Elétrica

Brasiltec

Manual do Produto

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Protocolo Modbus - RTU

1 MODBUS Protocol Message Format

The MODBUS Protocol defines the format for the master?s query and the slave?s response. The query contains the device (or broadcast) address, a function code defining the requested action, any data to be sent, and an error-checking field.
The response contains fields confirming the action taken, any data to be returned, and an error-checking field. If an error occurred in receipt of the message then the message is ignored, if the slave is unable to perform the requested action, then it will construct an error message and send it as its response. The MODBUS Protocol functions used by the Brasiltec Digital meters copy 16 bit register values between master and slaves. However, the data used by the Brasiltec Digital meter is in 32 bit IEEE 754 floating point format. Thus each instrument parameter is conceptually held in two adjacent MODBUS Protocol registers. Query
The following example illustrates a request for a single floating point parameter i.e. two 16-bit Modbus Protocol Registers.

First Byte								Last Byte
Slave Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)

Slave Address: 8-bit value representing the slave being addressed (1 to 247), 0 is reserved for the broadcast address. The Brasiltec Digitalmeters do not support the broadcast address.
Function Code: 8-bit value telling the addressed slave what action is to be performed. (3, 4, 8 or 16 are valid for Brasiltec Digital meter)
Start Address (Hi): The top (most significant) eight bits of a 16-bit number specifying the start address of the data being requested.
Start Address (Lo): The bottom (least significant) eight bits of a 16-bit number specifying the start address of the data being requested. As registers are used in pairs and start at zero, then this must be an even number.
Number of Points (Hi): The top (most significant) eight bits of a 16-bit number specifying the number of registers being requested.
Number of Points (Lo): The bottom (least significant) eight bits of a 16-bit number specifying the number of registers being requested. As registers are used in pairs, then this must be an even number.
Error Check (Lo): The bottom (least significant) eight bits of a 16-bit number representing the error check value.
Error Check (Hi): The top (most significant) eight bits of a 16-bit number representing the error check value.

Response

The example illustrates the normal response to a request for a single floating point parameter i.e. two 16-bit Modbus Protocol Registers.

First Byte								Last Byte
Slave Address	Function Code	Byte Count	First Register (Hi)	First Register (Lo)	Second Register (Hi)	Second Register (Lo)	Error Check (Lo)	Error Check (Hi)

Slave Address: 8-bit value representing the address of slave that is responding.
Function Code: 8-bit value which, when a copy of the function code in the query, indicates that the slave recognised the query and has responded. (See also Exception Response).
Byte Count: 8-bit value indicating the number of data bytes contained within this response
First Register (Hi)*: The top (most significant) eight bits of a 16-bit number representing the first register requested in the query.
First Register (Lo)*: The bottom (least significant) eight bits of a 16-bit number representing the first register requested in the query.
Second Register (Hi)*: The top (most significant) eight bits of a 16-bit number representing the second register requested in the query.
Second Register (Lo)*: The bottom (least significant) eight bits of a 16-bit number representing the second register requested in the query.
Error Check (Lo): The bottom (least significant) eight bits of a 16-bit number representing the error check value.
Error Check (Hi): The top (most significant) eight bits of a 16-bit number representing the error check value.

Exception Response

If an error is detected in the content of the query (excluding parity errors and Error Check mismatch), then an error response (called an exception response), will be sent to the master. The exception response is identified by the function code being a copy of the query function code but with the most-significant bit set. The data contained in an exception response is a single byte error code.

First Byte				Last Byte
Slave Address	Function Code	Error Code	Error Check (Lo)	Error Check (Hi)

Slave Address: 8-bit value representing the address of slave that is responding.
Function Code: 8 bit value which is the function code in the query OR ed with 80 hex, indicating that the slave either does not recognize the query or could not carry out the action requested.
Error Code: 8-bit value indicating the nature of the exception detected. (See ?Table Of Exception Codes? later).
Error Check (Lo): The bottom (least significant) eight bits of a 16-bit number representing the error check value.
Error Check (Hi): The top (most significant) eight bits of a 16-bit number representing the error check value.

2 Read Input Registers

2.1 MODBUS Protocol code 04 reads the contents of the 3X registers.

Example

The following query will request ?Volts 1? from an instrument with node address 1:

Field Name	Example(Hex)
Slave Adderess	01
Function	04
Starting Address High	00
Starting Address Low	00
Number of Points High	00
Number of Points Low	02
Error Check Low	71
Error Check High	CB

Note: Data must be requested in register pairs i.e. the

The following response returns the contents of Volts 1 as 230.2. But see also ?Exception Response? later.

Field Name	Example(Hex)
Slave Adderess	01
Function	04
Byte Count	04
Data, High Reg. High Byte	43
Data, High Reg. Low Byte	66
Data, Low Reg. High Byte	33
Data, Low Reg. Low Byte	34
Error Check Low	1B
Error Check High	38

2.2 Read Holding Registers

MODBUS Protocol code 03 reads the contents of the 4X registers.

Example

The following query will request the prevailing Network Node:

Field Name	Example(Hex)
Slave Adderess	01
Function	03
Starting Address High	00
Starting Address Low	00
Number of Points High	00
Number of Points Low	14
Error Check Low	C4
Error Check High	0B

Note: Data must be requested in register pairs i.e. the

The following response returns the contents of Demand Time as 1, but see also

Field Name	Example(Hex)
Slave Adderess	01
Function	03
Byte Count	04
Data, High Reg. High Byte	3F
Data, High Reg. Low Byte	80
Data, Low Reg. High Byte	00
Data, Low Reg. Low Byte	00
Error Check Low	F7
Error Check High	CF

2.3 Write Holding Registers

MODBUS Protocol code 10 (16 decimal) writes the contents of the 4X registers.

Example

The following query will set the Network Node to 60:

Field Name	Example(Hex)
Slave Adderess	01
Function	10
Starting Address High	00
Starting Address Low	14
Number of Registers High	00

Numero de Registros Low	02
Byte Count	04
Data, High Reg, High Byte	42
Data, High Reg, Low Byte	70
Data, Low Reg, High Byte	00
Data, Low Reg, Low Byte	00
Verifica erro Low	67
Verifica erro High	D5

Note: Data must be written in register pairs i.e. the Starting Address and the Number of Points must be even numbers to write a floating point variable. If the Starting Address or the Number of points is odd then the query will fall in the middle of a floating point variable the product will return an error message. In general only one floating point value can be written per query .

The following response indicates that the write has been successful. But see also Exception Response later.

Nome do Campo	Exemplo (Hex)
Endereço do Escravo	01
Função	10
Iniciando endereço High	00
Iniciando endereço Low	14
Numero do registro High	00
Numero do registro Low	02
Verifica erro Low	E0
Verifica erro High	08

Register Map:
Function code 04 to read input parameters:

Endereço (Registro)	Parâmetros de entrada de Registros			Protocolo Modbus Start Endereço Hex	
	Parâmetros	Unidade	Formato	Hi byte	Lo byte
40001	Tensão	Volts	Float	00	00
40007	Corrente	Amps	Float	00	06
40013	Potência Ativa	Watts	Float	00	0C
40019	Potência Aparente	VA	Float	00	12
40025	Potência Reativa	VAr	Float	00	18
40031	Fator de Potência	None	Float	00	1E
40071	Frequência	Hz	Float	00	46
40073	Energia Ativa Importada	kWh	Float	00	48
40075	Energia Ativa Exportada	kWh	Float	01	4A
40043	Energia Ativa Total	kWh	Float	00	56

Exemplo de como ler a voltagem no supervisório

Endereço:

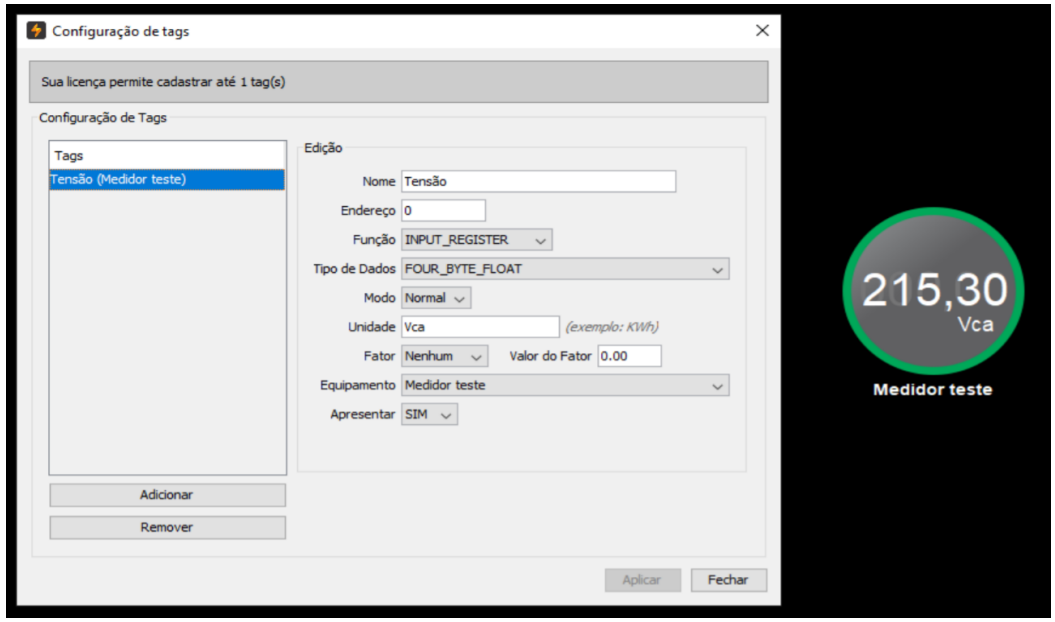
Na tabela acima mostra 40001, onde o 4 somente simboliza o código da função (read input register).Sendo assim o endereço a ser considerado é 1. No entanto como os dados são dois registradores devemos considerar 0 e 1, ou seja, no supervisório devemos configurar o endereço inicial que neste caso é 0.

Função:

Deve considerar input register.

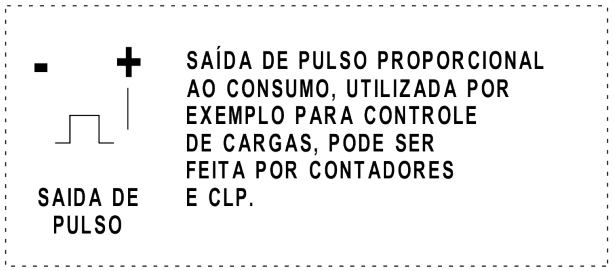
Tipo de dados:

Considerar four_byte_float.



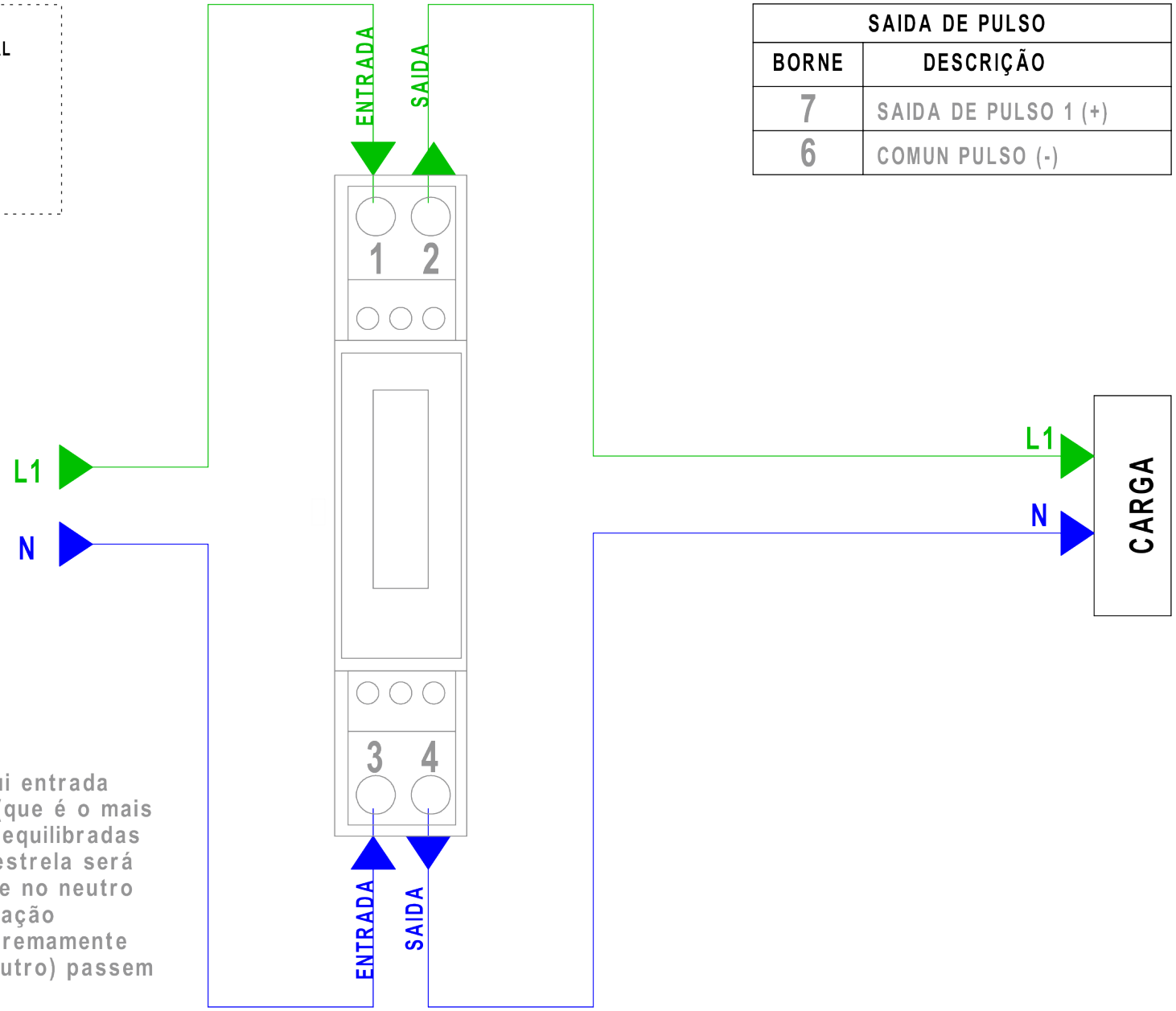
Function code 10 to set holding parameter, function code 03 to read holding parameter.

Address (Register)	Holding Register Parameter		Modbus Protocol Start Address Hex		Description
	Parameters	Format	Hi byte	Lo byte	
30021	Meter ID	Float	00	14	Ranges from 1 to 247, and requires a restart to become effective.Default ID is 1.
30029	Baud rate	Float	00	1C	0:2400bps(default) 1:4800bps 2:9600bps 5:1200bps Requires a restart to become effective.
363745	Time of display in turns.	BCD	F9	00	0-30s Default 0:does not display in turns.
363761	Pulse 1 output	Hex	F9	10	0000:0.001kWh/imp(default) 0001:0.01kWh/imp 0002:0.1kWh/imp 0003:1kWh/imp
363777	Measurem--ent mode	Hex	F9	20	0001:mode 1 (default) 0002:mode 2 0003:mode 3
363793	Pulse 1 output mode	Hex	F9	30	0000:Import+export energy, both LEDs of import and export energy light on(default) 0001:Import energy, only the LED of import energy lights on 0002:Export energy, only the LED of export energy lights on.



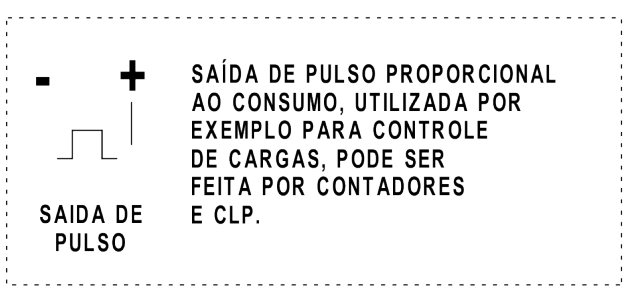
SAÍDA DE PULSO PROPORCIONAL AO CONSUMO, UTILIZADA POR EXEMPLO PARA CONTROLE DE CARGAS, PODE SER FEITA POR CONTADORES E CLP.

SAIDA DE PULSO	
BORNE	DESCRIÇÃO
7	SAIDA DE PULSO 1 (+)
6	COMUN PULSO (-)



220VCA
FASE/NEUTRO
METODO 2

Quando a instalação elétrica possui entrada trifásica com fechamento em estrela, (que é o mais convencional) e as cargas não estão equilibradas a soma das correntes no centro da estrela será diferente de zero, ou seja, a corrente no neutro não mais será nula. Nesta situação notar no diagrama abaixo que é extremamente necessário que ambos fios (fase e neutro) passem pelo medidor.



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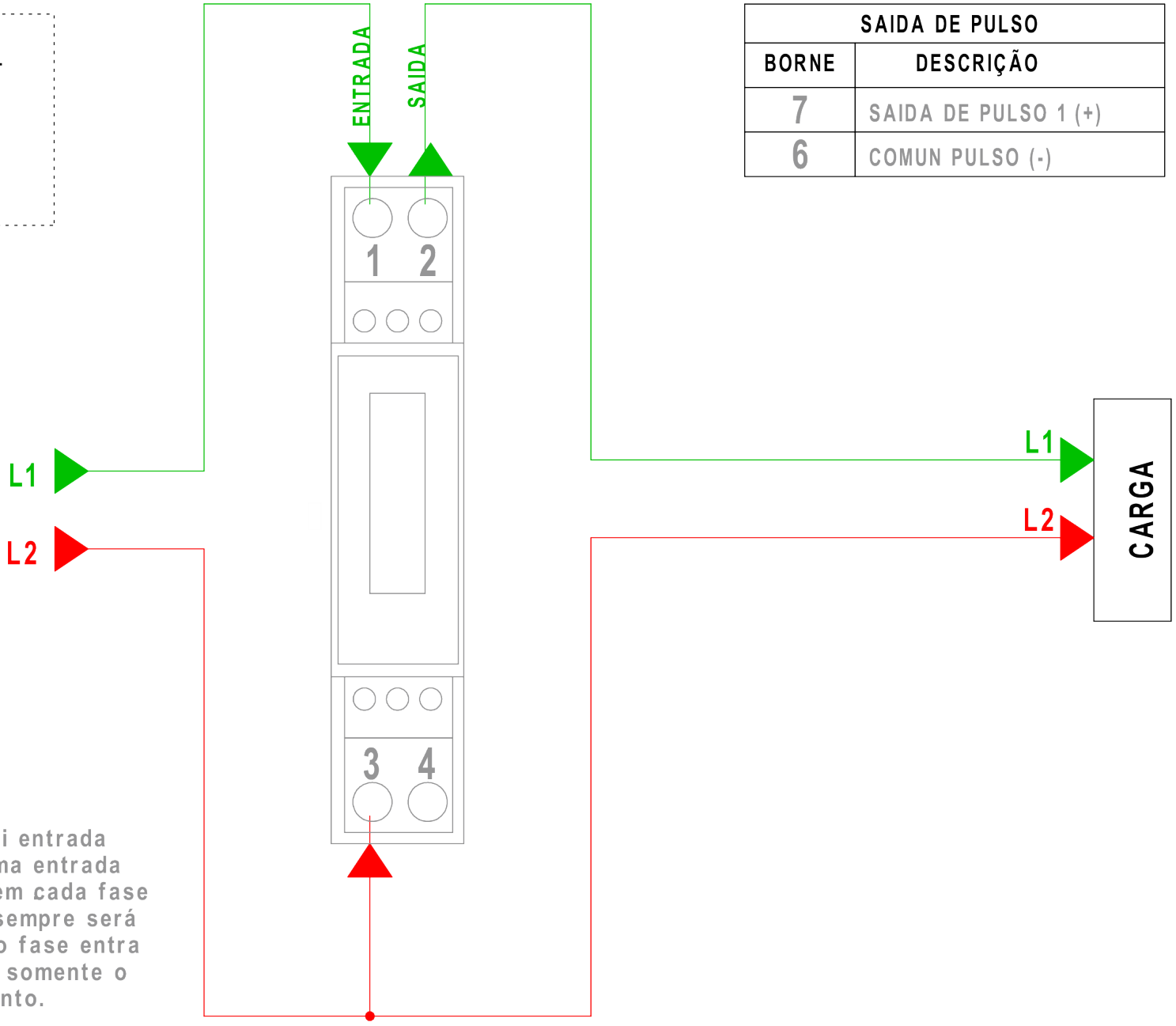
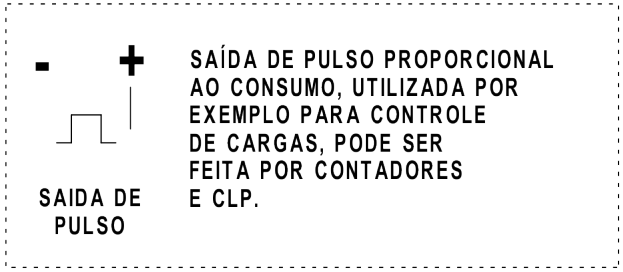


220VCA
FASE/FASE
METODO 01

Quando a instalação elétrica possui entrada monofásica ou quando provém de uma entrada trifásica cujo cargas está equilibrada em cada fase Nesta condição a corrente no neutro sempre será nula. Notar no circuito abaixo que o fio fase entra e sai do medidor, porém a outra fase somente o alimenta para ligar o instrumento.



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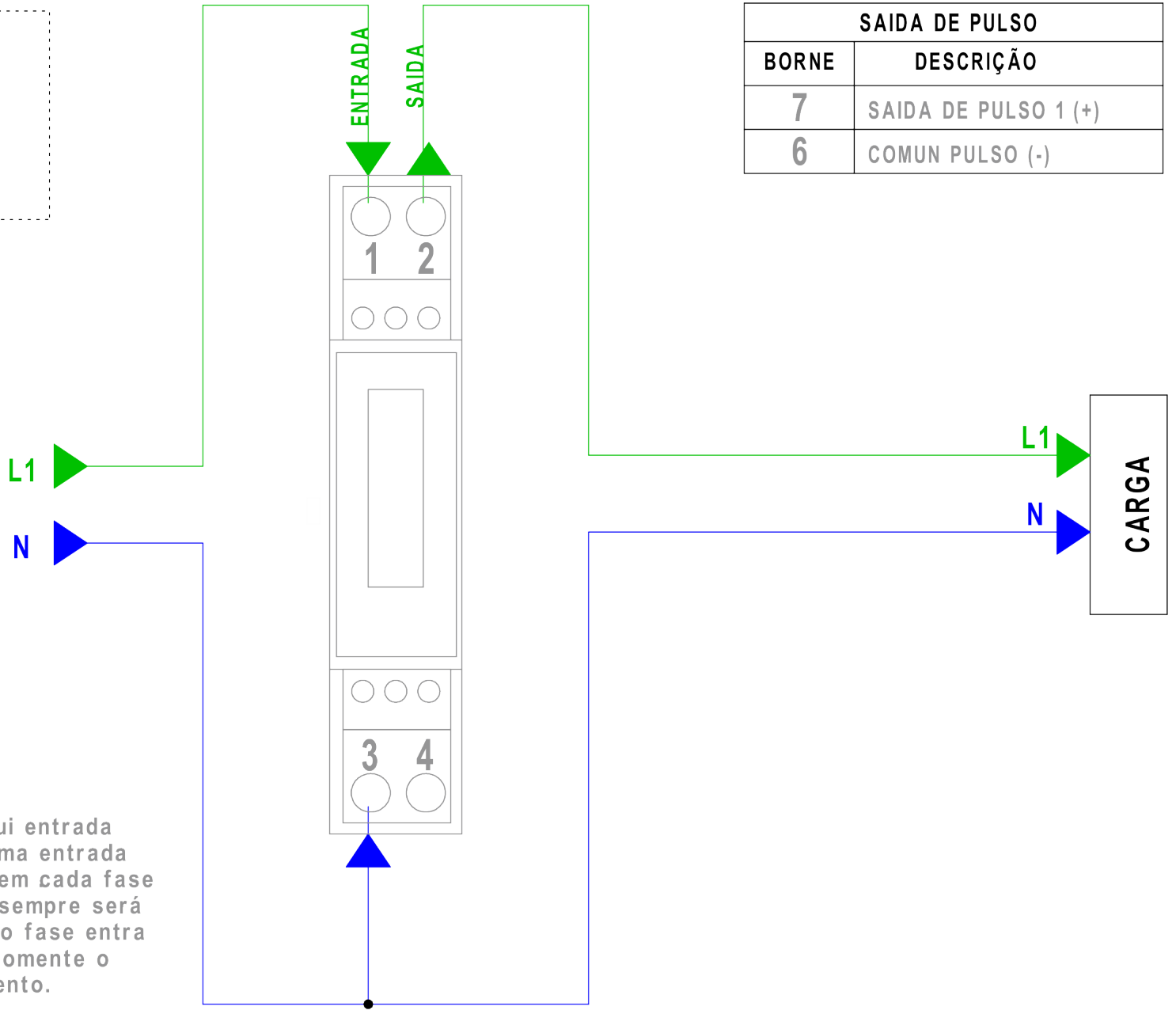

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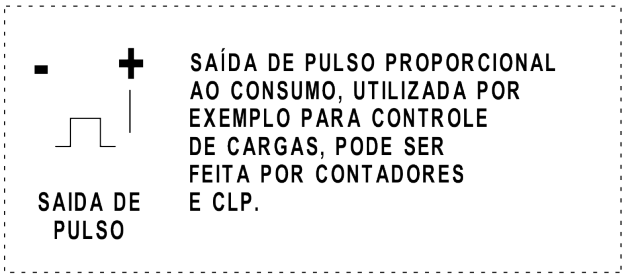

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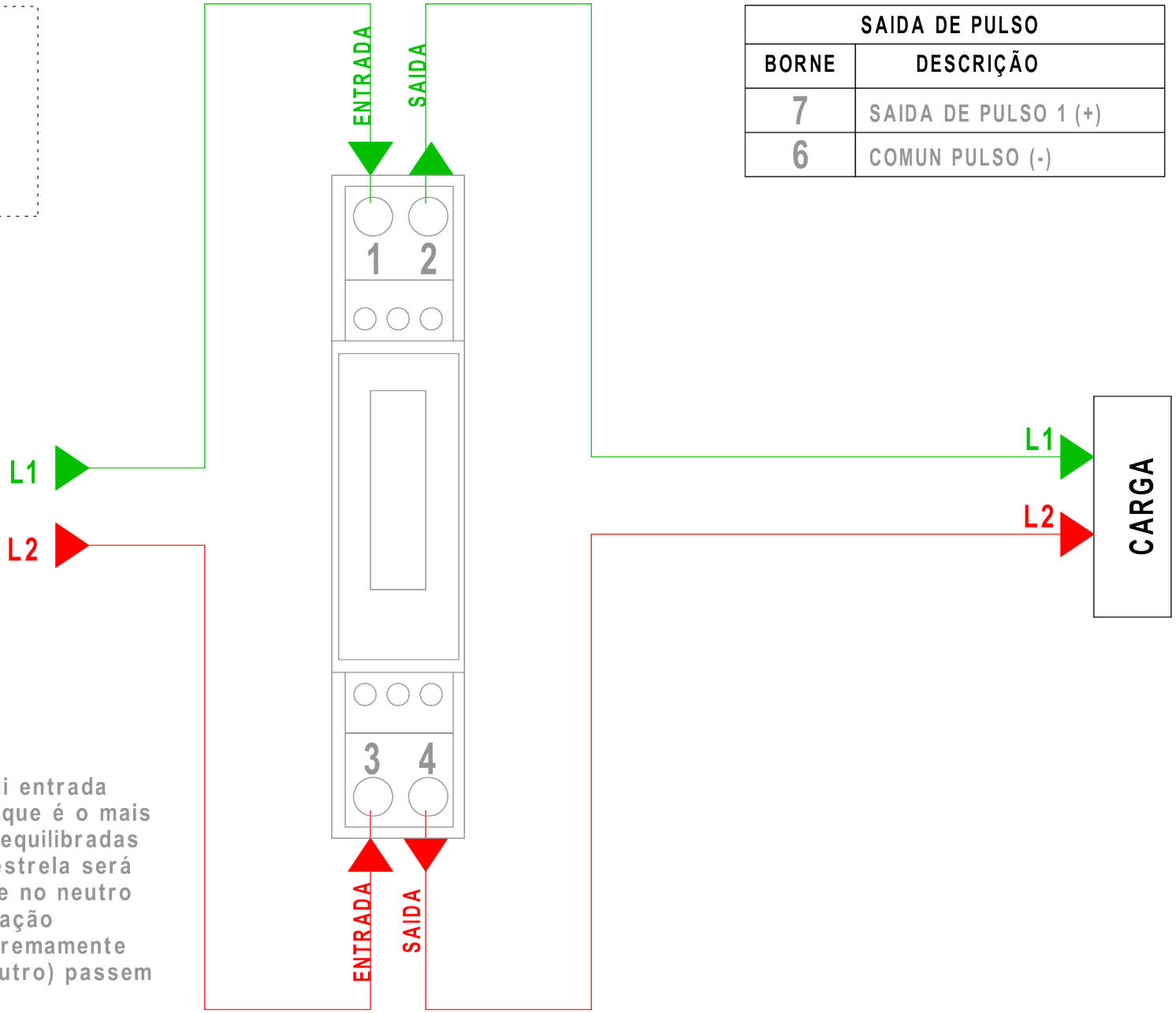

220VCA FASE/FASE METODO 2

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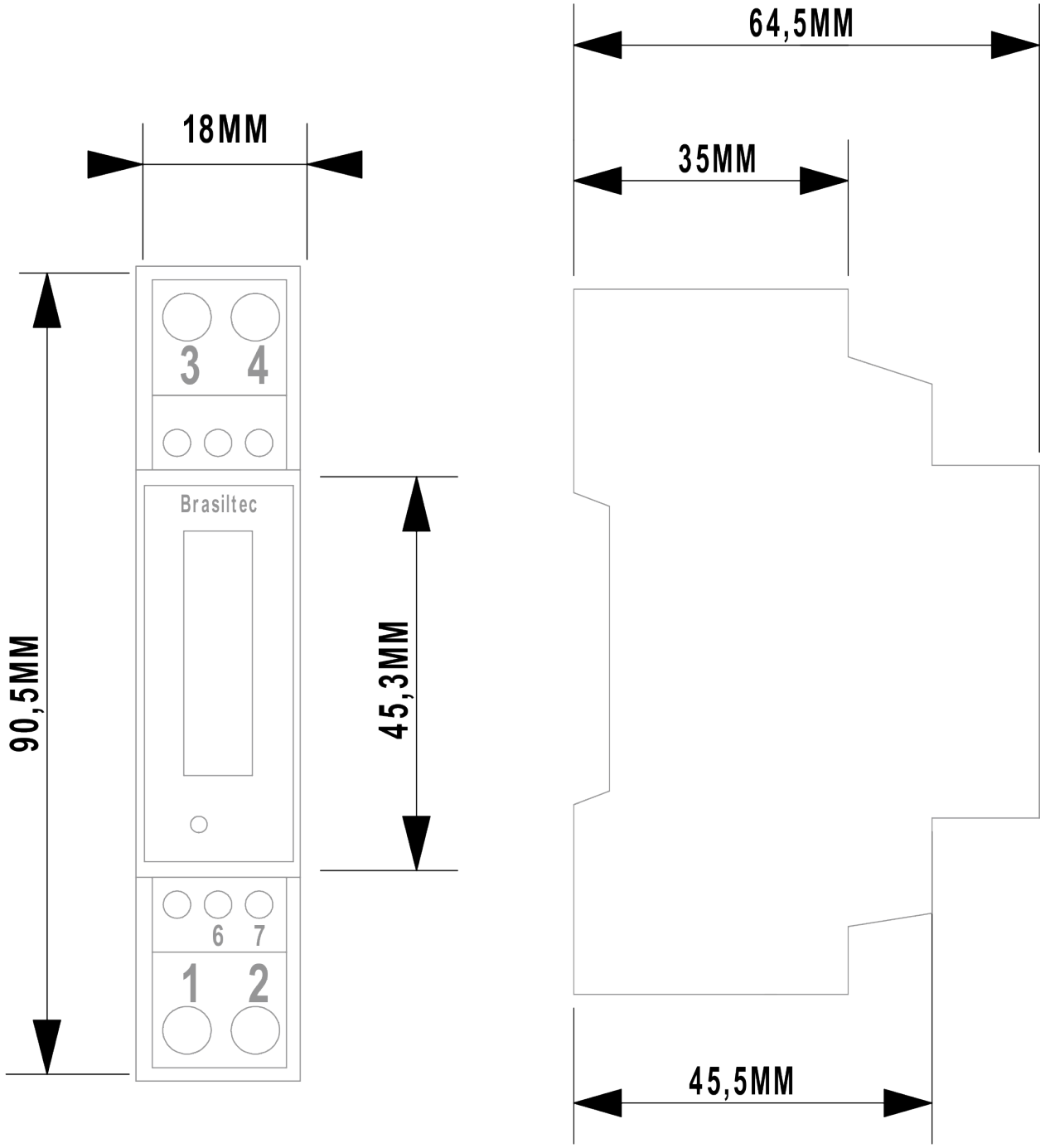
Dimensões



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Elétrica

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