Configuration</i>	N/a	


Example

Protocol stack software reference 5063486A02 according to GME-STD 065 R10 is coded as follows:

Stack_Reference	Stack_IndexLetter	Stack_IndexNumber	
Stack_Standard			
4Dh 43h 3Eh	41h	02h	0Ah

Remark

The protocol stack software reference is built in the software itself and cannot be changed (no SET_NODE_STACK_VERSION message)

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6.2.3 GET_NODE_SERIAL_NUMBER (4Ch)

➤ Read serial number (NodeID + ManufacturerID + DateCode)

MSG	Name	DATA Length	FRAME Length	Addressing		
4Ch	GET_NODE_SERIAL_NUMBER	0	11	P2P	GROUP	BROADCAST

Related messages	<i>Reply</i>	POST_NODE_SERIAL_NUMBER	6Ch
	<i>Configuration</i>	N/a	

6.2.4 POST_NODE_SERIAL_NUMBER (6Ch)

➤ Send serial number (NodeID + ManufacturerID + DateCode)

MSG	Name	DATA Length	FRAME Length	Addressing		
6Ch	POST_NODE_SERIAL_NUMBER	12	23	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
SerialNumber	ASCII String	N/a	N/a	See string definition below

Related messages	<i>Request</i>	GET_NODE_SERIAL_NUMBER	4Ch
	<i>Configuration</i>	N/a	


This format is consistent with data shown on product label and barcode.

Example

Product NodeID = 01:02:03
 Manufacturer ID = GD (always two letters)
 Year = 2009
 Week = 45

Coded in ASCII as follows:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Node ID					Node ID		Year		Week		
30h	31h	30h	32h	30h	33h	47h	44h	30h	39h	34h	35h

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6.3 Application Information

6.3.1 GET_NODE_APP_VERSION (74h)

➤ Read application software information

MSG	Name	DATA Length	FRAME Length	Addressing		
				P2P	GROUP	BROADCAST
74h	GET_NODE_APP_VERSION	0	11	P2P	GROUP	BROADCAST

Related messages	Reply	POST_NODE_APP_VERSION	75h
	Configuration	N/a	

6.3.2 POST_NODE_APP_VERSION (75h)

➤ Send application software information

MSG	Name	DATA Length	FRAME Length	Addressing		
				P2P	GROUP	BROADCAST
75h	POST_NODE_APP_VERSION	6	17	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
App_Reference	24-bits	N/a	N/a	
App_IndexLetter	8-bits ASCII	41h	5Ah	ASCII code (letter from 'A' to 'Z')
App_IndexNumber	8-bits	N/a	N/a	
App_Profile	8-bits	N/a	N/a	Revision of the ILTv3 profile (consistent with "Guideline" revision)

Related messages	Request	GET_NODE_APP_VERSION	74h
	Configuration	N/a	


Example

Application software reference 5063486A02 according to GME-INF xxx R1 is coded as follows:

App_Reference	App_IndexLetter	App_IndexNumber	
App_Profile			
4Dh 43h 3Eh	41h	02h	01h

Remarks

- The reference of the GME-INF xxx for a specific product can be found in the GME-STD 062 "ILTv3 Protocol Overview" document.
- The application software reference is built in the software itself and cannot be changed (no SET_NODE_APP_VERSION message).

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6.3.3 GET_NODE_LABEL (45h)

- Read user-defined label from one node

MSG	Name	DATA Length	FRAME Length	Addressing		
45h	GET_NODE_LABEL	0	11	P2P	GROUP	BROADCAST

Related messages	Reply		
		POST_NODE_LABEL	65h
	<i>Configuration</i>	SET_NODE_LABEL	55h

6.3.4 POST_NODE_LABEL (65h)

- Send user-defined text label for the node

MSG	Name	DATA Length	FRAME Length	Addressing		
65h	POST_NODE_LABEL	16	27	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
Label	String	N/a	N/a	User defined text up to 16 characters

Related messages	Request		
		GET_NODE_LABEL	45h
	<i>Configuration</i>	SET_NODE_LABEL	55h

Remark

Default values = 00h for all label characters


6.3.5 SET_NODE_LABEL (55h)

- Write user-defined text in E²Prom memory to identify the motor

MSG	Name	DATA Length	FRAME Length	Addressing		
55h	SET_NODE_LABEL	16	27	P2P	GROUP	BROADCAST

DATA	TYPE	MIN	MAX	Description
Label	String	N/a	N/a	User defined text up to 16 characters

Related messages	Request		
		GET_NODE_LABEL	45h
	<i>Reply</i>	POST_NODE_LABEL	65h

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7 Application profile

In addition to the above mentioned “Standard Messages”, every SOMFY RS485 product uses a specific set of messages for configuration and control.

The application-specific messages are available in separate documents called “Application Profile”.

Every “Application Profile” is linked to a different NodeType (see §4.1.2)

[...]