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Küppers Elektromechanik GmbH

User's Manual

FAU 50

Betriebsanleitung-Version

FAU_M_EN_170308_E002

SW-Version

Diese Handbuch ist gültig für

SW: V03-01.99 und höher

Index

1. General

The FAU is a microprocessor-based unit to convert output frequencies of KEM-Amplifiers into an analogue signal. You may chose between two signals:

- 0/4 to 20 mA potential-free load independent current signal
- 0/2 to 10 V potential-free voltage signal

Adjust the desired output signal via the external slide switch on the lefthand housing side (see chapter 4.2.7 and 5.2).

The FAU can scale your measuring values and display them as rate or totals. Special characteristics are:

- Short response time
- High accuracy
- Full and easy programming

1.1. Features

- LCD display
- Pulse divider
- Two limits: flow-limit MIN, flow-limit MAX.
- Potential-free limit switch outputs
- 1:1 frequency output
- Detection of rotational direction
  Reverse flow changes the polarity of the analogue output, resets the internal counter and activates a switch output
- Versatile inputs for active and passive pickups

1.2. Operating Principle

An edge-controlled pulse width measurement combined with programmable time base function provides rapid and stable measuring values. The FAU detects any alteration of the measuring value quickly and accurately.

Conversion, limits and divider are based on the measuring values. The FAU converts the input frequencies with a resolution of 13 bit, the transmission behaviour is adjustable.

Your parameter settings and the internal counters of the FAU are maintained by a lithium battery when the is unit turned off.

2. Operation

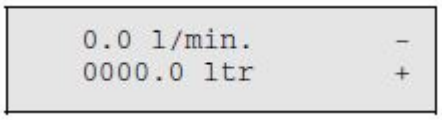
The FAU is operated via a front-panel touch keyboard and a two-line LCD display.

In this manual the four keys are shown as follows:

→	top lefthand key	P	top righthand key
↑	bottom lefthand key	E	bottom righthand key

First take a look at the menu structure of the FAU. Before starting to programme real values, press the keys as described below, observe how the display changes and compare it with the menu structure. This is how you will easily get familiar with structure and operation of the FAU. Detailed instructions for programming will follow from page 9 onwards.

2.1. Measuring Mode



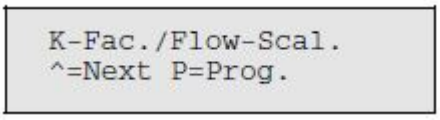
The measuring mode automatically appears after switching FAU. The display shows the last-selected display.

Press → to scan the individual displays. A description of each display will follow in chapter 4.

To get into the programming mode simultaneously press ↑ and E. After that the first parameter level will appear in the display.

2.2. Parameter Levels

The levels cannot be changed. They contain various parameters adaptable to your application.



1st line: Description of the parameter level

2nd line: Key functions
The sign ^ is for key ↑

E The FAU goes back to the measuring mode. The last-selected display appears.

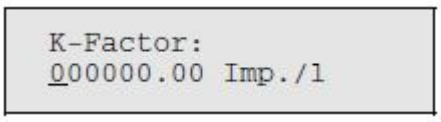
↑ To scan the four parameter levels.

P To call up the first parameter of the present parameter level.

2.3. Parameters

Having pressed P, the first parameter appears and you can change or confirm it immediately pressing E. After that the next parameter appears. Some parameters require you to enter numerals while others offer you pre-selections to chose from. After saving the last parameter pressing E, the FAU goes back to the parameter level. Press ↑ to call up the next parameter level. Press E to get back to the measuring mode.

2.3.1. Entering numerals



1st line: Description of the present parameter

2nd line: Current value, the cursor blinks on the first decimal digit

→ Each pressing will move the cursor in righthand direction. When the cursor has reached the last decimal digit, the next pressing will move the cursor back to first digit.

↑ To scan 0 to 9 for the present digit. "0" re-appears after "9".
When the cursor marks the decimal point, ↑ will not work.

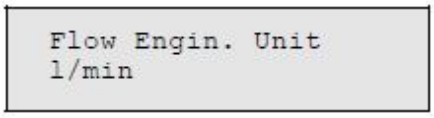
E To skip a parameter or enter your settings. The FAU automatically checks whether your settings are within the allowable range for the parameter. If you enter a value which is not within the allowable range, the FAU will not accept it and the last-entered setting appears. Only can you continue when your settings are within the allowable range.

Ranges fort he numerical Parameters

Parameter	Min. value	Max. value	Remarks
K-Factor	10.00	500000.00	pulses per litre
Density	700	2000	kg per m³
Gate Time	104	3224	msec
Divider	1	90000	decimal point and unit according to settings
Pulse Time	0.2	99.9	msec
Analog Start Value	0.000	99999.999	unit according to settings
Analog Final Value	0.001	99999.999	unit according to settings
Flow-Limit Max.	1	9999999	decimal point and unit according to settings
Hysteresis Max.	0.1	9.9	%
Flow-Limit Min.	1	9999999	decimal point and unit according to settings
Hysteresis Min.	0.1	9.9	%

2.3.2. Chosing from pre-selections

The FAU offers you pre-selections for some parameters like units or analogue offset.



pre-selection: litres per minute

↑ To scan the pre-selections for the present parameter. When the desired default appears, enter with E.

Summary of the pre-selections

Totals	Rate
kg	l/min
Grams	kg/m
Litres	ccm/m
ccm	g/min
Imp	l/h
Gal.	kg/h
lb	ccm/s g/s Gal/m lb/m

3. Programming

Start programming by simultaneously pressing ↑ and E.
This will cause all outputs to take a defined state:

Analogue output = minimum level, limits inactive and forward/backward detection = forward.

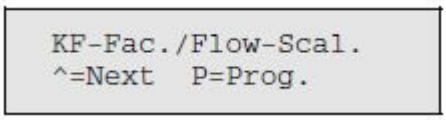
The display shows the first parameter level where the first line describes the parameter level and the second line informs you on the key functions. The sign "^" is for ↑.

E The FAU goes back to the measuring mode. The last-selected display appears.

↑ Scanning the four parameter levels.

P Calling up the first parameter of the present parameter level.

3.1. Level „K-Factor/Flow-Scaling“



This level is very important. Most settings which you enter here serve the calculation of further parameters of other levels.

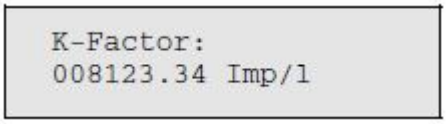
This level automatically appears with the first programming of the FAU. Programming this level is a pre-condition for operating the FAU. Four parameters have to be entered. With mass-related units there are five parameters. Press P to programme the first parameter of this level.

3.1.1. K-Factor of the flow meter

Each KEM Flow Meter is delivered with a calibration record, which shows the average K-factor of the flow meter. This factor defines the number of pulses per litre over the entire measuring range. In addition, the record contains various K-factors for certain flow values. With constant flow rates you may get a higher accuracy chosing the K-factor which is the closest to your flow rate.

The K-factor can be entered with up to two digits following the decimal point. The decimal point position will also apply for the actual flow display and the internal totaliser.

Example: gear flow meter type ZHM 02/1 with an average K-factor of 8,123.335 pulses per litre.



→ to chose the cursor position

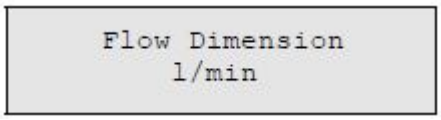
↑ to select 0 to 9 for the present cursor position

E to enter

Entering with E will call up the next parameter.

3.1.2. Unit for flow rates

To display measuring results in the corresponding unit, chose from pre-selections for volumetric and mass units. In the measuring mode, the unit is only displayed with volume and mass flow.



pre-selection: litres per minute

Use ↑ to go through the pre-selections.

Totals	Rate
kg	l/min
Grams	kg/m
Litres	ccm/m
ccm	g/min
Imp	l/h
Gal.	kg/h
lb	ccm/s g/s Gal/m lb/m

As soon as the desired unit appears, confirm with E. After that the next parameter appears.

3.1.3. Decimal point position for the flow rate display (DP Flow Display)

You should display your measuring results with a resolution in accordance with your application. Max. three digits after the decimal point are possible.

WARNING

Changing the decimal point position will also affect the limits. The FAU will remind you of checking the limits and adapting them to the present decimal point position.

Example: three digits after the decimal point are required.

Enter with E, after that the next parameter appears.

3.1.4. Density of the measuring medium

In case you selected a volumetric unit under chapter 3.1.2, the FAU will now skip this parameter. However, with mass-related units the FAU requires you to enter the density of the measuring medium.

KEM Flow Meters detect the volume flow. The FAU can calculate the corresponding mass flow considering the density, provided that the density is constant.

Example: the density of the measuring medium is 1,250 kg/m^3.

→ To chose the cursor position

↑ To select 0 to 9 for the present cursor position

E To enter

Enter with E, after that the next parameter appears.

3.1.5. Gate time

The parameters "Gate time" and "Gate memory" enable you to adapt the temporary transmission behaviour between frequency and analogue output to your requirements.

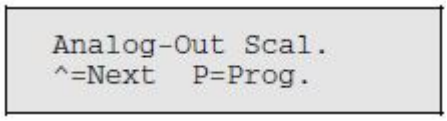
After the gate time has passed, the FAU calculates an average frequency for the measuring interval thereby calming signal fluctuations.

Periodic disturbances, e. g. pressure fluctuations, will be included in the displayed values, if the gate time is too short. You may avoid this by chosing an appropriate interval.

Example: flow variations with a period of 0.5 seconds require a gate time of ≥ 0.5 seconds.

You may chose a gate time from 0.10 up to 3.5 seconds in steps of 104 milliseconds.
Enter your setting with E and the final parameter of the K-factor level will appear.

3.1.6. Gate memory



This parameter determines the number of measurements which will be considered for calculating the actual measuring frequency (the response time of the measuring results depends on the gate time setting). With n > 0, the FAU calculates an average value considering the last n measurements and the actual measurement. The influence of the actual measurement can be determined as follows:

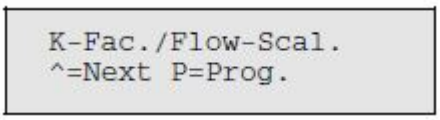
$$100\,\% * \frac{1}{n+1}$$

This way unique or rare disturbances are prevented from fully affecting the measuring results.
Adaption of both parameters gate time and -memory enables for any temporary behaviour whatever.

Example: The analogue output of the FAU supplies a controller with instantaneous values. You can prevent the upper harmonic waves (caused by pumps) in the flow signal from affecting the controller by chosing an appropriate gate time.
Quickly falling or rising flow values can cause the control unit to oscillate. Considering your controller settings, you should therefore reduce the influence of the actual flow value on the previous measuring results by chosing a higher value for gate memory.

Enter with [E], after that the FAU goes back to the K-Factor level.

From the parameter level there are three possibilities to go on:



[P] To go through the present parameter level again in the above-mentioned order and change single parameters if necessary.

[E] To go back to the measuring mode. The parameter settings do now apply.

[↑] To call up the next parameter level.

3.2. Parameter Level „Analogue Output Scaling“

The main function of the FAU is to generate a current or voltage signal proportional to the input frequency.

The present parameter level contains the parameters which are necessary to scale the analogue output for 0/4 to 20 mA or 0/2 to 10 V.

Only flow values have to be entered for the analogue output. The unit (see chapter 3.1.2) and resolution (see chapter 3.1.3) as entered in the parameter level "K-factor" (see chapter 3.1) apply.

You do not need to adjust the analogue output considering the frequency. The FAU knows the relation between flow rate and frequency by the K-factor (see chapter 3.1.1).

Press [P] to programme the analogue output.

Press [↑] to select the next parameter level.

3.2.1. Analogue offset: minimum level oft he analogue output

You may chose between an absolute minimum and a minimum shifted by 4 mA or 2 V.

Enter with [E], after that the next parameter appears.

3.2.2. Scaling the analogue output

You may assign the entire range of the analogue output to a working flow rate by entering a start and final value for the analogue output.

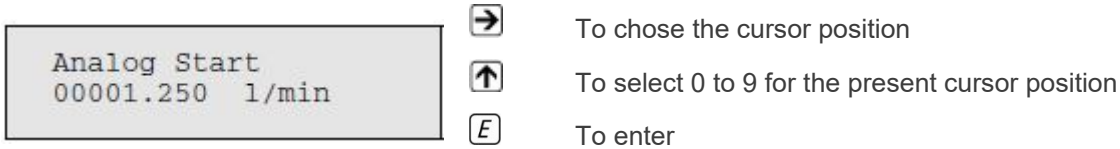
Example: A current signal of 0/4 to 20 mA is assigned to a flow range of 1.25 to 2.74 ltr/min.
20 mA correspond to a flow rate of 2.74 l/min starting at 1.25 ltr/min.

WARNING

The start value must be smaller than the final value. If this is not the case, a warning in the display will require you to enter values again beginning with the start value.

Analogue start value

Enter the flow rate for 0/4 mA or 2 V.

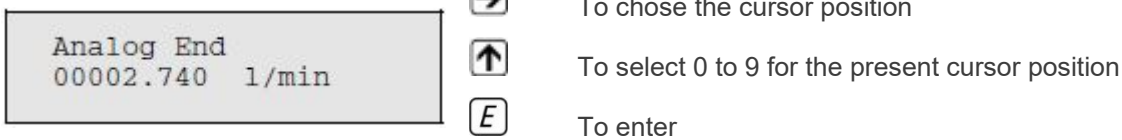


[→] To chose the cursor position
[↑] To select 0 to 9 for the present cursor position
[E] To enter

Enter with [E], after that the analogue final value appears.

Analogue final value

Now enter the actual flow value for 20 mA or 10 V.



[→] To chose the cursor position
[↑] To select 0 to 9 for the present cursor position
[E] To enter

Enter with [E], after that the next parameter appears.

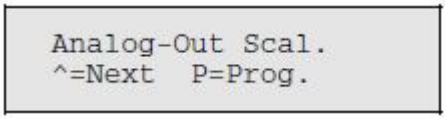
3.2.3. Response time of the analogue output

The FAU can convert the measuring frequency into an analogue signal based on the incoming frequency or based on the "calmed" frequency (see chapter 3.1.5 »Gate Time« and 3.1.6 »Gate memory«).

Example: Due to periodic flow rate fluctuations the FAU shall convert the calmed frequency calculated via "Gate time" and "Gate memory".

Entering with [E] will terminate the programming of this level.

There are three possibilities to go on:

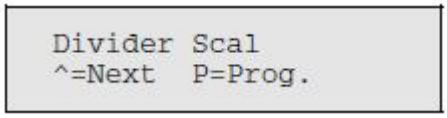


[P] To go through the present parameter level again in the above-mentioned order and change single parameters if necessary.

[E] To go back to the measuring mode. The parameter settings do now apply.

[↑] To call up the next parameter level.

3.3. Parameter level „Divider Scaling“



If you intend to use an external counter, the FAU can divide the signal of the flow meter and supply the counter with pulses proportional to the volume flow. In this level you can programme the dividing factor and the pulse time. Apart from that the FAU has an integrated totaliser.

Press [P] to start programming.

3.3.1. Unit for the divider

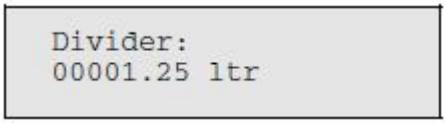
Keep to the unit entered for the flow rate (see chapter 3.1.2) as it determines the unit and resolution for the dividing factor. If you selected kg/min for the flow rate, you have to enter the dividing factor in kg.

3.3.2. Entering the dividing factor

The max. resolution for the dividing factor is pre-determined by the K-factor setting (see chapter 3.1.1) and unit (see chapter 3.3.1). Enter the volume with which the external counter shall count on.

With mass-related units the FAU will automatically consider the density of the measuring medium. The internal totaliser of the FAU is not affected by this setting.

Example: the external counter shall detect the number of filled vessels, contents 1.25 litres.



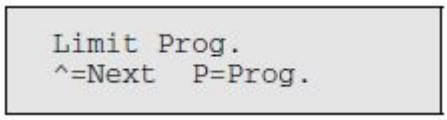
[→] To chose the cursor position

[↑] To select 0 to 9 for the present position

[E] To enter

Enter with [E], after that the next parameter appears.

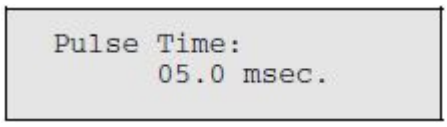
3.3.3. Pulse time for external counters



Depending on its input stage and type, the external counter may require a certain pulse time to identify the output pulses of the FAU. With the present parameter, you can adapt the pulse time to the external counter. This setting will not affect the integrated totaliser of the FAU.

WARNING

The pulse time must be shorter than 50% of the period of the max. dividing frequency. Other settings may falsify the output frequency.



Example: The external counter requires a pulse time of at least five milliseconds.

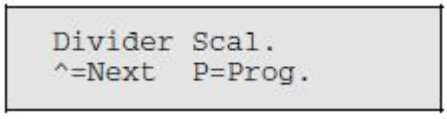
→ To chose the cursor position

↑ To select 0 to 9 for the present cursor position

E To enter

Example: The flow rate is 4,000 ccm/min and the external counter shall count on one unit with each ccm. The required pulse time t(p) can be calculated as follows:

$$\frac{4000\ \text{ccm} / min}{60\ \text{s} / \text{min} * 1\ ccm} = 66{,}67\ Hz => t(p) = \frac{14{,}99\ ms * 50\ \%}{100\ \%} = 7{,}5\ ms\ t(p)$$



Entering with E will terminate programming for the divider. The display is showing the present parameter level

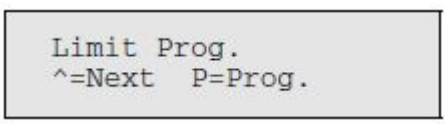
There are three possibilities to continue:

P to go through the present parameter level again in the above-mentioned order and change single parameters if necessary.

E to go back to the measuring mode. The parameter settings do now apply.

↑ to call up the next parameter level.

3.4. Parameter level „Limit-Programming“



The FAU has two separate switch outputs for real-time flow monitoring. You can determine a maximum and minimum. Any bypassing of these limits will activate the corresponding output.

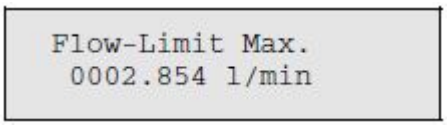
WARNING

The minimum must be smaller than the maximum. If this is not the case, a warning will require you to re-enter the limits starting with the maximum.

3.4.1. Flow-Limit Max.

Now enter the max. limit. If the flow rate exceeds this limit, the switch output MAX will be activated. Enter the max limit keeping to the unit and resolution selected under chapter 3.1.2, 3.1.3.

Example: the volume flow must not exceed 2.854 litres per minute.



→ to chose the cursor position

↑ to select 0 to 9 for the present cursor position

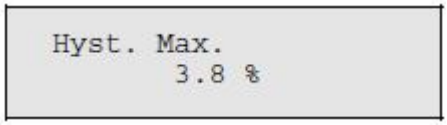
E to enter

Enter with E and continue with the hysteresis for the max. limit. E

3.4.2. Hysteresis for Limit MAX

If the volume or mass flow is unstable, the switch output may start to "scatter" when the flow rate approaches the limit. To avoid this enter a hysteresis which is slightly higher than the percentual flow variation within the max. limit range.

Example: with flow variations of 3.5 % in the upper range, the hysteresis should be approx. 3.8 %.



→ to chose the cursor position

↑ to select 0 to 9 for the present cursor position

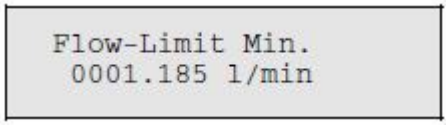
E to enter

Enter with E, after that "Flow-Limit MIN" appears in the display.

3.4.3. Flow-Limit MIN

Now enter the min. limit. If the flow rate bypasses this limit, the switch output MIN will be activated. Enter the min limit keeping to the unit and resolution selected under 3.1.2 and 3.1.3 (p. 10).

Example: the volume flow must not bypass 1.185 litres per minute.



→ to chose the cursor position

↑ to select 0 to 9 for the present cursor position

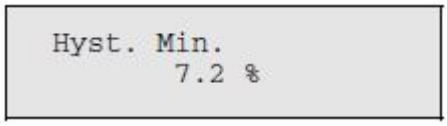
E to enter

Enter with E and continue with the hysteresis for the min limit.

3.4.4. Hysteresis for Limit MIN

If the volume or mass flow is unstable, the switch output may start to "scatter" when the flow rate approaches the limit. To avoid this enter a hysteresis which is slightly higher than the percentual flow variation within the min. limit range.

Example: with flow variations of 7.0 % in the lower range, the hysteresis should be approx. 7.2 %.



→ to chose the cursor position

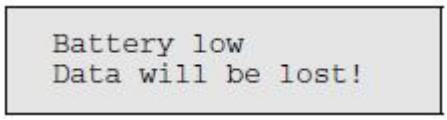
↑ to select 0 to 9 for the present position

E to enter

Entering with E will terminate programming. Press to get back to the measuring mode.

3.5. Battery Lifetime

The FAU has a battery to maintain all parameter settings and counts when the FAU is turned off. With normal operation (8 h per day) the battery will last for at least ten years.



When the battery becomes low or fails, the FAU will inform you on this with the following display after switching on: Hauptebene Linearisierung (Programmierung)

All parameters are lost now. Press to remove this display. The FAU will go to the first parameter level "K-Factor" (see chapter 3.1.1). After re-programming you can go on operating.

WARNING

If the FAU was turned off now, all parameters would be lost again. This would require a new programming of the FAU each time it had been turned off. You should therefore send the FAU back to KEM to have the battery replaced.

If the FAU was turned off now, all parameters would be lost again. This would require a new programming of the FAU each time it had been turned off. You should therefore send the FAU back to KEM to have the battery replaced.

4. Measuring Mode

The FAU offers you versatile possibilities of evaluating your measuring results:

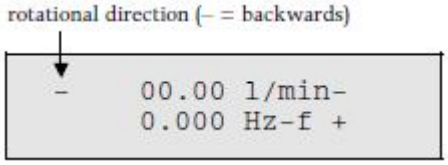
- various possibilities of displaying and monitoring the measuring results
- analogue output 0/4 to 20 mA or 0/2 to 10 V
- frequency inputs and control outputs

4.1. Displays in the Measuring Mode

→ to go through the displays. When the desired display appears, stop pressing →.

The display is maintained automatically even if you leave the measuring mode or turn off the FAU.

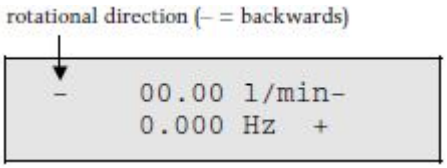
4.1.1. Actual flow in unit and measuring frequency



1st line: scaled flow rate with unit and
state limit MAX (+ = exceeded, – = not exceeded)
2nd line: direct input frequency,
state limit MIN (+ = bypassing, – = no bypassing)

4.1.2. Actual flow in unit and “calmed” measuring frequency

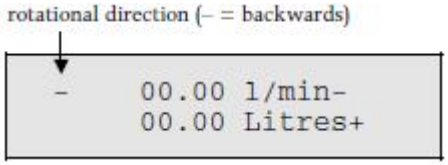
The FAU derives the calmed measuring frequency from the incoming measuring frequency considering the settings for "Gate time" (see chapter 3.1.5) and "Gate memory" (see chapter 3.1.6).



1st line: scaled flow rate with unit and
state limit MAX (+ = exceeded, – = not exceeded)
2nd line: calmed input frequency,
state limit MIN (+ = bypassing, – = no bypassing)

4.1.3. Actual flow and totalizer with unit

The FAU has a totaliser to count incoming pulses according to the settings for the K-factor (see chapter 3.1.1). Pressing P while this display is selected will reset the totaliser. A reset can also be realized with the control input "RESET".

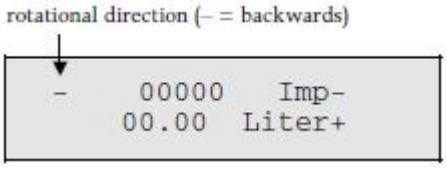


1st line: scaled flow rate with unit and
state limit MAX (+ = bypassing, – = no bypassing)
2nd line: scaled totaliser with unit and
state Limit MIN (+ = bypassing, – = no bypassing)

The totaliser counts up and down with rotational direction "forward" and "backwards" respectively.

4.1.4. Pulse counter and totalizer with unit

This display shows total pulses and incoming pulses of the flow meter. Pressing [P] while this display is selected will reset the totaliser. A reset can also be realized with the control input "RESET".

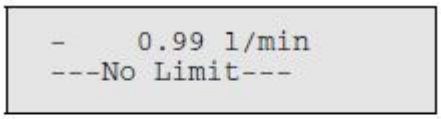


1st line: incoming pulses unscaled and state Limit MAX
(+ = exceeded, – = not exceeded)
2nd line: scaled totaliser with Unit and state Limit MIN
(+ = bypassing, – = no bypassing

Both counters count up and down with rotational direction "forward" and "backwards" respectively.

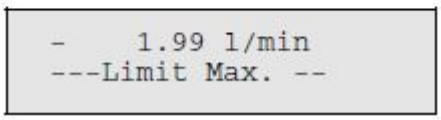
4.1.5. Actual flow and indication of the limit state

Example: A flow range of 0.6 up to 1.5 litres per minute must be maintained.^



1st line: scaled flow rate with unit
2nd line: state limit MIN/MAX
No Limit = no bypassing

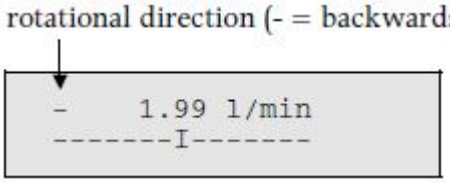
1st line: scaled flow rate with unit
2nd line: state limit MIN
Limit MIN = limit bypassed



1st line: scaled flow rate with unit
2nd line: state limit MAX
Limit MAX = limit exceeded

4.1.6. Actual flow with unit and analogue output level

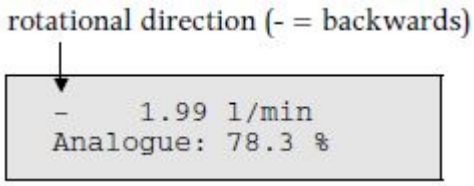
The sign "I" shows the present level of the analogue output. The scale (broken line) in the second line represents an output signal from 0 to 100 %. The polarity of the analogue signal changes with rotational direction "backwards".



1st line: scaled flow rate with unit
2nd line: the broken line is for 0 to 100%,
“I” shows the actual level of the output

If "<" appears at the beginning of the broken line, the output has bypassed 1% of the maximum.
If ">" appears at the end of the line, the output has exceeded 99% of the maximum.

4.1.7. Actual Flow with unit and analogue output in percent



1st line: scaled flow rate with unit
2nd line: analogue output in percent

4.2. Operating Priciple of the Control Inputs and the Outputs

The FAU has two frequency inputs and two control inputs which can influence different outputs and the internal counters. The control outputs are low-active, they have to be connected with the potential reference of the pickup supply. All outputs except for the analogue output are open-collector outputs.

4.2.1. RESET control input (terminals 11/7)

Activating this input will reset the internal pulse counter and totaliser to zero. Furthermore there is no incrementation or decrementation of the counters.

This function is also available via [P] in the displays under chapter 4.1.3 and 4.1.4.

Examples: changing of the measuring medium or a change of shifts.

4.2.2. HOLD control input (terminals 12/7)

The following happens while this input is active:

- The FAU maintains the present analogue level which is available at the analogue output.
- Reverse flow detection is disabled. The output holds the last-detected direction.
- Totaliser and pulse counter remain on their present count.
- Limit MIN and MAX are inactive

"HOLD active" in the 2nd line of the display indicates the HOLD input is active. The display of the actual flow is not affected by the HOLD input.

The HOLD function is useful when you do not want to evaluate the flow rate of start portions or while the flow meters are purged.

4.2.3. Divider output (terminals 13/14)

This output supplies external counters with a divided frequency (cf. p. 14, 3.3). The output sends an output pulse after the pre-selected volume has passed through the flow meter (cf. p.14, 3.3.2)

(the pulse time - p. 15, 3.3.3 - is adjustable). After that the transistor is blocking again.

4.2.4. MAX limit (terminals 15/16)

The open-collector track of this output conducts, when the actual flow exceeds the MAX limit (p. 15, 3.4.1). The output is blocked ("OC-track blocked"), when the actual flow bypasses the value for MIN limit less hysteresis (cf. p. 16, 3.4.2).

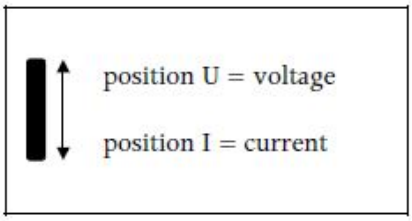
4.2.5. MIN limit (terminals 17/18)

The open-collector track of this output conducts, when the actual flow bypasses the MIN limit (p. 16, 3.4.3) The output is blocked ("OC-track blocked"), when the actual flow exceeds the value for MIN limit plus hysteresis (p. 17, 3.4.4).

4.2.6. Frequency output 1:1 (terminals 18/20)

The frequency input signal of CH1 is isolated by an optocoupler. The untreated and potential-free signal is available for further processing at terminals 19 and 20. Frequency and duty cycle of the original signal remain.

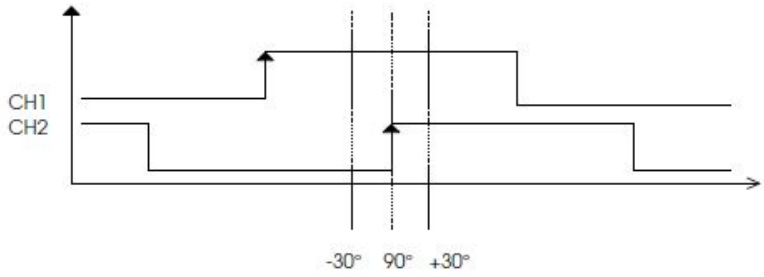
4.2.7. Analogue output 0/4 to 20 mA or 0/2 to 10 V (terminals 1, 2)



These two terminals give an analogue signal proportional to the assigned range (see chapter 3.2). The signal is a current or voltage signal according to the position of the external slide switch. The signal mode can be selected via the external lefthand slide switch

4.2.8. Forward/bachwards output (terminals 3/4)

The output transistor of the forward/backwards output conducts (= forward), if the frequency signal of CH2 is phase-shifted by 90° 30° compared with CH1.



4.2.9. Pickup supply (terminals 3/4)

This terminal provides a supply voltage of 12 V DC for KEM Pickups or Amplifiers. The current is restricted to 20 mA!

4.2.10. Frequency inputs CH1 and CH2 (terminals 6/7 and 8/7)

Inputs signals: 3 to 5,000 Hz – signals according to NAMUR or square wave voltage suitable.

CH1 serves the evaluation, CH2 is only used for detection of the rotational direction!

CH1 receives the outputs signal of the KEM Amplifier. You may add a 90°-phase-shifted signal to CH2 to detect the rotational direction.

CH2 cannot be used to realize twin channel operation.

4.2.11. Supply voltage of the FAU (terminals 9/10)

The FAU can be supplied with 24 V DC, 24 V AC, 115 V AC and 230 V AC. For DC-supply terminal 9 requires + 24 V and terminal 10 requires 0 V.

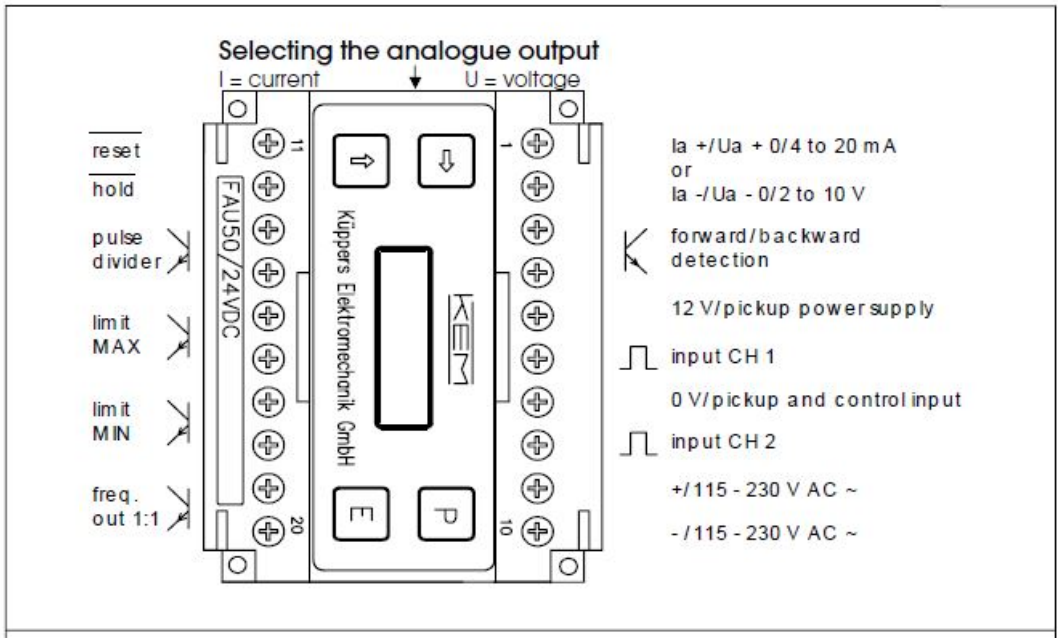
5. Specifications

5.1. Technical Data

Linearity	0.015 % of final value
Temperature Drift	0.050 % per 10 K
Residual Ripple	0.050 % of final value
Adjustable Range	Depending on programmed K-factor
Protection Class	IP20 Terminals shock-protected as per VBG4 and VDE0106 part 100
Allowable Ambient Temperature	+32 °F up to +113 °F [0 °C up to +45 °C]
Supply Voltage	230 V, 115 V/50 Hz AC or 24 V DC (15 %) (please indicate with order), power consumption 4 VA
Lifetime of Battery	8 years with storage and at least 10 years with daily 8-h-operation
Pickup Supply	12 V DC, 20 mA
Connections	Screw terminals, max. wire size 2.5 mm^2
Housing	Dimensions: L = 100, W = 77, D = 114 (mm), Plastic for mounting rail DIN/EN 500022-35 or wall mounting
Weight	DC-version: 350 g AC-version: 500 g
Frequency Range	3 up to 5,000 Hz
Frequency Inputs	CH 1 and CH 2 Current switch level: NAMUR DIN 19234 Voltage switch level: U_L < 6 V, U_H > 9 V, U_{max} = 30 V
Control Inputs	Reset/hold: active for U_L < 3 V (tmin = 100 ms) Switched for analogue output and totaliser potential reference 0 V of pickup supply (terminal 7)
Analogue Output	0/2 up to 10 V or 0/4 up to 20 mA, Switchable via external switch on the housing, resolution: 13 bit, polarity of output signal changes with rotational direction
Impedance	Current output: < 1,000 Voltage output: > 3,000
1:1 Frequency Output	Galvanically free, open collector: 30 V, 50 mA
Divider Pulse Output	Galvanically free, open collector: 30 V, 50 mA Pulsetime: 0.2 up to 100 ms, programmable
Adjustable Range of Divider	Depending on programmed K-factor
Limit Output MIN and MAX	Galvanically free, open collector: 30 V, 50 mA
Hysteresis of Limits	0 up to 9.9 % of programmed limit
Adjustable Range of Limits	Depending on programmed K-factor
Forward/Backward Output	Galvanically free, open collector: 30 V, 50 mA

5.2. Terminals

FAU 50

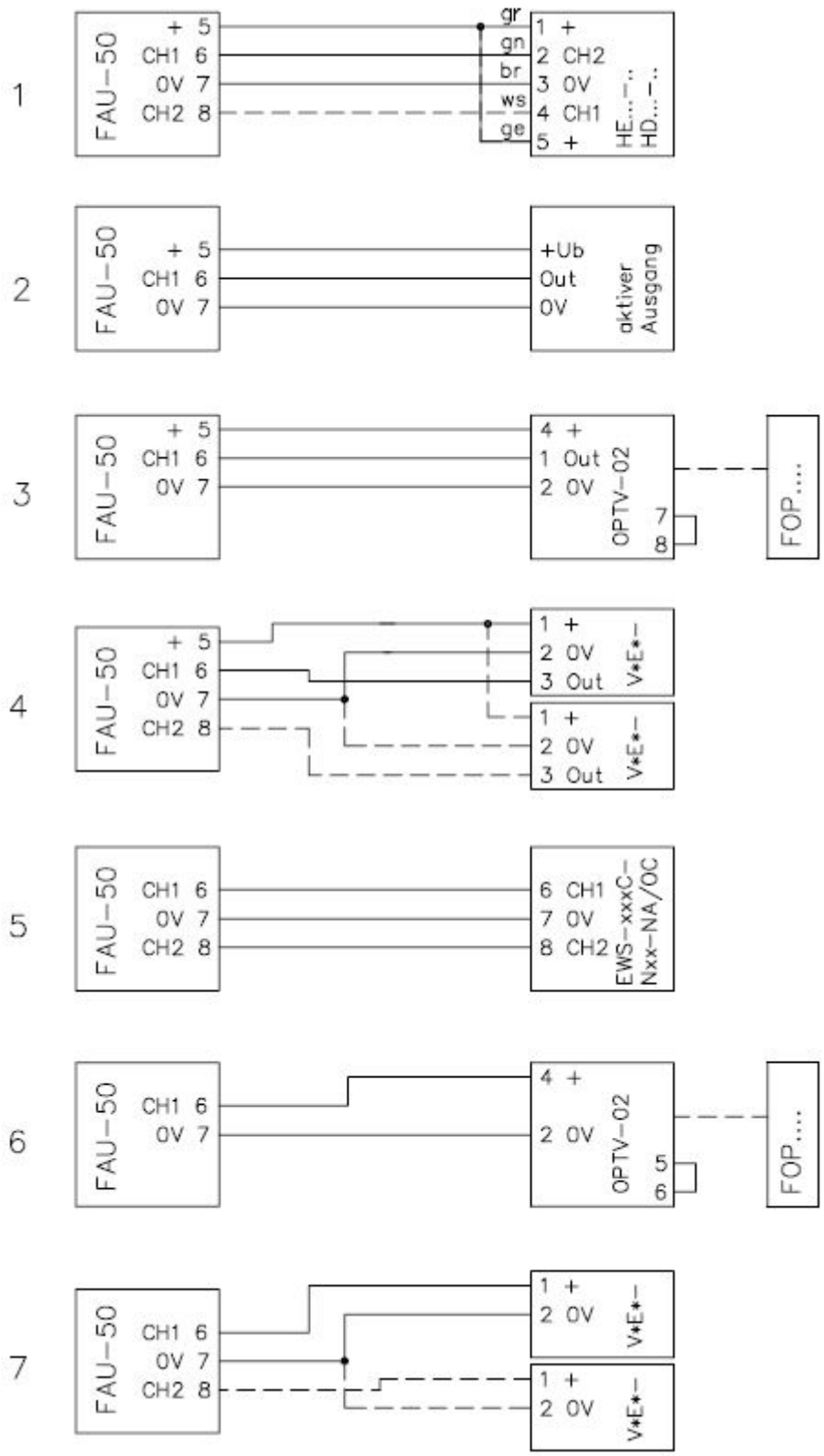


HINWEIS!

If the inverse input (terminal 8) is not used, connect terminal 7 and 8.

Terminal No.	Function, Electrical Specification	
1 2	+ analogue output – analogue output	} 0/4–20 mA or 0/2–10 V
3 4	collector emitter	forward/backward out U_{max} 30 V DC, I_{max} 50 mA low-inductive
5	+12 V DC supply voltage for KEM-Pickups or -Amplifiers, max. 20 mA	
6	frequency input CH1, NAMUR or voltage level	
7	0 V potential reference for external supply and control inuputs HOLD and RESET	
8	frequency input CH2, NAMUR or voltage level	
9 10	(+) supply voltage FAU (–) supply voltage FAU	24 V DC, 115 V AC oder 230 V AC / 4 VA, (± 15 %)
11	RESET, low-active control input (connect with terminal 7, 0 V)	
12	HOLD, low-active control input (connect with terminal 7, 0 V)	
13 14	collector pulse output emitter	U_{max} 30 V DC, Imax 50 mA low-inductive
15 16	collector limit MAX output emitter	U_{max} 30 V DC, Imax 50 mA low-inductive
17 18	collector limit MIN output emitter	U_{max} 30 V DC, Imax 50 mA low-inductive
19 20	collector 1:1 frequency emitter	U_{max} 30 V DC, Imax 50 mA low-inductive

5.3. Connection Schemes



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