Brief Operating Instructions **RA33**

Batch Controller



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

For detailed information, refer to the Operating Instructions and other documentation.

Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smart phone/Tablet: Endress+Hauser Operations App





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Table of contents

1	About this document	3
1.1	Document conventions	. 3
2 2.1	Basic safety instructions	.6
2.2 2.3 2.4	Intended use	6 .6
2.5 2.6	Product safety	6 7
3	Incoming acceptance and product identification	. 7
3.1 3.2 3.3 3.4 3.5	Incoming acceptance . Product identification . Nameplate . Name and address of manufacturer . Certificates and approvals .	7 .7 8
4 4.1 4.2 4.3 4.4 4.5	Mounting Incoming acceptance, transport, storage Dimensions Mounting requirements Mounting Post-mounting check	. 8 9 10 .11
5 5.1 5.2 5.3 5.4 5.5 5.6	Electrical connection . Connection instructions . Quick wiring guide . Connecting the sensors . Outputs . Communication . Post-connection check .	16 . 16 . 19 23 23 . 25
6 6.1 6.2 6.3	Operation options General information regarding operation Display and operating elements Operating matrix	26 26 26 29
7 7.1	Commissioning	30 30

1 About this document

1.1 Document conventions

1.1.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

A CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 Electrical symbols

Symbol	Meaning		
A0011197	Direct current A terminal to which DC voltage is applied or through which direct current flows.		
A0011198	Alternating current A terminal to which alternating voltage is applied or through which alternating current flows.		
Direct current and alternating current • A terminal to which alternating voltage or DC voltage is applied. • A terminal through which alternating current or direct current flows.			
 	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.		
A0011199	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.		
A0011201	Equipotential connection A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.		
A0012751	ESD - electrostatic discharge Protect the terminals from electrostatic discharge. Non-compliance may result in the destruction of parts of the electronics.		

1.1.3 Symbols for certain types of information

Symbol	Meaning	Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.		Preferred Procedures, processes or actions that are preferred.
×	Forbidden Procedures, processes or actions that are forbidden.	i	Tip Indicates additional information.
	Reference to documentation		Reference to page

Symbol	Meaning	Symbol	Meaning
	Reference to graphic	1., 2., 3	Series of steps
4	Result of a step		Visual inspection

1.1.4 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,	Item numbers	1., 2., 3	Series of steps
A, B, C,	Views	A-A, B-B, C-C,	Sections
EX	Hazardous area	×	Safe area (non-hazardous area)

2 Basic safety instructions

Safe operation of the device is only guaranteed if the Operating Instructions have been read and the safety instructions they contain have been observed.

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

- Trained, qualified specialists must have a relevant qualification for this specific function and task.
- Are authorized by the plant owner/operator.
- Are familiar with federal/national regulations.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

2.2 Intended use

The Batch Controller is a batching and dosing manager for metering any kind of fluid or mineral oil.

- The manufacturer accepts no liability for damages resulting from incorrect use or use other than that for which the device is intended. It is not permitted to convert or modify the device in any way.
- The device may only be operated when installed.

2.3 Workplace safety

For work on and with the device:

► Wear the required personal protective equipment according to national regulations.

If working on and with the device with wet hands:

• Due to the increased risk of electric shock, wear suitable gloves.

2.4 Operational safety

Risk of injury.

- Operate the device in proper technical condition and fail-safe condition only.
- ► The operator is responsible for interference-free operation of the device.

2.5 Product safety

This measuring device is designed in accordance with good engineering practice to meet stateof-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. The manufacturer confirms this by affixing the CE mark.

2.6 IT security

Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the device and associated data transfer, must be implemented by the operators themselves in line with their security standards.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

Proceed as follows on receipt of the device:

- 1. Check whether the packaging is intact.
- 2. If damage is discovered:

Report all damage immediately to the manufacturer.

- 3. Do not install damaged material, as the manufacturer cannot otherwise guarantee compliance with the safety requirements and cannot be held responsible for the consequences that may result.
- 4. Compare the scope of delivery to the contents of the order.
- 5. Remove all the packaging material used for transportation.

3.2 Product identification

The device can be identified in the following ways:

- Nameplate specifications
- Enter the serial number from the nameplate in the *W@M Device Viewerwww.endress.com/deviceviewer*: All data relating to the device and an overview of the Technical Documentation supplied with the device are displayed.

3.3 Nameplate

The nameplate is located on the side of the housing.

The nameplate provides you with the following information on the device:

- Manufacturer identification
- Order code

-

- Extended order code
- Serial number
- Firmware version
- Ambient and process conditions
- Input and output values
- Measuring range

- Activation codes
- Safety information and warnings
- Certificate information
- Approvals as per order version
- ► Compare the information on the nameplate with the order.

3.4 Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzer GmbH + Co. KG
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang
Model/type reference:	RA33

3.5 Certificates and approvals

3.5.1 Certificates and approvals

For certificates and approvals valid for the device: see the data on the nameplate

Approval-related data and documents: www.endress.com/deviceviewer \rightarrow (enter the serial number)

4 Mounting

4.1 Incoming acceptance, transport, storage

Compliance with the permitted environmental and storage conditions is mandatory. The exact specifications for this are provided in the "Technical Information" section of the Operating Instructions.

4.1.1 Incoming acceptance

On receipt of the goods, check the following points:

- Is the packaging or the content damaged?
- Is the delivery complete? Compare the scope of delivery against the information on your order form.

4.1.2 Transport and storage

Please note the following:

- Pack the device in such a way as to protect it reliably against impact for storage (and transportation). The original packaging provides optimum protection.
- The permitted storage temperature is -40 to +85 °C (-40 to +185 °F); it is possible to store the device at borderline temperatures for a limited period (48 hours maximum).

4.2 Dimensions



■ 1 Dimensions of the device in mm (in)



■ 2 Dimensions of the mounting plate for wall, pipe and panel mounting in mm (in)



Dimensions of the panel cutout in mm (in)



Dimensions of DIN rail adapter in mm (in)

4.3 Mounting requirements

With the appropriate accessories, the device with field housing is suitable for wall mounting, pipe mounting, panel mounting and DIN rail installation.

The orientation is determined by the legibility of the display. Connections and outputs are fed out of the bottom of the device. The cables are connected via coded terminals.

Operating temperature range: –20 to 60 $^\circ C$ (–4 to 140 $^\circ F)$

You can find more information in the "Technical data" section.

NOTICE

Overheating of the device due to insufficient cooling

To avoid heat buildup, please always ensure that the device is sufficiently cooled. Operating the device in the upper temperature limit range decreases the operating life of the display.

4.4 Mounting

4.4.1 Wall mounting

- **1**. Use the mounting plate as the template for drilled holes, dimensions $\rightarrow \square 2$, $\square 9$
- 2. Attach the device to the mounting plate and fasten it in place from the rear using 4 screws.
- 3. Fasten the mounting plate to the wall using 4 screws.



S Wall mounting

4.4.2 Panel mounting

1. Make the panel cutout in the required size, dimensions $\rightarrow \square 3$, $\square 10$



6 Panel mounting

Attach the seal (item 1) to the housing.



■ 7 Preparing the mounting plate for panel mounting

Screw the threaded rods (item 2) into the mounting plate (dimensions $\rightarrow \mathbb{B}$ 2, \mathbb{B} 9).

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Push the device into the panel cutout from the front and attach the mounting plate to the device from the rear using the 4 screws provided (item 3).

5. Fasten the device in place by tightening the threaded rods.

4.4.3 Support rail/DIN rail (to EN 50 022)

3



9 Preparing for DIN rail mounting

Fasten the DIN rail adapter (item 1) to the device using the screws provided (item 2) and open the DIN rail clips.

4.



■ 10 DIN rail mounting

Attach the device to the DIN rail from the front and close the DIN rail clips.

4.4.4 Pipe mounting



🖻 11 Preparing for pipe mounting

Pull the steel belts through the mounting plate (dimensions $\rightarrow \blacksquare 2$, $\blacksquare 9$) and fasten them to the pipe.



■ 12 Pipe mounting

Attach the device to the mounting plate and fasten it in place using the 4 screws provided.

4.5 Post-mounting check

To install the Batch Controller and the associated temperature sensors, observe the general installation instructions according to EN 1434 Part 6.

5 Electrical connection

5.1 Connection instructions

WARNING

Danger! Electric voltage!

► The entire connection of the device must take place while the device is de-energized.

ACAUTION

Pay attention to additional information provided

- Before commissioning, ensure that the supply voltage corresponds to the specification on the nameplate.
- Provide a suitable switch or power-circuit breaker in the building installation. This switch must be provided close to the device (within easy reach) and marked as a circuit breaker.
- An overload protection element (rated current \leq 10 A) is required for the power cable.

5.2 Quick wiring guide



■ 13 Connection diagram of the device

Terminal assignment

Terminal	Terminal assignment	Inputs
1	+ RTD power supply	Temperature (Optionally RTD or current input)
2	- RTD power supply	
5	+ RTD sensor	
6	- RTD sensor	
52	+ 0/4 to 20 mA input	

53	Signal ground for 0/4 to 20 mA input		
54	+ 0/4 to 20 mA input Density (current input)		
55	Signal ground for 0/4 to 20 mA input		
10	+ pulse input (voltage or contact)	Flow	
11	- pulse input (voltage or contact)	(Optionally pulse or current input)	
50	+ 0/4 to 20 mA or current pulse (PFM)		
51	Signal ground for 0/4 to 20 mA input flow		
80	+ digital input 1 (switch input)	Time synchronization	
81	- digital input (terminal 1)	 Start batch Stop batch Reset batch 	
82	+ digital input 2 (switch input)	Time synchronization	
81	- digital input (terminal 2)		
		Outputs	
60	+ status/pulse output 1 (open collector)	Batch control: pump/valve,	
61	- status/pulse output 1 (open collector) volume counter, sig ended, fault		
62	+ status/pulse output 2 (open collector)		
63	- status/pulse output 2 (open collector)		
70	+ 0/4 to 20 mA/pulse output	Current values (e.g. power) or	
71	- 0/4 to 20 mA/pulse output	counter values (e.g. energy)	
13	Relay 1 normally open (NO)	Batch control: pump/valve, fault	
14	Relay 1 normally open (NO)		
23	Relay 2 normally open (NO)		
24	Relay 2 normally open (NO)		
90	24V sensor power supply (LPS) 24 V power supply		
91	Power supply ground (e.g. for sensor power sup		
		Power supply	
L/+	L for AC + for DC		
N/-	N for AC - for DC		

5.2.1 Opening the housing



14 Opening the housing of the device

- 1 Terminal assignment labeling
- 2 Terminals

5.3 Connecting the sensors

5.3.1 Flow

Flow sensors with external power supply



- 🖻 15 Connecting a flow sensor
- A Voltage pulses or contact sensors including EN 1434 Type IB, IC, ID, IE
- B Current pulses
- C 0/4 to 20 mA signal

Flow sensors with power supply via the Batch Controller



- 16 Connecting active flow sensors
- A 4-wire sensor
- B 2-wire sensor

Settings for flow sensors with pulse output

The input for voltage pulses and contact sensors is divided into different types according to EN1434 and provides a power supply for switching contacts.

Pulse output of the flow sensor	Setting at the Rx33	Electrical connection	Comment
Mechanical contact	Pulse ID/IE up to 25 Hz	$A \qquad 10 \qquad B \\ 11 \qquad 11 \qquad A \\ A \qquad A \\ Sensor \\ B Rx33$	As an alternative, it is possible to choose "Pulse IB/IC+U" up to 25 Hz. The current flow via the contact is then lower (approx. 0.05 mA instead of approx. 9 mA). Advantage: lower power consumption, disadvantage: less immunity to interference.
Open collector (NPN)	Pulse ID/IE up to 25 Hz or up to 12.5 kHz	$A \qquad 10 \qquad B \\ 11 \qquad A $	As an alternative, it is possible to choose "Pulse IB/IC+U". The current flow via the transistor is then lower (approx. 0.05 mA instead of approx. 9 mA). Advantage: lower power consumption, disadvantage: less immunity to interference.
Active voltage	Pulse IB/IC+U	A + b + b + b + b + b + b + b + b + b +	The switching threshold is between 1 V and 2 V

Pulse output of the flow sensor	Setting at the Rx33	Electrical connection	Comment
Active current	Pulse I	$A \qquad \qquad$	The switching threshold is between 8 mA and 13 mA
Namur sensor (as per EN60947-5-6)	Pulse ID/IE up to 25 Hz or up to 12.5 kHz	$A \qquad + \qquad $	No monitoring for short circuit or line break takes place.

5.3.2 Temperature





To ensure the highest level of accuracy, we recommend using the RTD 4-wire connection, as this compensates for measurement inaccuracies caused by the mounting location of the sensors or the line length of the connecting cables.

5.3.3 Density



5.4 Outputs

5.4.1 Analog output (active)

This output can be used either as a 0/4 to 20 mA current output or as a voltage pulse output. The output is galvanically isolated. Terminal assignment, $\rightarrow \cong 16$.

5.4.2 Pulse output (active)

Voltage level:

- 0 to 2 V corresponds to Low level
- 15 to 20 V corresponds to High level

Maximum output current: 22 mA

5.4.3 Open collector output

The two digital outputs can be used as status or pulse outputs. Make the selection in the following menus **Setup** \rightarrow **Advanced setup** or **Expert** \rightarrow **Outputs** \rightarrow **Open collector**

5.5 Communication

The USB interface is always active and can be used independently of other interfaces. Parallel operation of multiple optional interfaces, e.g. fieldbus and Ethernet, is not possible.

5.5.1 Ethernet TCP/IP (optional)

The Ethernet interface is galvanically isolated (test voltage: 500 V). A standard patch cable (e.g. CAT5E) can be used to connect the Ethernet interface. A special cable gland is available for this purpose which allows users to guide pre-terminated cables through the housing. Via the Ethernet interface, the device can be connected using a hub or a switch or directly to office equipment.

- Standard: 10/100 Base T/TX (IEEE 802.3)
- Socket: RJ-45
- Max. cable length: 100 m



17 Connection of Ethernet TCP/IP, Modbus TCP

- 1 Ethernet, RJ45
- 2 Cable entry for Ethernet cable

5.5.2 Modbus TCP (optional)

The Modbus TCP interface is used to connect the device to higher-order systems to transmit all measured values and process values. The Modbus TCP interface is physically identical to the Ethernet interface $\rightarrow \blacksquare 17$, $\blacksquare 24$

5.5.3 Modbus RTU (optional)

The Modbus RTU (RS-485) interface is galvanically isolated (test voltage: 500 V) and used to connect the device to higher-level systems to transmit all measured values and process values. It is connected via a 3-pin plug-in terminal in the housing cover.



E 18 Connection of Modbus RTU

5.5.4 Printer interface / RS232 (optional)

The printer/RS232 interface is galvanically isolated (test voltage: 500 V) and is used to connect a printer. It is connected via a 3-pin plug-in terminal in the housing cover.



🖻 19 Printer connection via RS232

The following printers have been tested with the Batch Controller:

GeBE MULDE Mini thermal printer

5.6 Post-connection check

After completing the device's electrical installation, carry out the following checks:

Device condition and specifications	Notes
Is the device or cable damaged (visual inspection)?	-
Electrical connection	Notes
Does the supply voltage match the specifications on the nameplate?	100 to 230 V AC/DC (±10 %) (50/60 Hz) 24 V DC (-50 % / +75 %) 24 V AC (±50 %) 50/60 Hz
Do the mounted cables have adequate strain relief?	-
Are the power supply and signal cables correctly connected?	See wiring diagram on the housing

6 Operation options

6.1 General information regarding operation

The Batch Controller can be configured using operating keys or with the help of the "FieldCare" operating software.

The operating software, including the interface cable, is available as an order option, i.e. it is not included in the basic scope of delivery.

Parameter configuration is locked if the device is locked by the write protection switch $\Rightarrow \cong 27$ or the user code.

6.2 Display and operating elements



■ 20 Display and operating elements of the device

- 1 Green LED, "Operation"
- 2 Red LED, "Fault message"
- 3 Start (function key)
- 4 Stop (function key)
- 5 Numeric keyboard (function key)
- 6 Start printout (function key)
- 7 USB connection for configuration (interface)
- 9 160x80 dot-matrix display
- Green LED if voltage present, red LED in the event of an alarm/error. Green LED is always lit once the device is supplied with power.

Red LED flashing slowly (approx. 0.5 Hz): The device has been set to the bootloader mode.

Red LED flashing quickly (approx. 2 Hz): In normal operation: maintenance required. During firmware update: data transmission in progress.

Red LED remains lit: Device error.

6.2.1 Operating elements

3 operating keys, "-", "+", "E"

Esc/Back function: Press "-" and "+" simultaneously.

Enter/Confirm entry function: Press "E"

14 function keys

Start / stop function: Press "Start" to start a batching process. Press "Stop" to pause the batch that is currently running. Press "Stop" again to cancel the batch, press "Start" again to resume the batch run.

Function C: Press "C" when a batch is stopped to reset the counters on the display to their initial values.

Print function: Press "0" and "." simultaneously to initiate a printout for the last batch run. To avail of this functionality, the "RS232 printer interface" option must be purchased.

Write protection switch



■ 21 Write protection switch

1 Write protection switch on rear of housing cover

6.2.2 Preset counter entry function

A value for the preset counter can be entered any time. This value can be entered either in the **Display** menu or by pressing one of the keys 0-9 or period. It does not matter whether a

batching process is currently active when you enter the value. The new preset counter value is used when the next batching process is started.

If the preset counter is part of a display group, the preset counter value which is valid for the current batch is always displayed. If the value is changed when the batching process is stopped, the new value appears immediately on the display. However, if the value is changed during an active batching operation, the old value of the preset counter, which still applies for the current batch run, is displayed until this batching operation is finished. The new value, which is valid for the next batching operation, is displayed directly afterwards.

6.2.3 Display



22 Display of the Batch Controller (example)

- 1 Display group 1, no batch active. Flow, temperature, preset counter
- 2 Display group 2, batch active. Flow, volume counter, preset counter

6.2.4 "FieldCare Device Setup" operating software

To configure the device using the FieldCare Device Setup software, connect the device to your PC via the USB interface.

Establishing a connection

- 1. Start FieldCare.
- 2. Connect the device to the PC via USB.
- 3. Create project in File/New menu.
- 4. Select Communication DTM (CDI Communication USB).
- 5. Add device EngyCal RA33.
- 6. Click Connect.
- 7. Start parameter configuration.

Continue with device configuration in accordance with these Operating Instructions for the device. The complete Setup menu, i.e. all of the parameters listed in these Operating Instructions, can also be found in the FieldCareDevice Setup.

NOTICE

Undefined switching of outputs and relays

During configuration with FieldCare, the device may assume undefined statuses! This may result in the undefined switching of outputs and relays.

6.3 Operating matrix

A complete overview of the operating matrix, incl. all of the configurable parameters, can be found in the appendix of the Operating Instructions.

Language	Picklist with all available operating languages. Select the language of the device.
Display/operation menu	 Select the group for display (alternate automatically or fixed display group) Configure brightness and contrast of display Display sayed analyses and batch reports

- Display saved analyses and batch reports
 - Enter a value for the preset counter
- Recipe selection

Setup menu	The parameters for quick commissioning of the device can be configured in this setup. The advanced setup contains all of the essential parameters for configuring the device function.
	 Units Signal type Pulse value, value (for pulse signal type) or Start of measuring range (for current signal type) End of measuring range (for current signal type) Unit Counter unit Date and time Advanced setup (settings that are not essential for the basic
	 Date and time Advanced setup (settings that are not essential for the operation of the device) Special settings can also be configured via the "Expert"

Diagnostics menu	Device information and service functions for a quick device check.
	 Diagnostic messages and list Event logbook Device information Simulation Measured values, outputs

Expert menu	The Expert menu provides access to all of the operating positions of the device, including fine-turning and service functions.
	 Skip directly to the parameter via Direct Access (on device only) Service code to display service parameters (via PC operating software only) System (settings) Inputs Outputs Application Diagnostics

7 Commissioning

Make sure that all post-connection checks have been carried out before putting your device into operation:

- See 'Post-mounting check' section, $\rightarrow \cong 15$.
- Checklist, 'Post-connection check' section, $\rightarrow \square 25$.

After the operating voltage is applied, the display and the green LED are illuminated. The device is now operational and can be configured via the keys or the "FieldCare" parameterization software $\rightarrow \cong 28$.



Remove the protective film from the display as this would otherwise affect the readability of the display.

7.1 Quick commissioning

For quick commissioning of the "standard" Batch Controller application, only a few operating parameters must be entered in the **Setup** menu.

Prerequisites for quick commissioning:

RTD temperature sensor, 4-wire direct connection

Menu/setup

- Units: Select unit type (SI/US)
- Signal type: Select the signal type for the flow (pulse or current)
- Unit: Select the flow unit
- Unit counter: Define the unit for the flow counter, e.g. m³, kg
- **Pulse value, value**: Enter the unit and value of the pulse value for the flow transmitter (for the pulse signal type)
- Start of measuring range and end of measuring range (for the current signal type)
- Date/time: Set the date and time

The device is now operational and ready to control batches.

You can configure device functions, such as data logging, tariff function, bus connection and the scaling of current inputs for flow or temperature, in the **Advanced setup** menu or in the **Expert** menu. Descriptions of these menus can be found in the Operating Instructions.



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