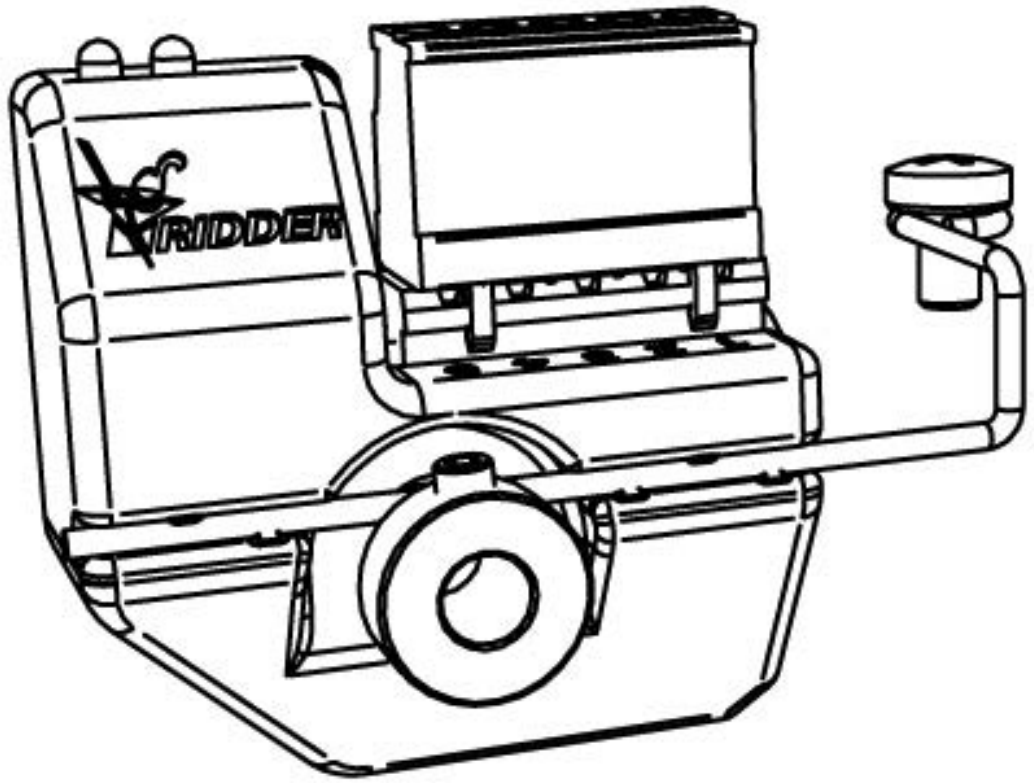

Product manual

Ridder PositioningUnit RPU

265036EN - 201507-V05

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Contents

1.1 Product manual PositioningUnit RPU

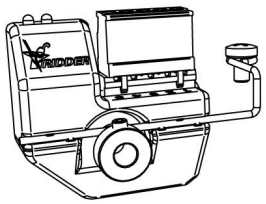
This product manual contains important information for connecting and commissioning the Ridder PositioningUnit (RPU). Before proceeding, please read this product manual to carry out the work in a safe and responsible manner. All work must be carried out by qualified and skilled mechanical and / or electrical installers.

1.2 The warnings in this product manual

This product manual contains the following advice, comments and warnings:

TIP	A suggestion to perform an action more efficiently.
ATTENTION	**May result in damage or problems if an action is performed incorrectly.**
CAUTION	**May result in minor injury if the hazard is not avoided.**

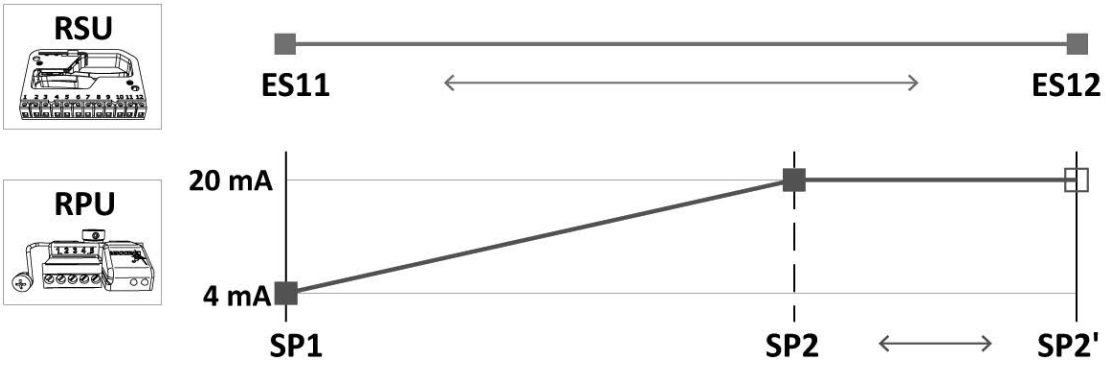
2.1 PositioningUnit RPU description



The Ridder PositioningUnit (RPU) is a high-accuracy digital positioning meter for use in Ridder RW motor gearboxes. The current position is monitored constantly and this information is relayed to a climate regulator using a 4-20 mA signal. The RPU can be used with all types of Ridder RW motor gearboxes that are equipped with a Ridder RSU limit switch system. The RPU can be supplied both individually and as a built-in component of an RW motor gearbox.

The RPU's 4-20 mA signal is generated by a Hall sensor built into the RPU and above this is a contact-free rotating magnetic axis. Using the test signal, the RPU calculates the 4-20 mA signal to be sent back. This signal is reversible. Using an ohmic resistor, the RPU can also generate a 0-5 V or 0-10 V feedback signal. The RPU is equipped with an operating button and LEDs that display its status.

The RPU is easy to install and teach in. Normally, the measuring range that needs to be learned by the RPU will correspond to the switching range already programmed into the RSU limit switch system. The end positions to be taught into the RSU (SP1 and SP2') for the relevant measuring range will then correspond to the end positions (ES11 and ES12) of the RSU. It is also possible to set just one of the end positions of the RPU's measuring range as an end position from the limit switch system. The RPU's measuring range will then be smaller than the switching range of the RSU limit switch system.

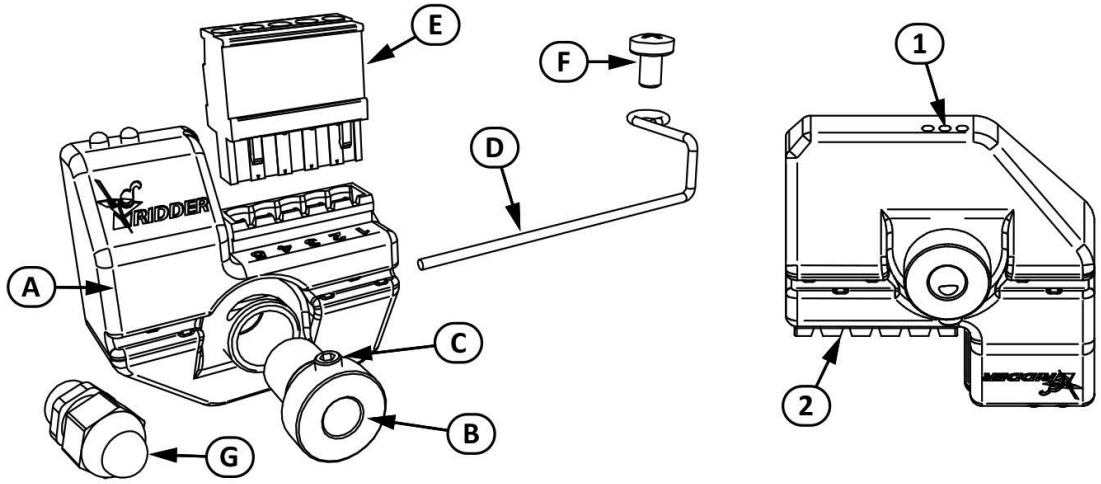


During operation, the RPU PositioningUnit RPU monitors the signal quality constantly using an integrated reference monitoring system. If the reading detected by the RPU deviates from the expected reading, due to a loss of power for example, the RPU will generate an error message. A value of 0 mA will then be relayed back and an LED blink code will appear.

In order to perform a reset after a reference deviation, the RPU is equipped with a reference input. This reference input can be connected to a duty switch in the RSU limit switch system. By operating this duty switch in an end position, the reference deviation and the resulting error message will be reset automatically.

The RPU PositioningUnit can also be set up and taught in in such a way that in the event of a reference deviation it will reset using range recognition. The RPU can do this without a duty switch being connected to the reference input. In this case, for a reference reset the whole measuring range already taught into the RPU must be travelled again.

2.2 RPU item numbers and parts



Packages for RPU PositioningUnit (Version 3.0):

Part no.	Description	Explanation
502687	RPU 24V\4-20mA\V3\SET	Set, RPU version 3.0
502688	RPU 24V\4-20mA\V3\BI	Mounted in RW motor gearbox, RPU version 3.0

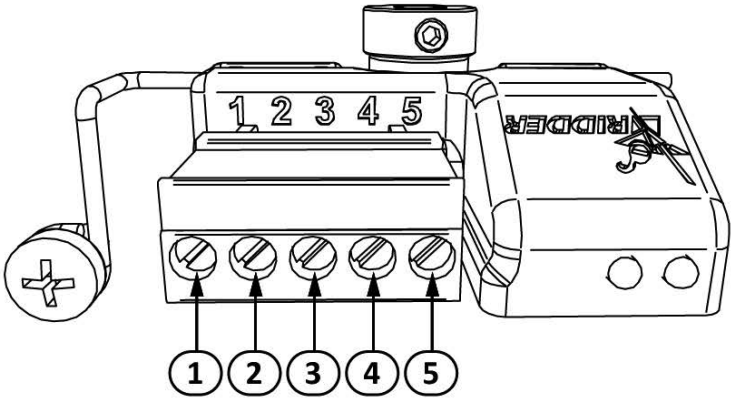
Components of RPU PositioningUnit (502680):

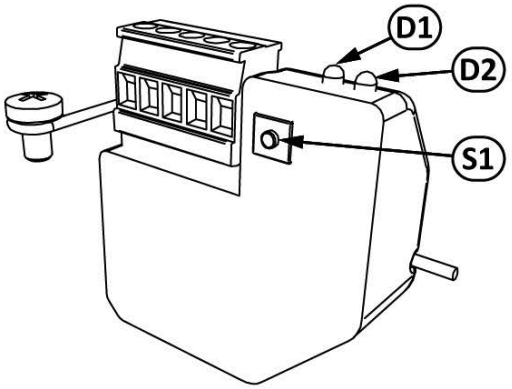
Pos.	Part no.	Description
A	277702	RPU Basic unit V3.0
B	425426	Magnetic axis RPU
C	292421	Adjuster screw M4x6\RVS
D	425418	Mounting clip RPU\RVS
E	279550	Plug with 5 pins
F	293240	Buttonhead screw M5x8
G	272031	Cable gland M20

Features of various versions of the RPU:

Part no.	RPU part no.	RPU version	Raised points ①	Connector ②	Status
502670	277700A	1.0	Geen	Green	No longer available
502670	277700	1.1	1	Green	No longer available
502671	277700	1.1	1	Green	No longer available
502680	277701	2.0	2	Black	No longer available
502681	277701	2.0	2	Black	No longer available
502687	277702	3.0	3	Black	Current version
502688	277702	3.0	3	Black	Current version

2.3 RPU technical specifications





General:

Description	Value
Power supply RPU	24 V AC/DC (1,3 W)
Power supply 4-20 mA output	24 V DC (0,5 W)
Steps of 4-20 mA	2679 steps (0,006 mA per step)
Sensor measurements per revolution	4096 (12-bit)
Maximum number of revolutions	512
Ambient temperature	0-40 °C (32-104 °F)
Dimensions (W x H x D)	approx. 53,5 mm x 55 mm x 29 mm
Weight	approx. 0.17 kg

Connection terminals:

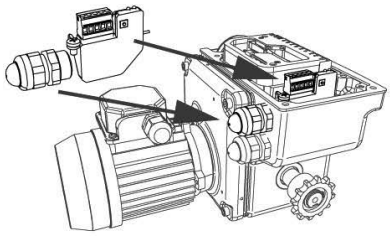
RPU	Type	Description	Nominal	Min.	Max.	Current
1 (DC)	Supply	24 V DC power supply	24 V DC	20 V DC	30 V DC	50 mA
1 (AC)	Supply	24 V AC power supply	24 V AC	18 V AC	27 V AC	50 mA
2	Supply	Ground	GND	-	-	-
3	Output	Ground 4-20 mA signal	GND	-	-	-
4	Output	Supply 4-20 mA signal	24 V DC	7,5 V DC	30 V DC	4-20 mA
5 (DC)	Input	Reference input 24 V DC	24 V DC	18 V DC	30 V DC	1 mA
5 (AC)	Input	Reference input 24 V AC	24 V AC	18 V AC	27 V AC	0,5 mA

Operating parts:

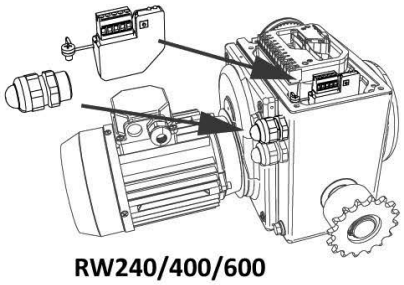
Pos.	Description
S1	Operating button
D1	Signal LED GREEN
D2	Signal LED RED

3.1 Ridder RW Motor gearboxes

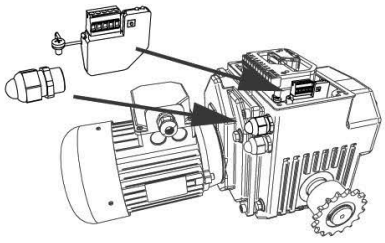
The RPU PositioningUnit can be built into the Ridder RW motor gearboxes listed below which are equipped with an RSU limit switch system.



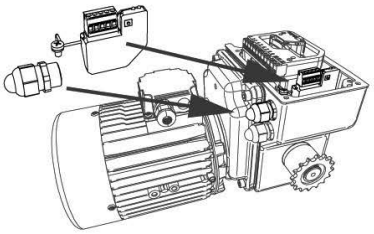
RW45



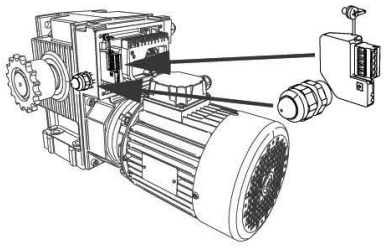
RW240/400/600



RW800



RW70/100/140/200-34/68

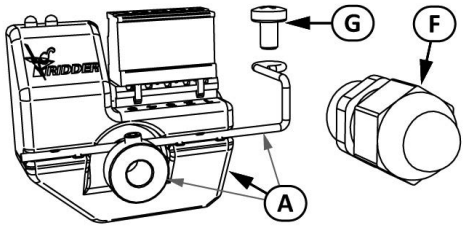


RW1000/1400/1200S/1600S

3.2 Installing the RPU

Follow the instructions below in order to install the RPU into an RW motor gearbox.

1



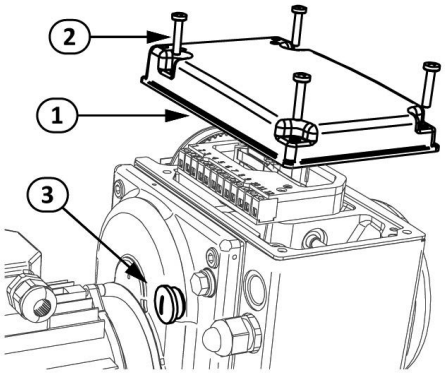
Check that you have all the necessary parts::
- The RPU with magnetic axis and mounting clip (A);
- Buttonhead screw M5x8 (F);
- Cable gland M20 (G).

2

⚠ CAUTION

Disconnect the power supply from the RW motor gearbox before installing the RPU PositioningUnit.

3

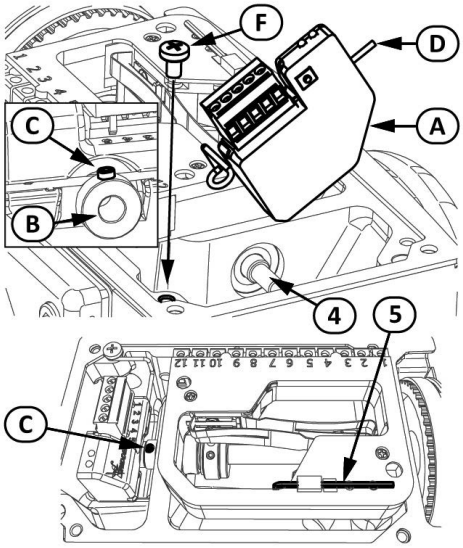


Remove the limit switch housing (1):
- Remove the limit switch housing (1) of the Ridder RW motor gearbox by unscrewing the 4 screws (2);
- Remove the blinding cap (3).

⚠ ATTENTION

Follow the installation instructions for the RPU from step 4!
To assure a tension-free mounting, first secure the RPU with the mounting clip (D) and then the magnetic axis (B)!

4



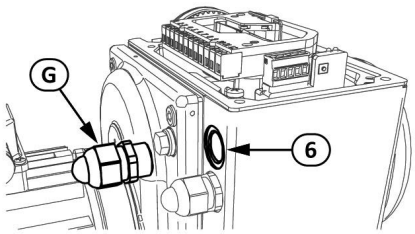
Install the RPU PositioningUnit (1):

- Slide the mounting clip (D) against the RPU;
- Turn the magnetic axis upwards (B) using the adjuster screw (C);
- Tilt the RPU and place it with the magnetic axis (B) in front of the stub (4) of the RSU operating shaft;
- Slide the RPU with the magnetic axis (B) onto the stub (4) of the RSU operating shaft;
- Position the RPU in such a way that it can be secured into place easily and **tension-free**!
- Mount the mounting clip (D) onto the motor gearbox housing with the buttonhead screw (F);
- Secure the magnetic axis **tension-free** onto the stub by tightening the adjuster screw (C). For this, use the Allen key (5) from the RSU limit switch system.

⚠ ATTENTION

Irreversible damage can occur to the magnetic axis unless the RPU is mounted tension-free.

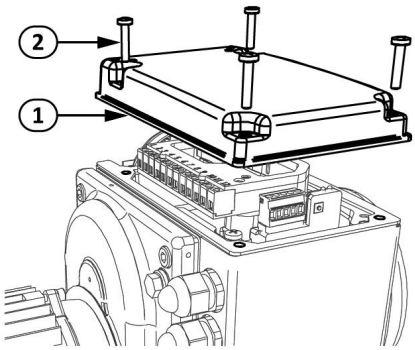
5



Install the cable gland (G):

- Mount the cable gland (G) into the appropriate section of the RW motor gearbox (6). Depending on the type of RW motor gearbox, this may be located in a different position to that shown here.

6



Replace the limit switch housing (1):

- Replace the limit switch housing (1) of the Ridder RW motor gearbox by tightening the 4 screws (2). (Only when cable mounting or teaching in does not take place directly after the mechanical installation of the RPU.)

This will prevent any moisture or dirt from entering the limit switch compartment.

4.1 Connecting the RPU: Reference monitoring and reset, 0-5 V / 0-10 V feedback signal

Depending on how you connect the RPU Ridder PositioningUnit, there are various ways to use the RPU's reference monitoring and reset options.

RPU reference input connected
In order to use the reference monitoring and reset with a reference switch, the reference input of the RPU must be connected directly to one of the duty switches of the RSU limit switch system. To do this, a shared 24 V AC/DC power supply for the RPU and the RSU limit switch system is required. The wiring diagram is shown in §4.3.

RPU reference input not connected
If the RPU reference input is not connected, a reference reset must be carried out using range recognition or by using the operating button on the RPU. A reference reset using range recognition is only possible with the RPU PositioningUnit version 2.0 or higher (see §2.2 for distinguishing features). Wiring diagrams for this method of installation can be found in §4.4 (shared power supply for RPU and RSU) and in §4.5 (separate power supply for RPU and RSU).

Feedback signal of 0-5 V / 0-10 V
It is also possible to convert the 4-20 mA signal from the RPU into a 0-5 V or 0-10 V signal. An ohmic resistor is required for this. The relevant wiring diagram can be found in §4.6.
This method of installation is also applicable to the wiring diagrams in §4.3, §4.4 and §4.5.

When connecting RPU's reference input, a shared 24 V AC/DC power supply for the RPU and the RSU limit switch system is required!

For optimum performance, it is advisable to connect the reference input of the RPU directly to the RSU limit switch system.

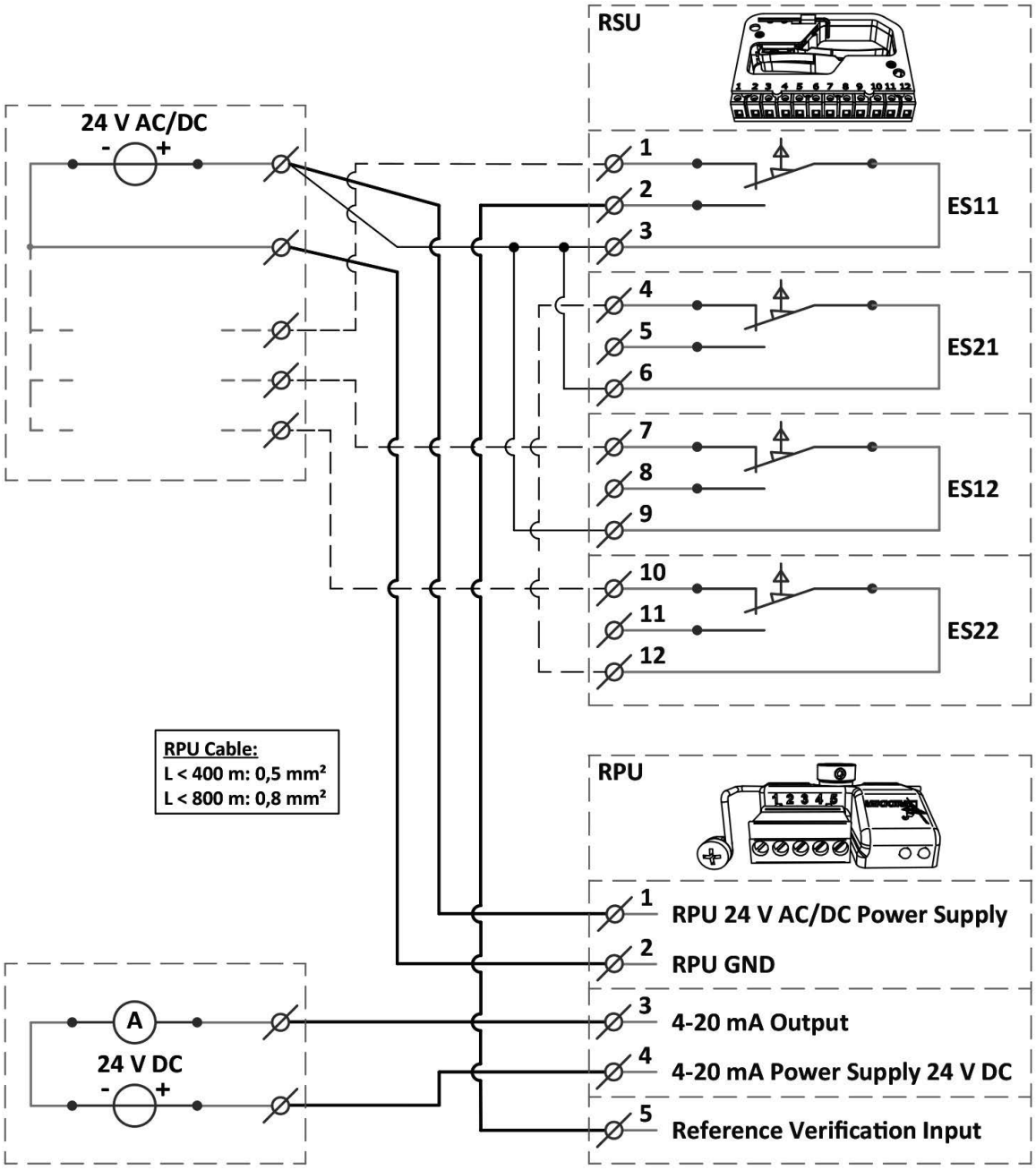
4.2 Abbreviations used in wiring diagrams

Abbreviation	Description
AC	Alternate Current
DC	Direct Current
ES11, ES12	Duty switches RSU limit switch system
ES21, ES22	Safety switches RSU limit switch system
GND	Earth
R	Resistance
RPU	Ridder PositioningUnit
RSU	Limit switch system for Ridder RW motor gearbox

4.3 Shared power supply RPU and RSU: RPU's reference input connected

The wiring diagram below shows how to connect the RPU for use with:

- A shared 24 V AC/DC power supply for the RPU and the RSU limit switch system;
- A 24 V DC power supply for the 4-20 mA feedback signal from the RPU;
- Connecting the reference input to the RSU limit switch system (connection 2 or 8.



TIP

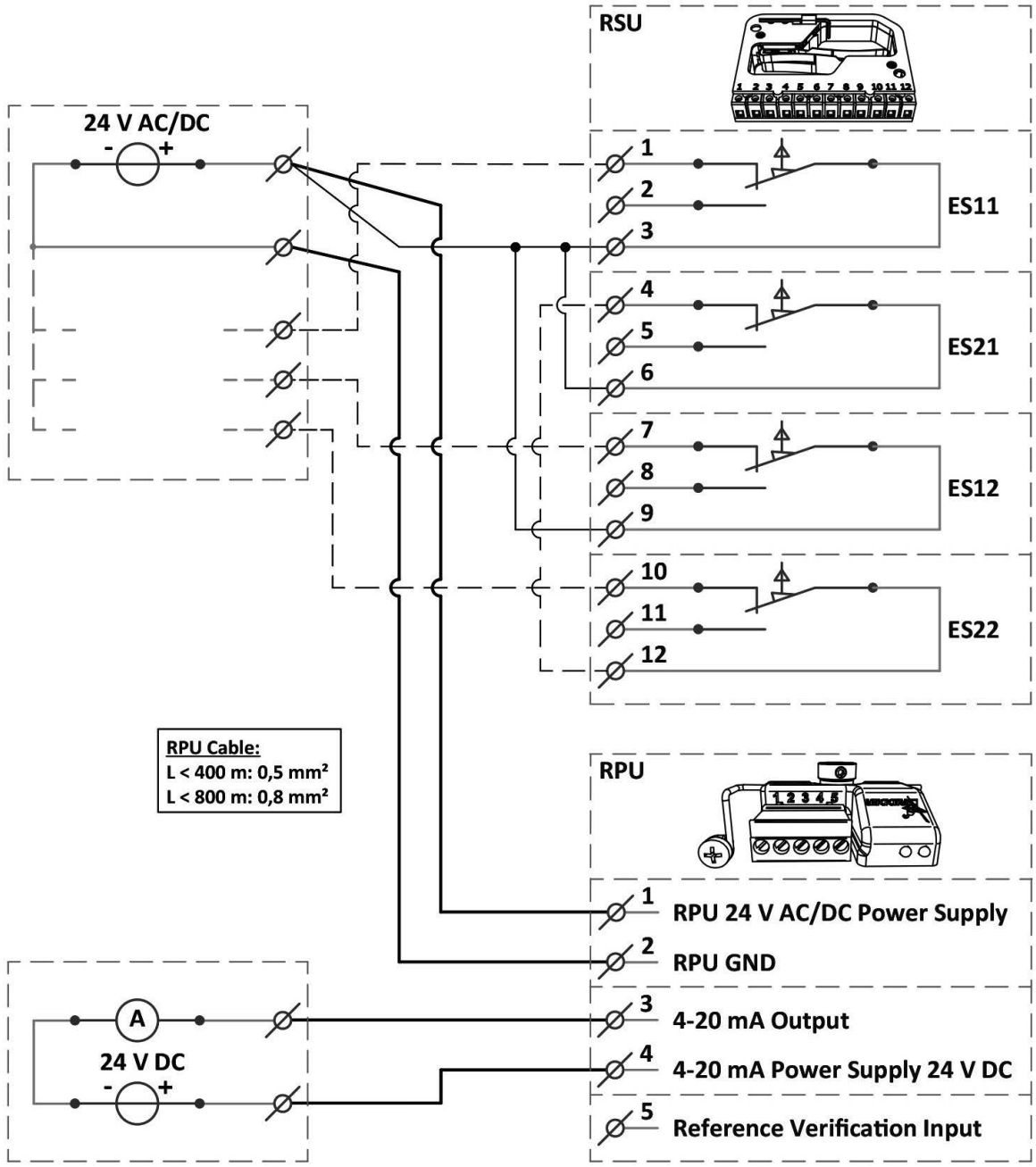
For the reference reset with reference switch, use the most operated duty switch of the RSU limit switch system.

4.4 Shared power supply RPU and RSU: RPU's reference input not connected

The wiring diagram below shows how to connect the RPU for use with:

- A shared 24 V AC/DC power supply for the RPU and the RSU limit switch system;
- A 24 V DC power supply for the 4-20 mA feedback signal from the RPU;

The RPU's reference input can also be connected if necessary (see §4.3).

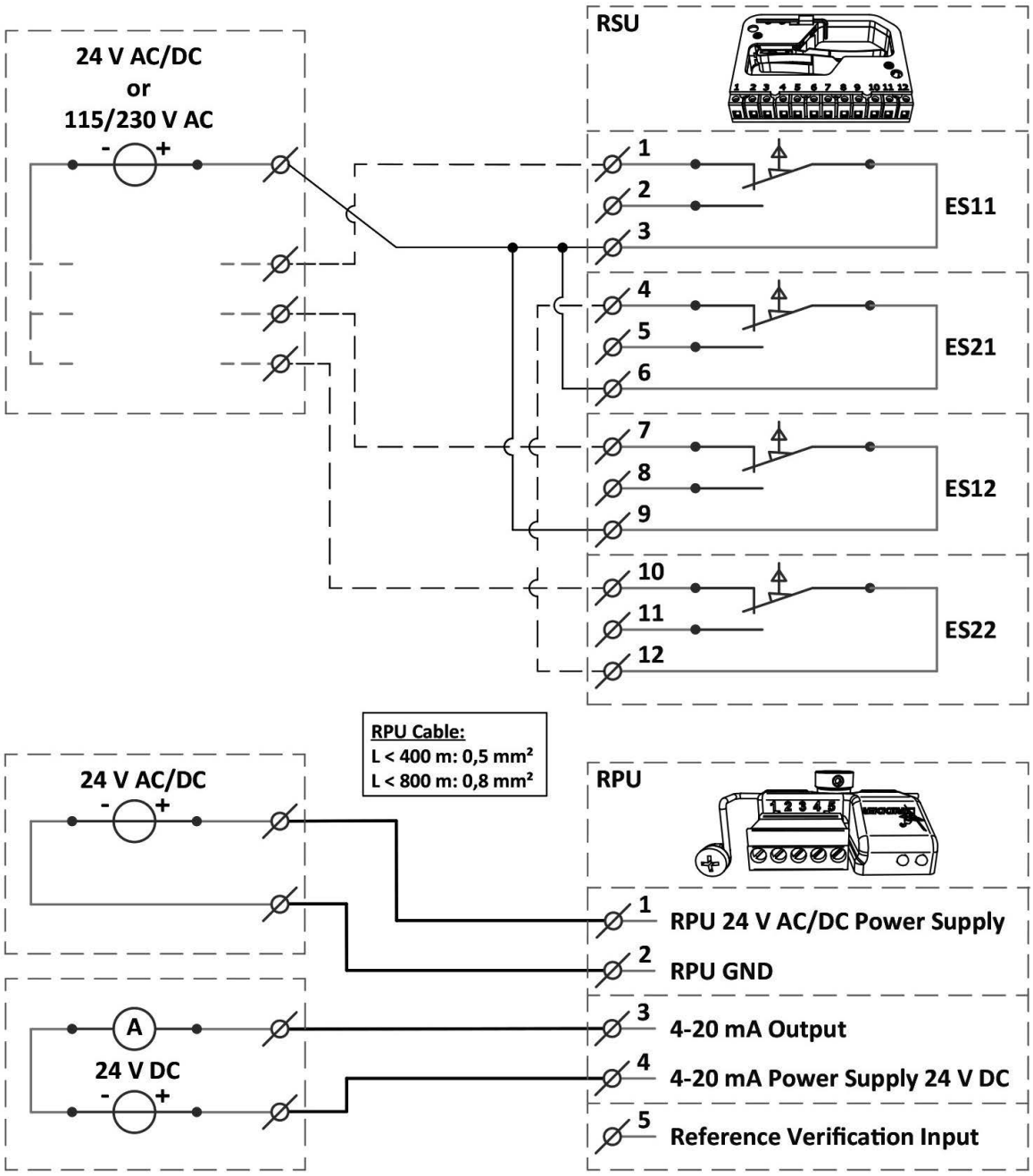


4.5 Separate power supply RPU and RSU: RPU's reference input not connected

The wiring diagram below shows how to connect the RPU for use with:

- A 24 V AC/DC power supply for the RPU;
- A 24 V DC power supply for the 4-20 mA feedback signal from the RPU;
- A separate 24V AC/DC of 115/230 V power supply for the RSU limit switch system.

The reference input of the RPU cannot be connected when using this set-up.

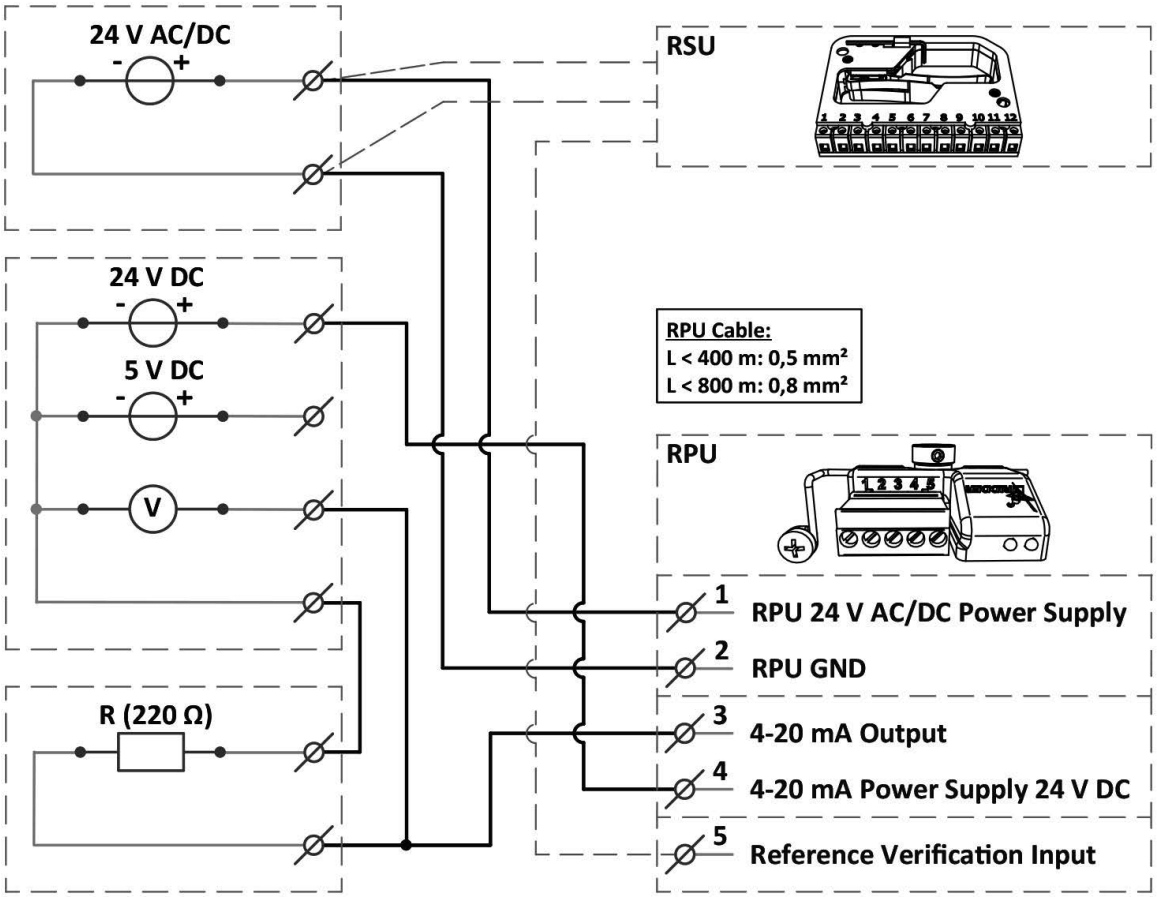


4.6 Feedback signal 0-5 V / 0-10 V

The wiring diagram below shows how to connect the RPU in situations where the 4-20 mA signal needs to be converted into a 0-5 V or 0-10 V signal. This method of connection is applicable to all the wiring diagrams in the previous sections §4.3, §4.4 and §4.5.

To convert the 4-20 mA signal, an ohmic resistor is required. The following resistance levels are used for this:

- For 0-5 V: **220 Ω** (4 mA * 220 Ω = 0,88V; 20 mA * 220 Ω = 4,4 V);
- For 0-10 V: **440 Ω** (4 mA * 440 Ω = 1,76V; 20 mA * 440 Ω = 8,8 V).



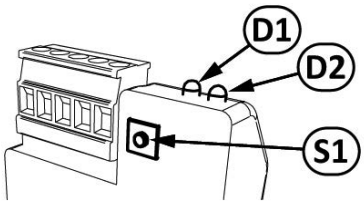
5.1 Teaching in the RPU

After the RPU has been installed and connected, it will need to be taught in. This is necessary in order to set (or reset) the end positions of the range to be measured in the memory of the RPU. The teaching-in procedure below should also be followed when teaching the RPU in with new settings.

To teach the RPU in, the following requirements must be met:

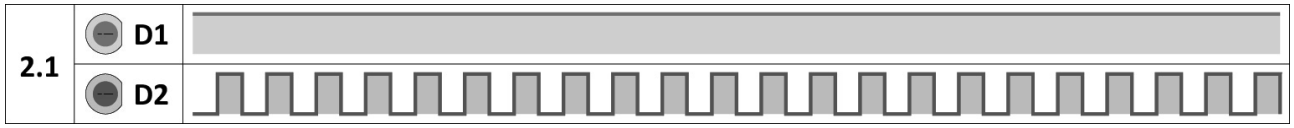
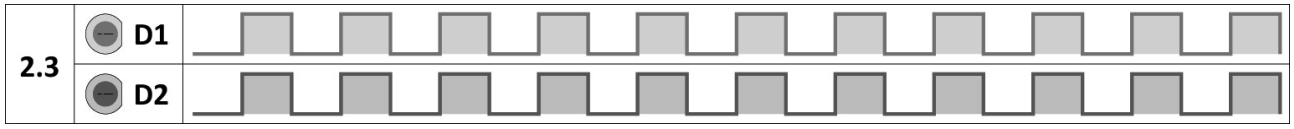
- The RSU limit switch system must be connected and set up correctly;
- The 24 V AC/DC power supply of the RPU must be connected and active;
- If a reference switch is being used for a reference reset, the reference input of the RPU must be connected to a duty switch in the RSU limit switch system.

To teach the RPU in, it is necessary to use the operating button S1 as well as the green LED (D1) and the red LED (D2). Both the LEDs will display a range of blink codes during the teaching-in process.



ATTENTION **If an RPU PositioningUnit is uninstalled and then re-installed, it will need to be taught in again!**

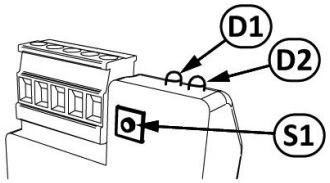
TIP You will need to use the standard teaching-in procedure in order to teach in the RPU PositioningUnit with new settings.

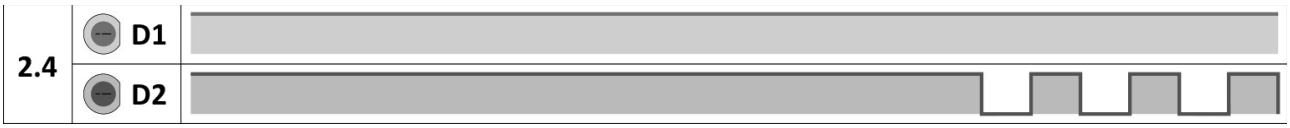
▶	Description
1	Switch on the 24 V AC/DC power supply for the RPU. The green (D1) and red (D2) LEDs will illuminate with blink code blink code 2.1 (no references). 
2	Press the control button S1 until **both** LEDs D1 (green) and D2 (red) light up according to the blink code 2.3 (“teaching in” mode). 

TIP When activating the teaching-in mode, the RPU will send out a 4 mA signal. This signal can be used to calibrate the climate regulator.

3 Send the RW motor gearbox to the first (end) position from which the RPU should send a 4 mA feedback signal.

4 Press the control button S1 until **both** LEDs remain lit.
Release the button and wait until the LED D2 (red) starts to blink. See blink code 2.4 (end position 1).

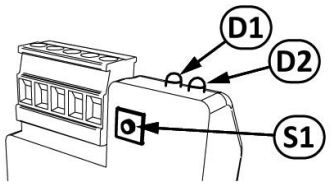


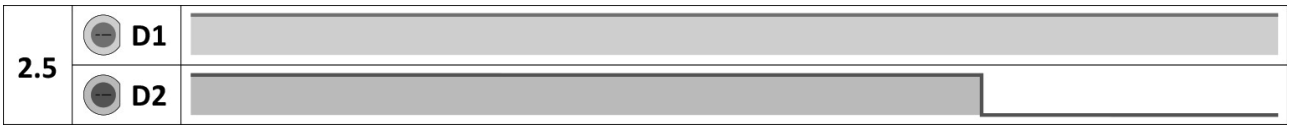


Please note: if the reference input of the RPU is connected to an operating duty switch from the RSU limit switch system, the RPU will detect and save this.

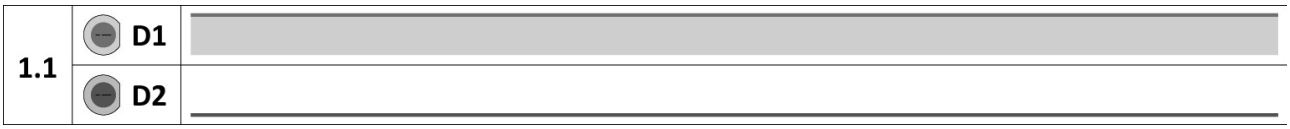
5 Send the RW to the second (end) position from which the RPU 20 mA should send a feedback signal.

6 Press the control button S1 until **both** LEDs remain lit. Release the button and wait until the LED D2 (red) goes out. See blink code 2.5 (end position 2).





After the waiting time of 2 seconds, the blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 1.1 (normal operation).

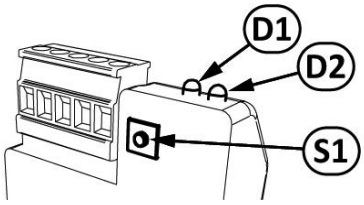


Please note: if the reference input of the RPU is connected to an operating duty switch from the RSU limit switch system, the RPU will detect and save this.

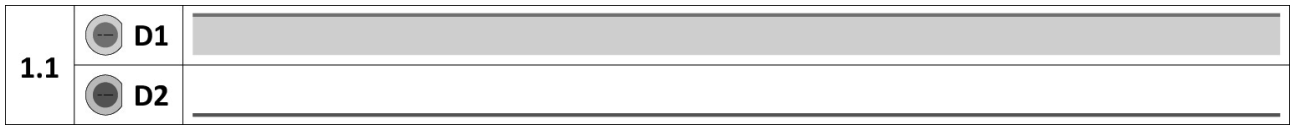
7 The RPU has now been taught in and a 4-20 mA signal will be transmitted.
Send the RW motor gearbox back to the start position or another safe position, if necessary.

5.2 Reversing the RPU feedback signal from 4-20 mA to 20-4 mA

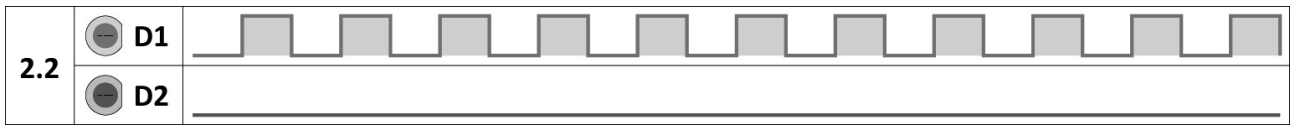
To reverse the feedback signal from 4-20 mA to 20-4 mA, you will need to follow the procedure described below. In order to reverse the feedback signal, you will need to use the operating button S1, the green LED (D1) and the red LED (D2). Both the LEDs will display a range of blink codes during the teaching-in process.



▶	Description
1	Ensure that the RPU's 24 V AC/DC power supply is connected and switched on. The green (D1) and red (D2) LEDs will then illuminate with blink code 1.1 (normal operation).

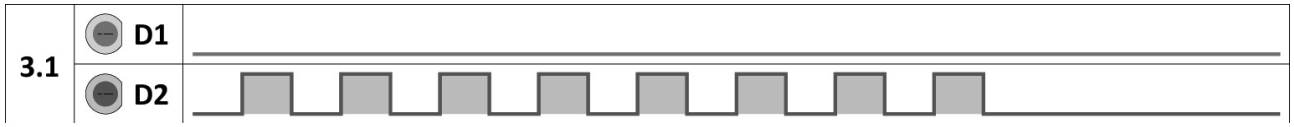


2	Activate the reverse mode by pressing the operating button (S1) for 4 seconds. After 4 seconds the blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 2.2 (reverse mode). Release the operating button S1.

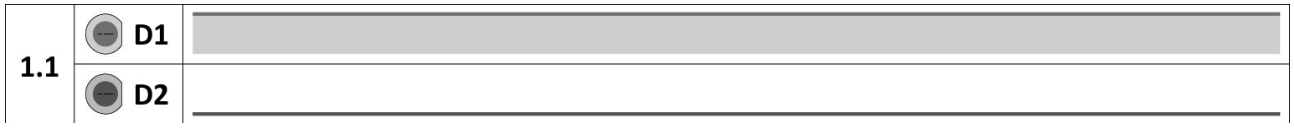


⚠ ATTENTION **If the reverse mode is activated the feedback signal is reversed each time the control button (S1) is pressed.**

3	Now press the operating button briefly (S1, less than one second). The feedback signal will be reversed. The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 3.1 (reverse mode).



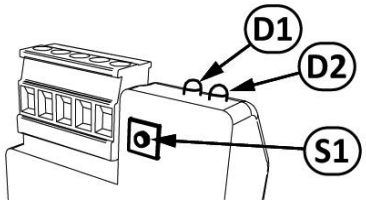
4	Press the operating button (S1) for 2 seconds to save the changes. The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 1.1 (normal operation).



5	The procedure for reversing the feedback signal from 4-20 mA to 20-4 mA is now complete.

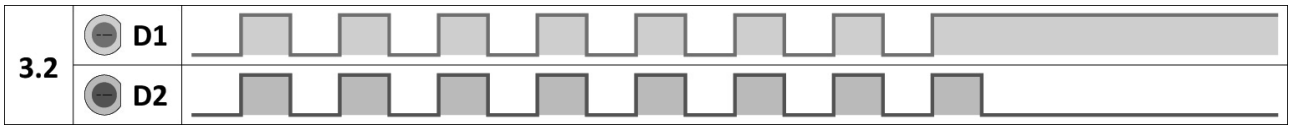
5.3 Activating and deactivating a reference reset using the RPU's range recognition

The RPU PositioningUnit (version 2.0 and higher) has an option for performing a reference reset using range recognition. This makes it possible for the RPU to restore a reference deviation by travelling through the whole range to be measured. In practice this means guiding the system from the start position to the end position (or vice versa) in order to reset the RPU's references. This option is activated as standard in the RPU.

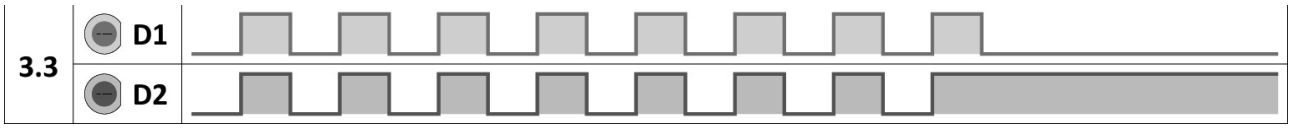


In order to deactivate this option, you will need to follow the steps below. The option can be reactivated at any time. It will not be necessary to teach in the RPU again for this.

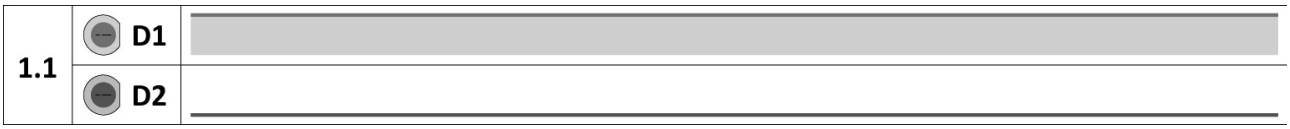
▶	**Description**
1	Press the operating button S1 and hold it for more than 12 seconds until the green (D1) and red (D2) LEDs begin to blink rapidly. Now release the operating button. Depending on the settings, the LEDs will now display 1-A or 1-B.
1-A	Reference reset using range recognition is activated: the LEDs will display blink code 3.2. LED D1 (green) stays illuminated.



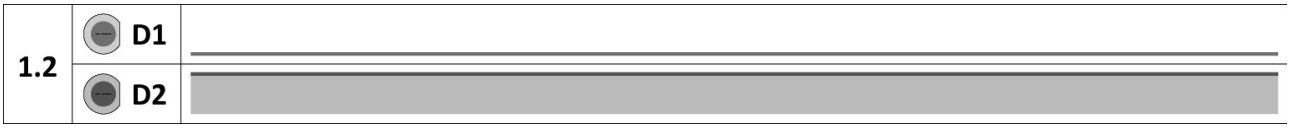
1-B	Reference reset using range recognition is deactivated: the LEDs will display blink code 3.3.



2	By briefly pressing the operating button, it is possible to activate or deactivate the option of reference reset using range recognition. If LED D1 (green) is illuminated, the option is activated (blink code 1.1).



	If LED D2 (red) is illuminated, the option is deactivated (blink code 1.2).



3	When you have selected the correct setting, this can be saved by pressing the operating button S1 for a minimum of 2 seconds.
4	The procedure for activating or deactivating the reference reset using range recognition option has now been completed.

5.4 Reset RPU references after reference deviation

When the RPU's reference monitoring detects a reference deviation, it will need to undergo a reset. A reference deviation can occur after the rotation of the RPU's magnetic axis when the RPU has lost its power supply.

When the power supply is restored, the RPU will generate an error message. The LEDs on the RPU will then illuminate with blink code 2.1. The RPU will also transmit 0 mA in order to report the reference deviation as an error.

Depending on how the RPU is set up and connected, one of the methods described below can be followed in order to reset the RPU.

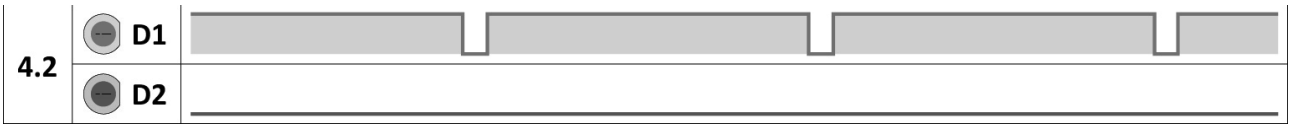
5.4.1 Reset RPU references using RSU limit switch system

To perform a reference reset using a duty switch from the RSU limit switch system, the following requirements need to be met:

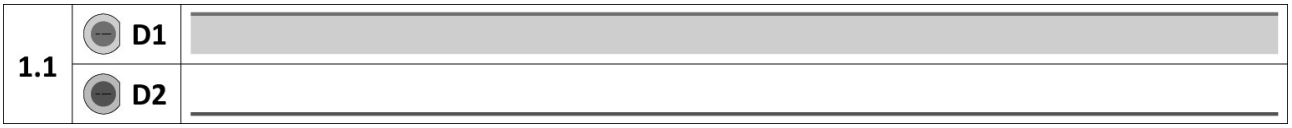
- Prior to teaching in, the reference input of the RPU has been connected to a duty switch of the RSU limit switch system;
- The switch position of this duty switch must correspond with one end position of the measuring range that the RPU has been taught in.

When these requirements have been met, the following steps must be taken in order to complete the reference reset:

▶	Description
1	Send the RW motor gearbox to the reference position from which the limit switch connected to the RPU is operated.
2	Wait 10 seconds before sending the RW motor gearbox away from this reference position. The green (D1) and red (D2) LEDs will illuminate with blink code 4.2 (reference reset).



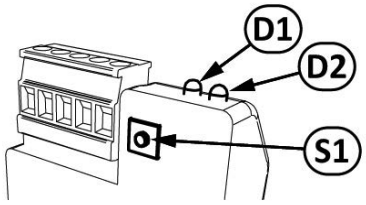
2	After 10 seconds, the reference is reset. During operation, the green (D1) and red (D2) LEDs will then be resume blink code 1.1 (normal operation).



3	The procedure for performing a reference reset has now been completed.

5.4.2 Reset RPU references using range recognition

If the reference input of the RPU is not connected to the RSU limit switch system and the reference reset using range recognition option is activated, it is possible to reset an alternative reference by having the RPU travel the learned measuring range. To do this you will need to follow the steps below:

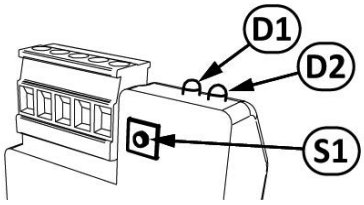


▶	Description
1	Send the RW motor gearbox to the closest end position that has been taught into the RPU.
2	Wait a minimum of 5 seconds so that the RPU can recognize that this position corresponds to the end position that it has been taught in.
3	Send the RW motor gearbox in one movement, without stopping, to the other end position that has been taught into the RPU.
4	After the RPU has covered the entire measuring range that has been taught in, the RPU will reset its references. The RPU will then resume normal operation (blink code 1.1).
5	The procedure for a reference reset using range recognition has now been completed.

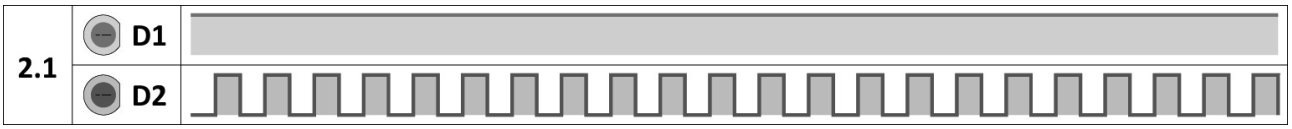
1.1	**D1**	
	D2	

5.4.3 Reset RPU references using operating button (S1)

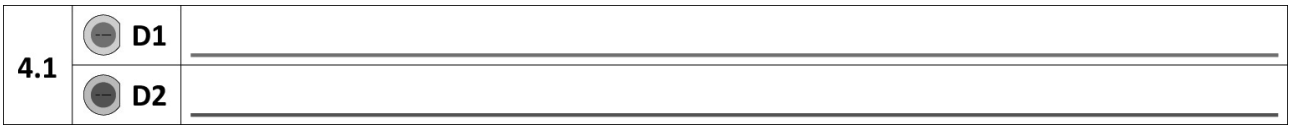
If the RPU reference input is not connected to the RSU limit switch system and the reference reset using range recognition option is deactivated, the alternative reference must be reset using the operating button (S1) of the RPU. To do this you will need to follow the steps below.



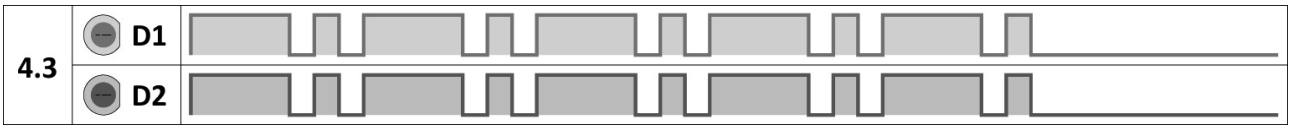
▶	Description
1	Send the RW motor gearbox to one of the end positions that have been taught in. The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 2.1 (no references).



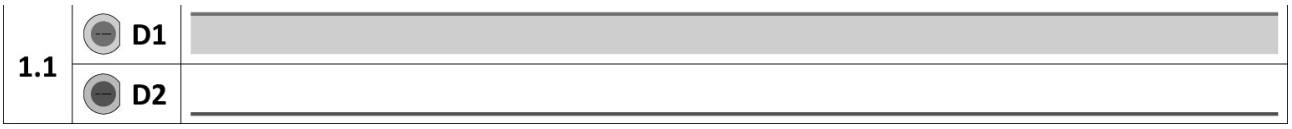
2	Switch off the RPU's power supply by removing the five-pin plug (E). The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 4.1 (no power supply).



3	Now press the operating button (S1) and **continue to hold it** in while you reconnect the power supply. The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 4.3 (reference reset mode). Now release the operating button (S1).



4	Send the RW motor gearbox from the current end position for a few seconds in the direction of the other end position. After the RPU has detected the direction, the RPU's references will be reset. The blink code will change and the green (D1) and red (D2) LEDs will illuminate with blink code 1.1 (normal operation).



5	The procedure for a reference reset has now been completed.

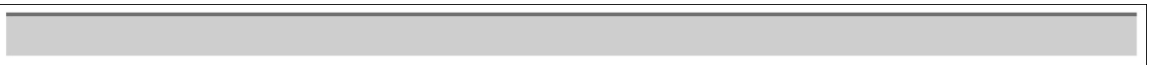
In this section, some common problems and solutions are described. If the problem you are experiencing is not listed here, you can contact the supplier or manufacturer.

Problem 1	**PositioningUnit RPU has no 4-20 mA signal.**
Observation 1	RPU signal measured is 0 mA.
Cause 1	Power supply RPU is disconnected.
Solution 1	Connect power supply.
Cause 2	Power supply for RPU control signal is disconnected.
Solution 2	Connect power supply.
Cause 3	The RPU has determined a reference deviation.
Solution 3	Reset the position of the RPU according to the method described in §5.3 and §5.4 and the following sections of this product manual.
Cause 4	Connection or cable problem.
Solution 4	Check the connections and cabling, and restore these if necessary.
Cause 5	No route has been taught in, the start and end positions are the same.
Solution 5	Teach in the RPU again.

Problem 2	**Output signal from the RPU PositioningUnit is wrong.**
Observation 2	A 4-20 mA signal is measured, 20-4 mA is needed.
Cause 1	The RPU has been taught in inversely.
Solution 1	Reverse the feedback signal by following the method described in §5.2 of this product manual.

Problem 3	**Output signal from RPU PositioningUnit is unstable.**
Observation 3	A 4-20 mA signal changes and fluctuates and/or the final values of 4 or 20 mA are not reached.
Cause 1	Magnet in magnetic axis is loose.
Solution 1	Replace the magnetic axis (also see §2.2 of this product manual). Contact your supplier for this.

Blink code / Explanation

1.1	D1	
	D2	

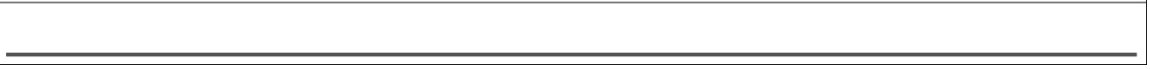
Normal operation: RPU is functioning normally.
Reference reset: Reference reset with RPU measuring range is activated.

1.2	D1	
	D2	

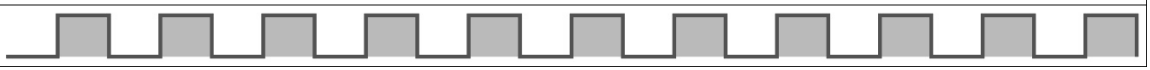
Reference reset: Reference reset with RPU measuring range is deactivated.

2.1	D1	
	D2	

Teaching-in mode: The RPU has not yet been taught in (see §5.1).
Reference reset: The RPU is detecting a reference deviation (see §5.3).

2.2	D1	
	D2	

Teaching-in mode: The RPU has not yet been taught in (see §5.1).
Reference reset: The RPU is detecting a reference deviation (see §5.3).

2.3	D1	
	D2	

Teaching-in mode: The RPU is in teaching-in mode (see §5.1).

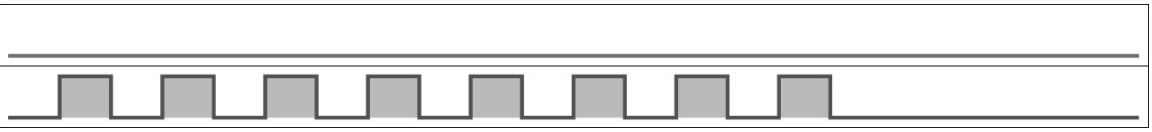
2.4	D1	
	D2	

Teaching-in mode: First end position of the RPU has been taught in (see §5.1).

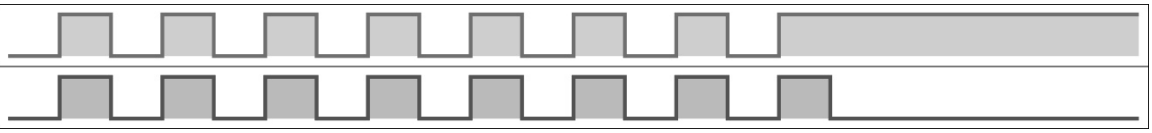
2.5	D1	
	D2	

Teaching-in mode: Second end position of the RPU has been taught in (see §5.1).

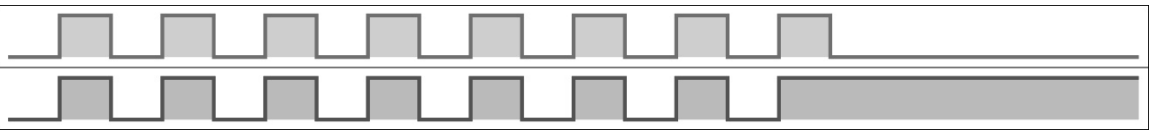
Blink code / Explanation

3.1	D1	
	D2	

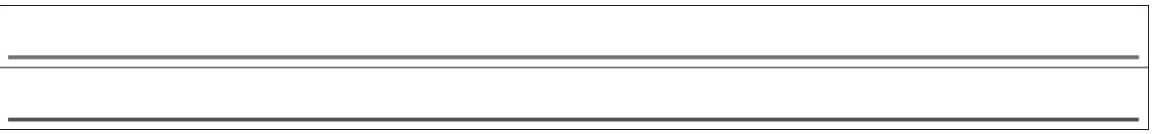
Reverse mode: The feedback signal 4-20 mA or 20-4 mA is reversed (see §5.2).

3.2	D1	
	D2	

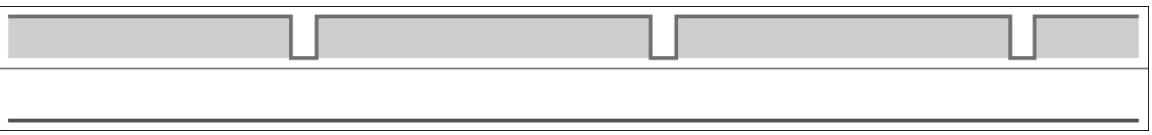
Reference reset: Set-up mode for reference reset with RPU measuring range (activated).

3.3	D1	
	D2	

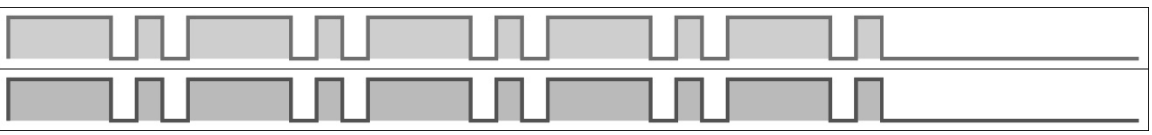
Reference reset: Set-up mode for reference reset with RPU measuring range (deactivated).

4.1	D1	
	D2	

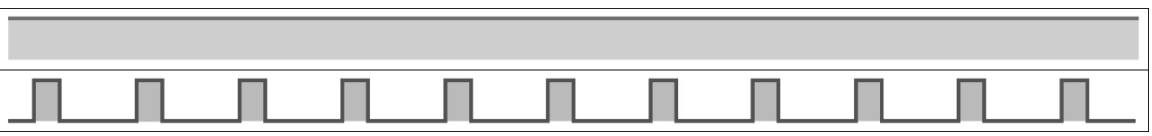
No power supply: The RPU has no power supply (see §5.3).

4.2	D1	
	D2	

Reference reset: The RPU is set to position in which the duty switch is functioning (see §5.3).

4.3	D1	
	D2	

Reference reset: The RPU's references are being reset (see §5.2).

4.4	D1	
	D2	

Magnetic fault: The RPU's magnetic axis is not been installed correctly (see §3.2).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