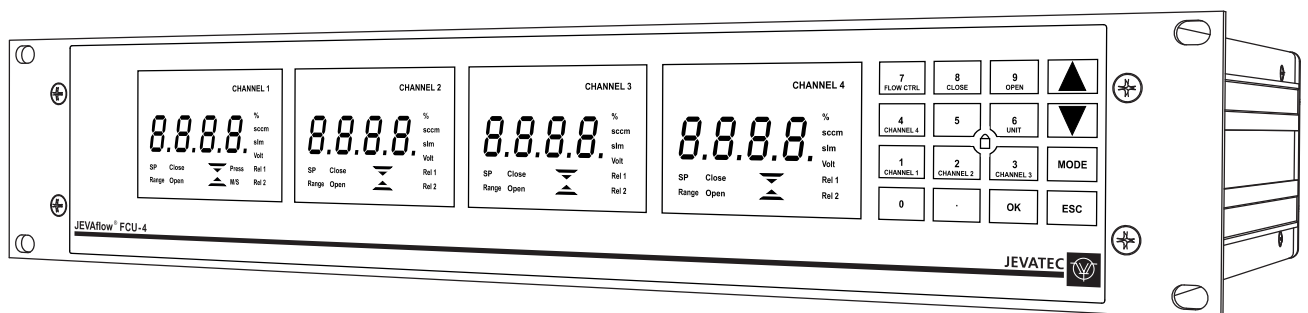


JEVAflow[®] FCU-4

Controller for MFC

Instruction Manual



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1. Notices

1.1 Conventional Application

The JEVAflow[®] FCU-4 is an operating unit for up to four mass flow controllers (MFC). It is operated in combination with analog or digital MFCs, which correspond to the available connections. Please refer to the appropriate manual for any given MFC for instructions on operation of the MFC.

The operation can be executed via keypad at the front panel of the device or interface RS232 via PC alternatively. A display for the readout of the reference and the actual value is available for each channel. The input of the reference and the actual values can be chosen between % or sccm and slm respectively.

In order to maintain the preset mixture of gases at changing flow rates the JEVAflow[®] FCU-4 has a master/slave function.

1.2 Warranty

The JEVAflow[®] FCU-4 is warranted to function within specification for a period of one year, if operated as specified in this manual. All material and manufacturing defects are covered within this period.

Damages due to inappropriate use are not covered by warranty. The manufacturer will assume no warranty when the operator or third parties modify the product in any way, which exceeds the operations listed in the appropriate manual. The product must be sent back in original packaging at the customers' account. We reserve the right to decide on replacement or refurbishment after inspection.

1.3 Transport Damages

- Check the packaging for visible damages
- Send advice of any damages to the carrier and to the insurer in case of damage
- Retain the packaging material, because return in the original packaging is prerequisite for warranty claims
- Check equipment supplied in original packaging, and verify that all components are present
- Check the instrument for visible damage



WARNING: Damaged Product.

Operating a damaged product can be dangerous.

2. Safety

2.1 Signs and Symbols



DANGER or WARNING:
Information on the prevention of injury.



DANGER:
Information on the prevention of injury by electric shock.



REFERENCE:
General notes regarding further information and articles.

2.2 Basic Safety Regulations

- During all work, such as installation, maintenance, and repair, please comply with respective safety regulations.



DANGER: Mains voltage
Coming into contact with components inside the instrument carrying the mains voltage can, when introducing object or liquids, cause injury or death.



WARNING: Improper usage
Improper usage can damage the instrument. Use the instrument only in accordance to the manufacturers' instructions.



WARNING: Incorrect connection and operation data
Incorrect connection and operation data can damage the instrument. Comply with all prescribed connection and operation data.

3. Technical Data

3.1 General Data

3.1.1 Mechanical Data

Dimensions:	Width: 436 mm 483 mm (with lateral fixing ears) Height: 88 mm (2 HU) Depth: 271 mm Rack slot 19", 2 HU
Weight:	approx. 3.2 kg
Build-in depth:	approx. 320 mm (including connected plug)
Application:	Bench top instrument Rack installation

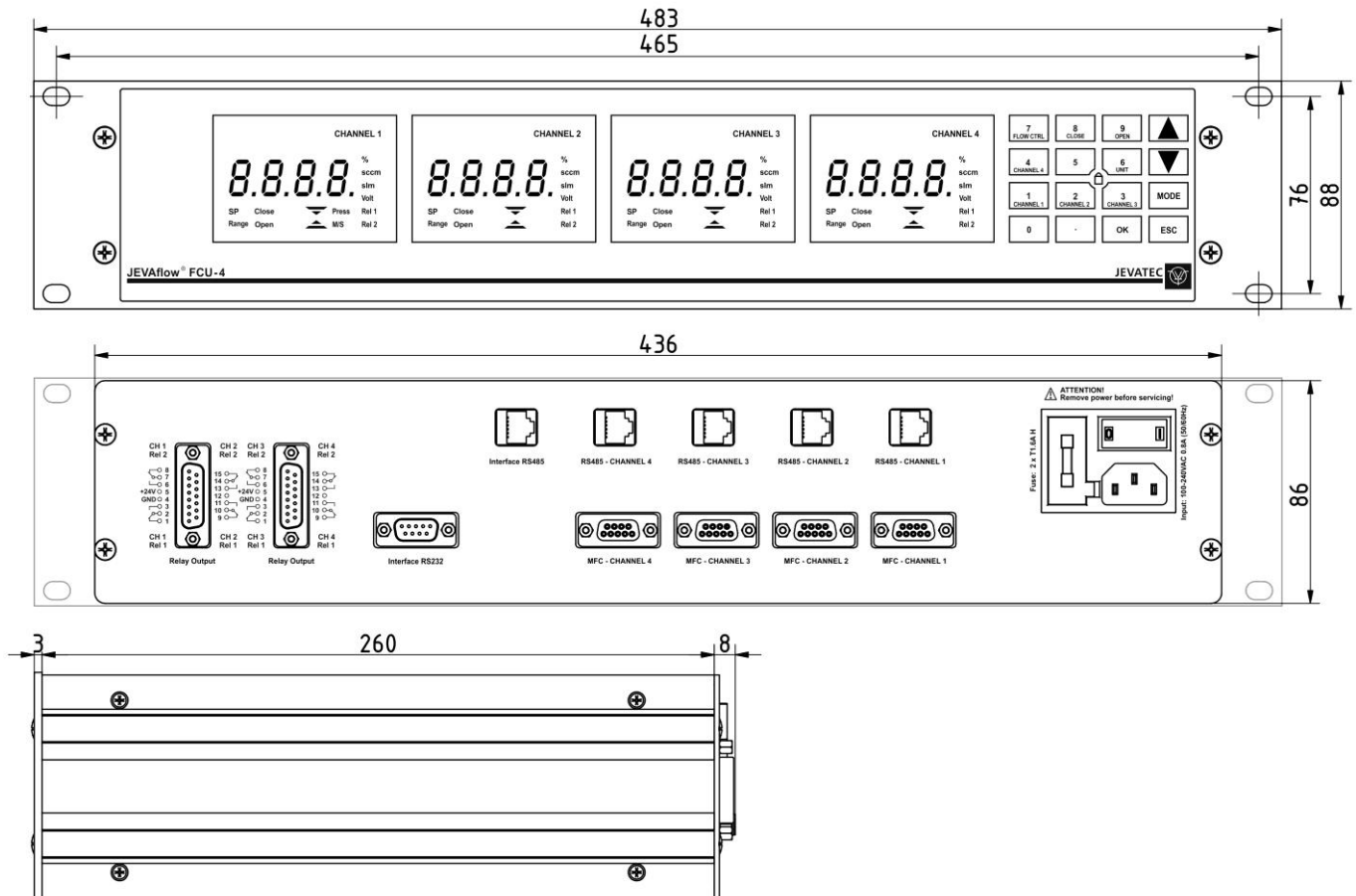


Figure 1 - Dimensions JEVAflow[®] FCU-4 (in mm)

3.1.2 Standard Parameters (factory settings)

Parameter	Parameter Description	Setting	
SP	Set point	0	0 %
rAn5	Control range	100	100 sccm
bAnd	Tolerance band	5	5 %
rAtP	Ramping	0	0 seconds
oPEn	Valve voltage	- 15U	- 15 V
iFC	Type of MFC	AnA	analog MFC
SLAU	Master/Slave function	oFF	off
br i	Brightness of the display	H i	high
boot	Operating mode after re-start	oFF	off
r232	Baud rate for interface RS232	19.2	19200 Baud
r485	Baud rate for interface RS485	9.6	9600 Baud

Table 1 - Factory Settings

3.1.3 Environment

Temperature:	Storage: -20 – +60 °C Operation: +5 – +40 °C (sea level) +5 – +30 °C (2000 m NN)
Relative humidity of the air:	max. 80 % (up to 30 °C) decreasing to max. 50 % (from 40 °C) non condensing
Usage:	indoors (max. 2000 m NN)
Protection class:	IP40

3.1.4 Standards

- Compliance with Low Voltage Directive 2006/95/EC
- Compliance with EMC Guideline 2004/108/EC

International/national standards and specifications:

- EN 61010-1
(Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use)
- EN 61000-6-2
(Electromagnetic Compatibility (EMC)
Part 6-2: Generic Standards – Immunity for Industrial Environments)
- EN 61000-6-3
(Electromagnetic Compatibility (EMC)
Part 6-3: Generic Standards – Emission Standard for Residential, Commercial and Light-Industrial Environments)

3.2 Mains Connection

Voltage:	90 – 240 VAC
Frequency:	50/60 Hz
Device fuses:	2 x T1.6A H
Power consumption:	max. 40 W
Current consumption:	max. 0.8 A
Protection class:	1
Connection:	Rubber connector IEC 320 C14

3.3 Connections for Analog and Digital MFC

Number of the digital connections (RS485):	4
Number of the analog in / outputs:	4/4
Control range (Range):	1 sccm – 300 slm
Measuring accuracy (analog):	$\pm 0.2\%$ ± 1 Digit of the ultimate value
Measuring rate:	10 s^{-1}
Measuring unit:	%, sccm, slm
Analog input voltage range:	-0.5 – 10.25 VDC
Standard range:	0 – 10 VDC
Connections analog MFC:	SUB-D, 9-pole, socket
Connections digital MFC:	RJ45 (6-pole) for RS485
	SUB-D, 9-pole, socket for power supply
Sensor powering:	$\pm 15 \text{ V}$, max. 250 mA
	$\pm 24 \text{ V}$, max. 250 mA (optional)

3.4 Switching Functions

Number of the switching functions:	8
Assignment:	2 per channel
Contact type:	changeover contact, potential-free
Load (ohmic):	switching current: max. 1 A
	switching voltage: max. 30 VAC / 30 VDC
Connection:	2 x SUB-D, 15-pole, plug

3.5 Interfaces

3.5.1 RS232

Standard:	RS232
Parameters:	8 data bits, 1 stop bit, no parity, no flow ctrl.
Signals:	RXD and TXD
Baud rate:	9600, 19200, 38400 Baud
Connection:	SUB-D, 9-pole, plug

3.5.2 RS485

Standard:	RS485 (half-duplex)
Parameters:	8 data bits, 1 stop bit, no parity
Signals:	A and B
Baud rate:	9600, 19200, 38400 Baud
Connection:	RJ45, 6-pole

4. Installation

4.1 Supplied Equipment

Description	Number
JEVAflow [®] FCU-4	1
Mains cord with shockproof plug (EU)	1
Operating Instructions (each DE and EN)	1
Spare fuses	2
Adhesive feet	4

Table 2 - Supplied equipment

4.2 Mechanical Installation

The JEVAflow[®] FCU-4 can be installed as follows:

- Benchtop instrument
- Rack installation

4.2.1 Benchtop Instrument

In case you want to use the JEVAflow[®] FCU-4 as benchtop instrument, please proceed as follows:

- Affix the rubber feet to the bottom edges.
- Place the device at the desired location.



WARNING: Mains power shutdown

Install the JEVAflow[®] FCU-4 so that you are in a position to operate the mains switch at any time or ensure that the mains power can be shut down at any time.

4.2.2 Rack Installation

The JEVAflow[®] FCU-4 as slot housing (19", 2HU) is designed for being installed into a rack system. In case you want use the JEVAflow[®] FCU-4 as rack unit, please proceed as follows:

- Insert the JEVAflow[®] FCU-4 into the rack system.
- Affix the instrument.



WARNING: Mains power shutdown

Install the JEVAflow[®] FCU-4 so that you are in a position to operate the mains switch at any time or ensure that the mains power can be shut down at any time.

4.3 Connections

4.3.1 Rear of the Instrument

Figure 2, page 12 shows the rear of the JEVAflow[®] FCU-4. The pin assignment of the individual connections is described in the following paragraphs.

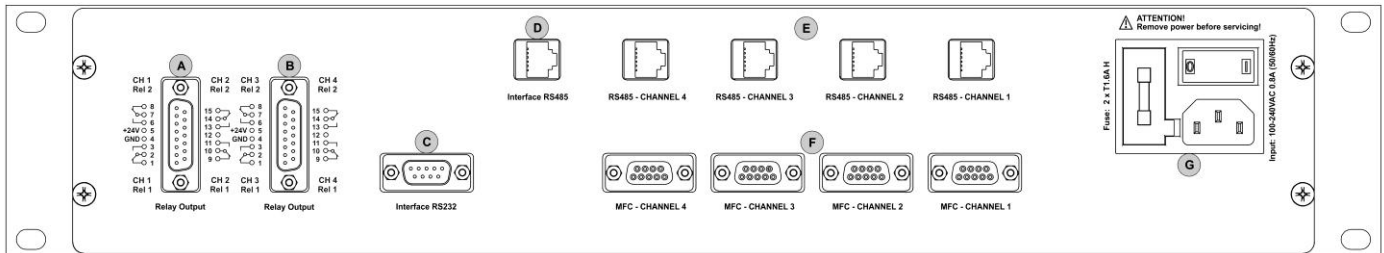


Figure 2 - Rear of the Instrument

- A Connection for relay output for channel 1 and 2
- B Connection for relay output for channel 3 and 4
- C Connection for interface RS232
- D Connection for interface RS485
- E Connection RS485 for up to 4 digital MFC (RS485 - MFC X)
- F Connection for up to 4 MFC (MFC - CHANNEL X)
- G Mains connection with mains switch and device fuses

4.3.2 Mains Connection

The mains connection on the rear of the instrument (🔌 Figure 2, page 12) is intended for a mains cord, which has been fitted with a rubber connector on the instrument side.



DANGER: Mains voltage

Insure that device is professionally installed/ grounded. Incorrect grounding can lead to injury or death. Use only three core mains cables and extension cables respectively with a protective ground connection. Insert the mains plug only into a mains outlet with a protective ground contact.

4.3.3 MFC - CHANNEL X

The connections MFC - CHANNEL 1 to MFC - CHANNEL 4 (🔗📖 Figure 3, page 13) serve as connections for up to a maximum of four MFCs.

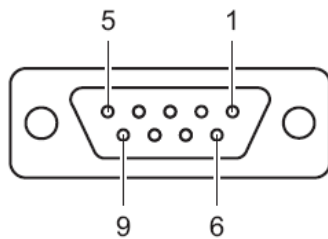


Figure 3 - Socket MFC - CHANNEL X (SUB-D, 9-pole)

1	Valve Open / Close	6	Set point
2	Actual value (Flow)	7	Signal GND
3	+15 V DC (optional + 24 VDC)	8	Signal GND
4	Power GND	9	Valve voltage
5	-15 VDC (optional open)		



CAUTION: Improper MFC

MFCs which are not intended for usage via these connections, can be destroyed or damage the instrument.

Connecting:

- Use appropriate connecting cables between JEVAflow[®] FCU-4 and MFC.

4.3.4 RS485 - CHANNEL X

The connections RS485 - MFC - CHANNEL 1 to MFC - CHANNEL 4 (🔗📖 Figure 4, page 13) serve as connections for up to a maximum of four digital MFC.

Digital MFCs are to be configured according to their respective manual and to be provided with the addresses 1 to 4 (dependent on their channel number). The parameters of the MFC are to be keyed into the JEVAflow[®] FCU-4 (🔗📖 Chapter 6.1 MFC Parameters, page 24).

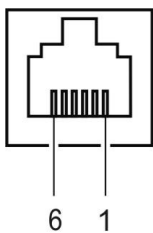


Figure 4 - Connection RS485 – CHANNEL X

1	Shield	4	A
2	Shield	5	Shield
3	B	6	Shield



CAUTION: Improper MFC

MFCs which are not intended for usage via these connections can damage the instrument. Operate the JEVAflow FCU-4 only with the appropriate MFC (RS485 protocol required).

Connecting:

- Connect the MFC using the appropriate connection on the rear of the JEVAflow[®] FCU-4.

4.3.5 Interface RS232

The Interface RS232 (🔗📖 Figure 5, page 12) enables the operation of the device by a computer or a terminal.

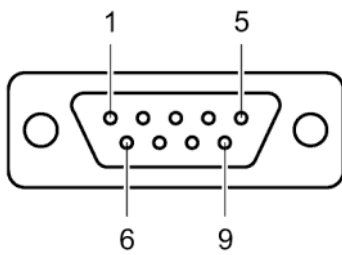


Figure 5 - Connecting Plug Interface (SUB-D, 9-pole)

1	-	6	DSR (bridge to DTR)
2	RxD	7	RTS (bridge to CTS)
3	TxD	8	CTS (bridge to RTS)
4	DTR (bridge to DSR)	9	-
5	GND		

Connecting:

- Connect the serial interface of the computer using a shielded cable to the connector interface RS232 on the rear of the JEVAflow[®] FCU-4.



Warning:

Use only a serial null modem cable with two 9-pole SUB-D female connectors for use of the interface RS232.

4.3.6 Interface RS485

The Interface RS485 (🔗📖 Figure 6, page 14) serves exclusively as monitor output and enables to “listen” to the communication on the data bus via computer.

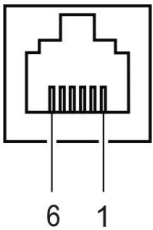


Figure 6 - Connection Interface RS485

1	Shield	4	A
2	Shield	5	Shield
3	B	6	Shield

Connecting:

- Connect the serial interface of the computer using a shielded cable to the connector interface RS485 on the rear of the JEVAflow[®] FCU-4.

4.3.7 Relay Output

You can use the potential-free relay contacts 1 and 2 of channel 1 and 2 for switching through the connector Relay Output (🔗📖 Figure 7, page 15).

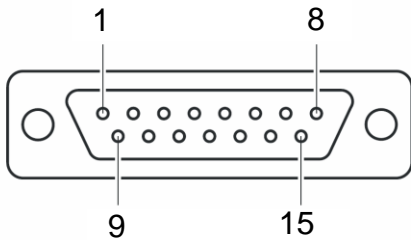


Figure 7 - Connecting Plug for Relay Output (SUB-D, 15-pole) for Channel 1 and 2

1	CHANNEL 1 Relay 1 NC	9	CHANNEL 2 Relay 1 NC
2	CHANNEL 1 Relay 1 COM	10	CHANNEL 2 Relay 1 COM
3	CHANNEL 1 Relay 1 NO	11	CHANNEL 2 Relay 1 NO
4	GND	12	not connected
5	24 V DC, 0.5 A	13	CHANNEL 2 Relay 2 NO
6	CHANNEL 1 Relay 2 NO	14	CHANNEL 2 Relay 2 COM
7	CHANNEL 1 Relay 2 COM	15	CHANNEL 2 Relay 2 NC
8	CHANNEL 1 Relay 2 NC		

You can use the potential-free relay contacts 1 and 2 of channel 3 and 4 for switching through the connector Relay Output (🔗📖 Figure 8, page 15).

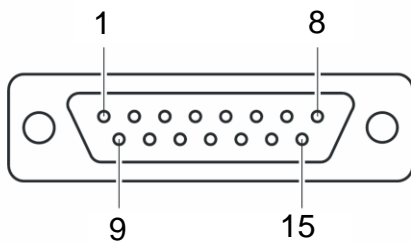


Figure 8 - Connecting Plug for Relay Output (SUB-D, 15-pole) for Channel 3 and 4

1	CHANNEL 3 Relay 1 NC	9	CHANNEL 4 Relay 1 NC
2	CHANNEL 3 Relay 1 COM	10	CHANNEL 4 Relay 1 COM
3	CHANNEL 3 Relay 1 NO	11	CHANNEL 4 Relay 1 NO
4	GND	12	not connected
5	24 V DC, 0.5 A	13	CHANNEL 4 Relay 2 NO
6	CHANNEL 3 Relay 2 NO	14	CHANNEL 4 Relay 2 COM
7	CHANNEL 3 Relay 2 COM	15	CHANNEL 4 Relay 2 NC
8	CHANNEL 3 Relay 2 NC		



DANGER: Dangerous to Touch Voltage

Voltages over 60 VDC or 30 VAC are dangerous to touch. You are allowed to switch with the connector Relay Output only voltages of 30 VDC or 30 VAC, max. 1 A. This voltage has to meet the requirements of a grounded protective low voltage (SELV-E according to EN 61010).

5. Operation

5.1 Front Panel

Figure 9 page 16 shows the front panel of the JEVAflow[®] FCU-4.

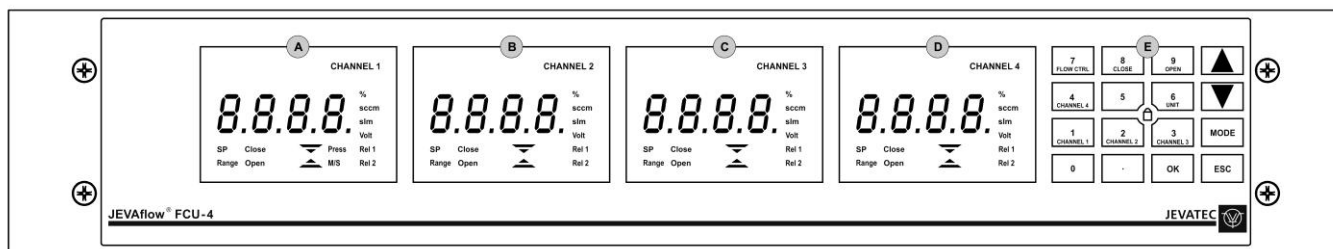


Figure 9 - Front Panel

- A Display of channel 1
- B Display of channel 2
- C Display of channel 3
- D Display of channel 4
- E Operating keys

5.1.1 Display

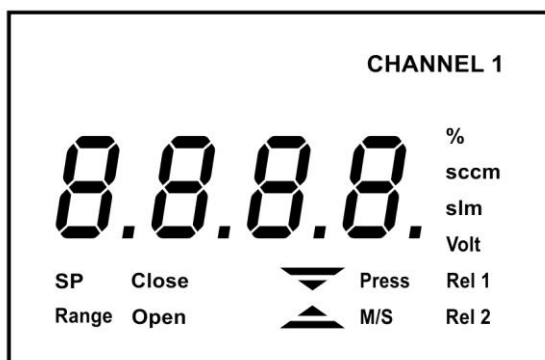


Figure 10 - Display of Channel

Display	Description
CHANNEL X	Selected channel for parameter input through keypad active
8.8.8.8.	Measured value or status message
SP	Set point display active
Range	Range display active
Close	Status display valve completely closed
Open	Status display valve completely open (purging)
▼	Status display set point overshoot
▲	Status display set point undershot
Press	Display of a pressure value active
M/S	Status display master/slave function

Display (continuation)	Description
%	Display in % of the control range
sccm, slm	Display in sccm for control range < 10 slm or slm for control range ≥ 10 slm
Volt	Display of the valve voltage in volts
Rel 1, Rel 2	Relay status The relay operates if the sign lights up

Table 3 - Display Structure and Description

5.1.2 Operating Keys

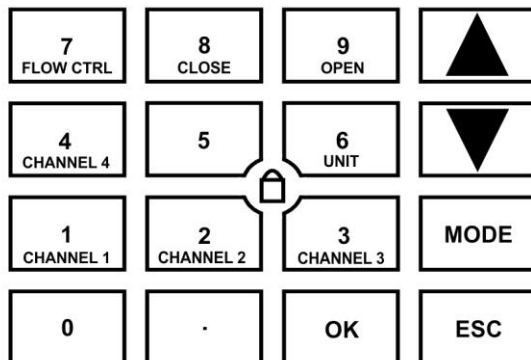


Figure 11 - Front Panel Cutout- Keypad

CHANNEL 1, 2, 3, 4

With the key CHANNEL 1, 2, 3 or 4 you can activate the respective channel in the display mode. The key ESC deselects the active channel. The number of active channel will be displayed during this time.

UNIT

The readout is switched between % and sccm or slm respectively. One channel has to be selected for this function to operate.

CLOSE

The valve in the MFC will be closed completely. One channel has to be selected for this function to operate.

OPEN

The valve in the MFC will be opened completely. One channel has to be selected for this function to operate.

FLOW CTRL

The valve will be reset to the regulation status. One channel has to be selected for this function to operate.

Numeric pad 0-9 and Decimal Point

Numeric pad and decimal point serve the set point and parameter input.

OK

Key for confirmation of an input.

ESC

Key to cancel an input or to deselect an activated channel.

Arrow Keys (▼ DOWN / ▲ UP)

The arrow keys are needed to enter data in the configuration mode or to alter the set point in the display mode. A standard value can be reduced or enlarged in steps of 0.1 % by pushing the keys. The appropriate keys will be marked as DOWN (▼) and UP (▲) in the following.

MODE

You can switch between the display of the actual flow (Flow), the set point (Set Point), the control range (Range), and the valve voltage by a short push of the key MODE in the display mode. You can switch to the configuration modes for MFC or Instrument Parameters by pushing the MODE for approx. 2 seconds. You can set various parameters.

Symbol Key Lock

LED for keyboard lock. Lights up red in case of activated keyboard lock.

5.2 Turning Power On and Power Off

5.2.1 Turning Power On

- Turn power on using the mains switch.

After Power on the JEVAflow[®] FCU-4 will operate the following:

- Self test
- Display test
- Display of the used software version
- Re-establish the parameter set up last
- Activate the display mode

5.2.2 Turning Power Off

- Turn power off using the mains switch.



CAUTION: Waiting Time

Wait for at least 5 seconds before switching on the instrument again.

5.3 Operating Modes

The JEVAflow[®] FCU-4 can be operated in the following modes:

- **Readout Mode**

The readout mode for the display of the flow values and for the short-term display of actual flow values.

🔑📖 Chapter 5.4 Readout Mode, page 19

- **Configuration Mode**

The configuration mode enables access to various parameters. You can see these parameters or change them by pushing the arrow or numeric keys. You can configure the JEVAflow[®] FCU-4 in this way.

🔑📖 Chapter 5.5 Configuration Mode, page 22

5.4 Readout Mode

5.4.1 Selection

The JEVAflow[®] FCU-4 operates automatically in the readout mode after switching on. The instrument will automatically revert to the readout mode if during running the configuration mode no operation is executed for 60 seconds.

5.4.2 Description

The actual flow values of the MFC are shown by default in the readout mode. The actual values of the set value (SP), the control range (Range) and the valve voltage (Volt) can be read by selection of the channel and operation of the key MODE. The display reverts to the actual flow values after approx. 10 seconds.

5.4.3 Functions

5.4.3.1 The Set Point

The set point can be selected freely between 0 % and 100 % for each channel. You have to consider that the lowest possible set point depends on the used MFC and is $\neq 0$.

The actual flow is displayed in the readout mode. The set point can be displayed for approx. 10 seconds by a short push of the key MODE.

The input of a fixed set point is made through the configuration mode for MFC parameters.

🔑📖 Chapter 6.2 Instrumentation Parameters, page 25

The fine adjustment of the set points for each channel is executed through the cursor keys **Up** and **Down**. The actual set point will be increased by 0.1 % of the control range through the cursor key **Up**, it will be reduced by 0.1 % through the cursor key **Down**. The display shows the new set point approx. 10 seconds after pressing the cursor keys **Up** or **Down**.

5.4.3.2 Set Point Tolerance Band

The relay 2 of the respective channel operates if the deviation of the actual gas flow from the set point exceeds the set point tolerance band. Furthermore the status displays for **Set Point Overshot** or **Set Point Undershot** light up.

A drop out of the tolerance band is normal during set point changes within the control period of the MFC.

5.4.3.3 Channel Switch Off and Switch On

To switch off a channel without changing the saved set point, select the channel through the respective key and press the **CLOSE** key. The saved value stays unchanged. Resetting is accomplished by pushing the **FLOW CTRL** key.

5.4.3.4 Purging


In order to purge a MFC it is necessary to select the channel through the respective key for the channel. Press the **OPEN** key for approx. 3 seconds to start the purging. The valve of the MFC will be opened completely. The purging ends by pressing the **FLOW CTRL** or **CLOSE** keys.

5.4.3.5 Master/Slave Mode

The **Master/Slave Mode** works always with channel 1 as master and the channels 2 to 4 as slave. There is a difference between two operation modes.

The set point of channel 1 works as index value in mode 1 (SP) while the actual value of channel 1 is the index value in mode 2 (FLO).

The **Master/Slave Mode** as well as the respective operating mode are also activated, selected and deactivated through the configuration mode for instrument parameters.

 Chapter 6.2 Instrument Parameters, page 26

The setting of the set point is made through the configuration mode for MFC parameters.

In combination with the setting of the set point on channel 1 (master) in mode 1 the set points for the channels 2, 3 and 4 (slave) are corrected automatically.

The adjustment setting of the set points of each channel is carried out through the cursor keys **Up** and **Down**. These settings do not encroach upon the other channels.

The set point of the channels 2, 3 and 4 is newly figured on the basis of the actual flow of channel 1 every 0.5 seconds in mode 2.

5.4.3.6 Ramping

An increasing set point (Ramping) can be set via software or keypad between 0 s (standard value) and 255 s. Decimal places are not allowed.

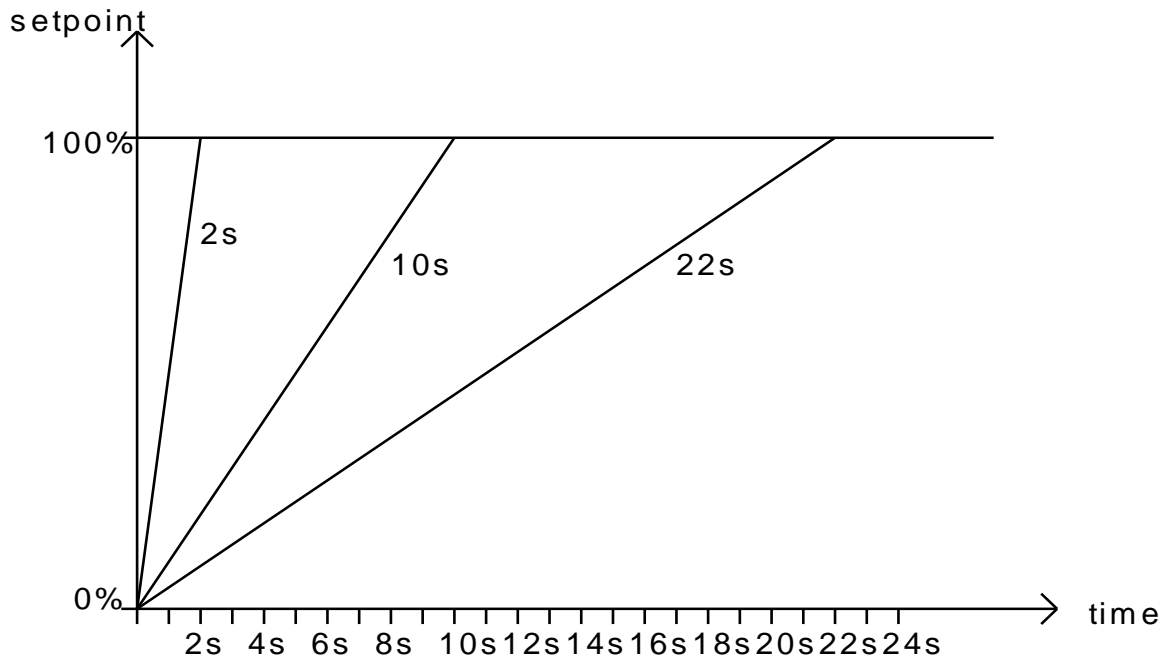


Figure 12 - Diagram of the Ramping Function

If the ramping time is > 0 seconds, the new set point will not be changed immediately but slowly increased or decreased. The ramping time is the period of increase between 0 % and 100 %. The ramping transconductance remains steady if the set point is changed between other values (e. g. from 20 % to 70 %).

5.5 Configuration Mode

5.5.1 Selection

To switch from readout mode to configuration mode, press MODE key for approx. 2 seconds.

5.5.2 Parameter Sets

In the configuration mode you have access to various parameters. You can see or change these parameters through the arrows keys. In this way you can configure the JEVAflow[®] FCU-4, Table 4, page 22 shows all available parameters.

Parameter Sets	Parameters
MFC Parameters	<i>SP</i> <i>rAnG</i> <i>bAnd</i> <i>rAtP</i> <i>oPEn</i> <i>iFC</i>
Instrument Parameters	<i>SLAU</i> <i>br i</i> <i>boot</i> <i>r232</i> <i>r485</i>

Table 4 - Parameter Sets and Corresponding Parameters



The available parameters are divided into the following parameter sets:

MFC Parameters

These parameters apply only to the MFC of the selected channel. A parameter set is available for each channel.

  Chapter 6.1 MFC Parameters, page 24

Instrument Parameters

You can configure the instrument in general with the help of these parameters. The parameters are valid for all channels.   Chapter 6.2 Instrument Parameters, page 25

5.5.3 Operating Concept

You can select and change a certain parameter from the readout mode as follows:

- Press the CHANNEL key 1, 2, 3 or 4, in order to select the desired measuring channel.
 - The status display CHANNEL 1, 2, 3 or 4 of the selected channel lights up.
- Press the MODE key for approx. 2 seconds.
 - You are in the configuration menu of the MFC parameters.
- Press the ESC key and then the MODE key for approx. ca. 2 seconds.
 - You are in the configuration menu of the instrument parameters.
- Press the MODE key to select the desired parameter.
 - The name and the value of the parameter are displayed.
- Use either the arrow keys or the numeric pad in accordance to the selected parameter in order to change the value of the parameter.
 - The new value of the parameter will be displayed.
- Save the value by pressing the OK key.
- Cancel the procedure by pressing the ESC key.
- Press the MODE key to access to the next parameter.

The instrument reverts to the readout mode when the last parameter of a parameter set is passed. Changes of parameters are only valid if the OK key was pressed after input or selection. The values are saved in the EEPROM.

If you are in the configuration mode and no change is executed within a period of 60 seconds, the instrument reverts to the readout mode.

6. Parameters

6.1 MFC Parameters

Each channel has an own set of parameters.

- Select the desired channel by pressing the CHANNEL key 1, 2, 3 or 4.
- Keep the MODE key pressed for approx. 2 seconds.
 - The instrument is now in the mode MFC Parameters.
- Press the MODE key to select the desired parameter.
- The name and the value of the parameter are displayed.
- Use the numeric keys to change the parameter.
- Press the ESC key to disallow the changed value.
- Press the OK key to save the parameter setting and afterwards the MODE key to come to the next parameter.
- Press the MODE key to attain to the next parameter without saving of the parameter setting.
- Repeat the steps in order to change further parameters.
- Press the ESC key to leave the mode MFC Parameters.

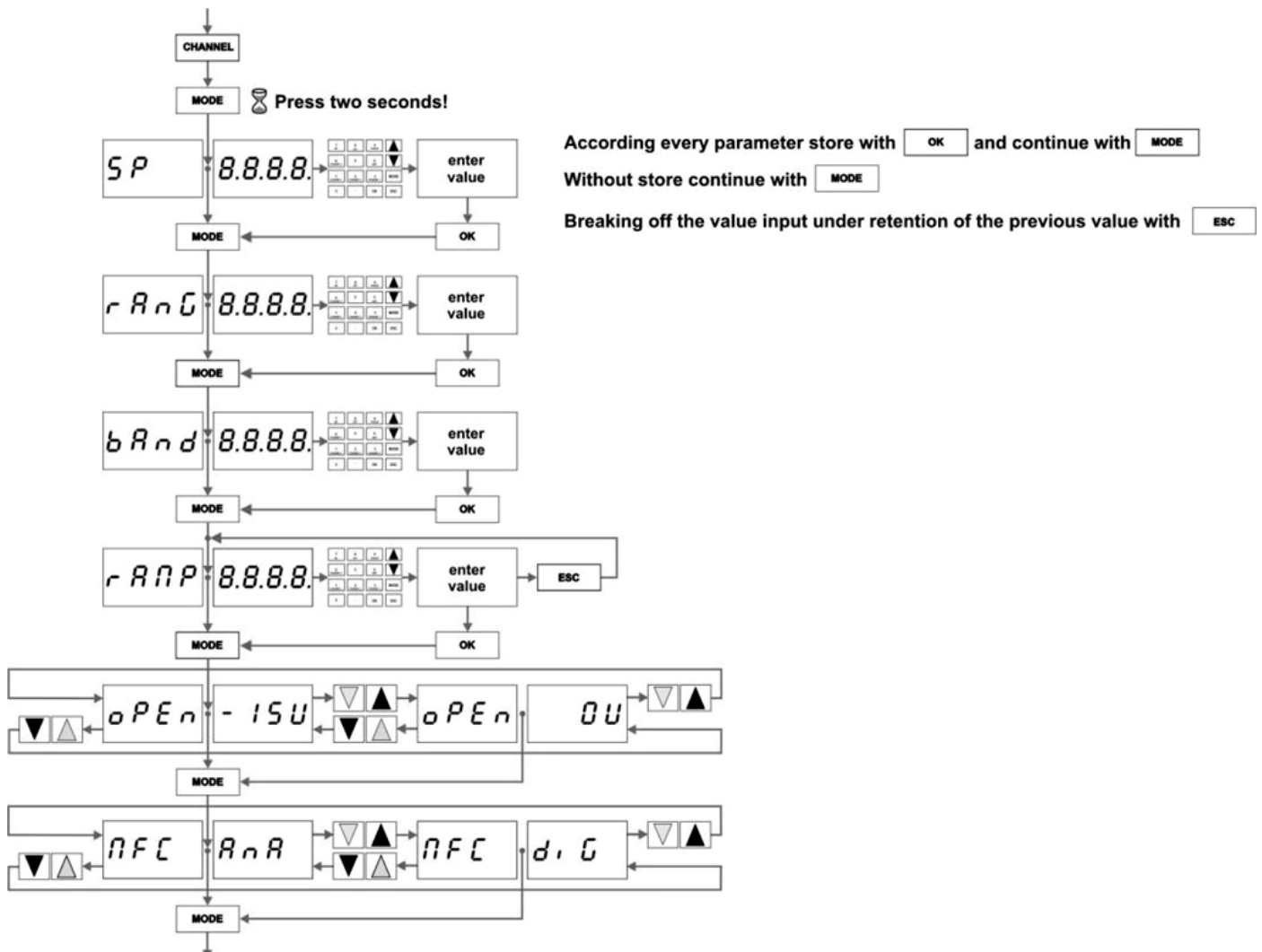


Figure 13 - Setting MFC Parameters

6.1.1 Set Point (SP)

The set point of each channel can be selected freely between 0...100 %. The lowest possible set point depends on the used MFC and is $\neq 0$. It is impossible to input set points above 100 %.



Note:

The set point always has to be entered in % or sccm!

6.1.2 Range (rAnG)

The control range of a MFC is displayed in **sccm** (millilitre per minute = ml/min) or for bigger instruments in **slm** (litre per minute = l/min). 1000 sccm = 1 slm.



Note:

The control range has to be put in always in the measuring unit sccm.

6.1.3 Band (bAnd)

The tolerance band for the set point's overshoot or undershoot can be set between 1 and 50 %. Decimal places are not allowed.



Note:

The values of the tolerance band have to be entered in % units!

6.1.4 Ramping (rAMP)

The set point's increasing or decreasing time (Ramping) can be set between 0 s (standard value) and up to 255 s. Decimal places are not allowed.

6.1.5 Open (oPEn)

The control voltage of the completely opened status has to be configured on -15 V or 0 V dependent on the connected MFC. Please take the control voltage from the respective data sheet of the connected MFC.

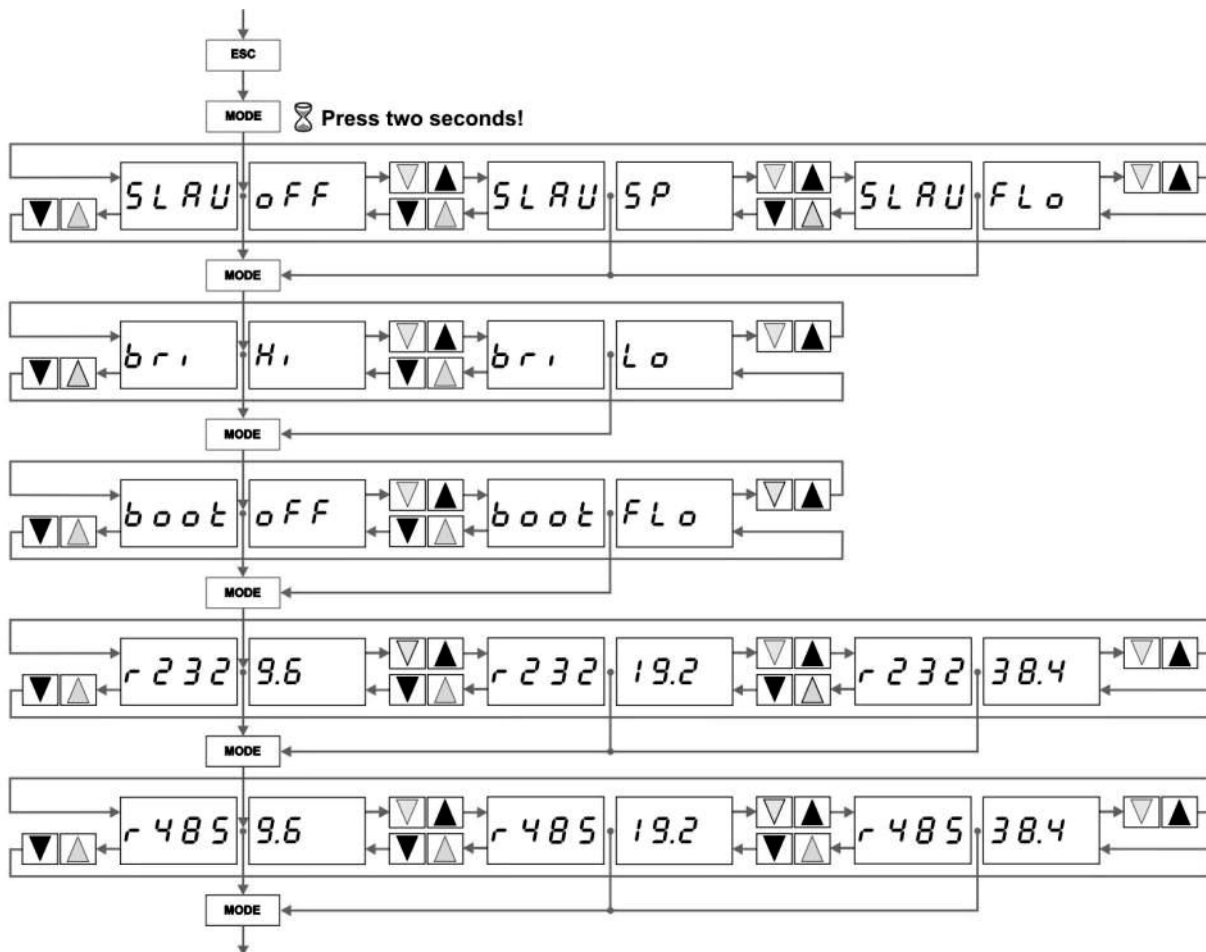
6.1.6 MFC (MFC)

The MFC type can be selected between analog and digital MFC.

6.2 Instrument Parameters

You can configure the instrument in general with the help of these parameters. The parameters are valid for all measuring channels.

- Press the ESC key
- Keep the MODE key pressed for approx. 2 seconds
 - The instrument is now in the mode Instrument Parameters
- Press the MODE key to select the desired parameter
 - The name and the value of the parameter are displayed
- Use the arrow keys to change the parameter setting.
- Press the OK key to save the parameter setting and afterwards the MODE key to come to the next parameter
- Press the MODE key to come to the next parameter without saving the parameter setting
- Repeat the steps in order to change further parameters
- Press the ESC key to leave the mode Instrument Parameters



According every parameter store with **OK** and continue with **MODE**

Without store continue with **MODE**

Ending or breaking off with **ESC**

Figure 14 - Setting Instrument Parameters

6.2.1 Master/Slave-Function (SLAV)

Function Master/Slave. The parameter determines the kind of the function Master/Slave.

Display	Description
oFF	Master/Slave mode off
SP	Master/Slave index value set point channel 1
FLo	Master/Slave index value flow channel 1

Table 5 - Values of Parameter SLAV

6.2.2 Display Brightness (bri)

Brightness of the display.

Display	Description
Lo	Low brightness
Hi	High brightness

Table 6 - Values of the Parameter bri

6.2.3 Operating Mode after Resetting (boot)

Status of the channels after disconnecting and resetting.

Display	Description
oFF	MFC at all channels in status Close
FLo	MFC at all channels in status Flow Control

Table 7 - Values of the Parameter boot

6.2.4 Baud Rate Interface RS232 (r232)

Baud rate of the interface RS232

Display	Description
9.6	Baud rate 9600 Baud
19.2	Baud rate 19200 Baud
38.4	Baud rate 38400 Baud

Table 8 - Values of the Parameter r232

6.2.5 Baud Rate Interface RS485 (r485)

Baud rate of the interface RS485 for the activation of digital MFC.

Display	Description
9.6	Baud rate 9600 Baud
19.2	Baud rate 19200 Baud
38.4	Baud rate 38400 Baud

Table 9 - Values of the Parameter r485

7. Computer Interface

7.1 Connection

The JEVAflow[®] FCU-4 can communicate with a computer through a serial interface RS232. The appropriate connecting socket and the necessary cable are described in Chapter 4.3.5, page 14.

7.2 Communication

7.2.1 Protocol

The following log is used for communication:

- 8 data bits
- no parity bit
- 1 stop bit

The baud rate is selectable.

- 9600
- 19200
- 38400

7.2.2 General Command Structure

stxKKBBBparameter CR

stx	Control character 02Hex
KK	Channel number on JEVAflow FCU-4 (01 = Channel 1, 02 = Channel 2, 03 = Channel 3, 04 = Channel 4)
BBB	Command (R.. – Read Commands, S.. – Write Commands)
Parameter	All set commands expect a parameter (e. g. set point in % at SFD). Always a number is expected as parameter. Leading blanks are ignored. Only "." is accepted as decimal separator. Non-meaningful separators are ignored. Set point: in % of the control range (e. g. stx01SFD50.5) Control value: in sccm (e. g. stx01SFK2500 sets the control range on 2.5 slm) Ramping: in seconds (e. g. stx01SRT10 sets Ramping on 10 seconds)
CR	Terminator 0DHex

7.2.3 Command Set (Mnemonics)

Read Commands	Description
RVN	Read Version Number - Read version and series number <i>x.xx<TAB>S/N</i>
RFX	Read Flow – Read actual flow in %

Table 10 - Mnemonics for Read Commands

Write Commands	Description
SFU	Set Flow Unit - Set unit in sccm/slm (1), % (0)
SKO	Set Keyboard Off - Keyboard lock Lock Keyboard (1) - LED for Key Lock lights up red, Release Keyboard (0) – LED for Key Lock does not light up The command SKO is reset at each restart of the instrument!

Table 11 - Mnemonics for Write Commands

Read and Write Commands	Description
RGP	Read General Parameter - Read instrument parameters <i>a<TAB>b<TAB>c<TAB>d<TAB>e</i> a = SLAV off (0), SP (1), FLo (2) b = bri Hi (0), Lo (1) c = boot off (0), Flo (1) d = r232 9,6 (0), 19,2 (1), 38,4 (2) e = r485 9,6 (0), 19,2 (1), 38,4 (2)
SGP[a, b, c, d, e]	Set General Parameter - Set instrument parameters a = SLAV off (0), SP (1), FLo (2) b = bri Hi (0), Lo (1) c = boot off (0), Flo (1) d = r232 9,6 (0), 19,2 (1), 38,4 (2) e = r485 9,6 (0), 19,2 (1), 38,4 (2)
RFD	Read Set Point - Read set point in % of the control range
SFD	Set Set Point - Set set point in % of the control range
RFK	Read Range - Read control range in sccm
SFK	Set Range - Set control range in sccm
RRT	Read Ramping Time - Read set point ramping time in seconds
SRT	Set Ramping Time - Set set point ramping time in seconds
RVM	Read Valve Mode - Read operation mode for the channel FLOW CTRL (0), CLOSE (1), OPEN (2)
SVM	Set Valve Mode - Set operation mode for the channel FLOW CTRL (0), CLOSE (1), OPEN (2)

Table 12 - Mnemonics for Read and Write Commands

The read commands **RFD**, **RFK**, **RFX** and **RRT** return the actual set value.
The write commands **SFD**, **SFK**, **SRT**, **SFC** and **SSP** return an **OK**.

8. Maintenance and Servicing

8.1 Maintenance

8.1.1 General Maintenance Advices

For external cleaning please use a cotton cloth dampened with clear water. Do not use any aggressive or abrasive detergents.



Warning: Mains voltage

The instrument contains voltage carrying components. Do not introduce any objects into the openings of the instrument. Keep the instrument dry. Do not open the instrument.

8.2 Troubleshooting

8.2.1 Trouble Indication

A malfunction within the JEVAflow[®] FCU-4 is shown by an error message on the display.
(👉📖 Chapter 8.2.2 Error Messages, page 31)

8.2.2 Error Messages

Error (Display)	Cause and Remedy
Err	Inaccurate value for parameter. Acknowledge with key ESC.

Table 13 - Error Messages

8.2.3 Help in Case of Malfunctions

If the malfunction persists even after having acknowledged repeatedly and / or having replaced the MFC, please contact JEVATEC.

8.2.4 Exchange of fuses

Use for the exchange of defective device fuses exclusively the fuse type T1.6A H indicated on the rear site of controller. The both device fuses you can find in the fuse holder of mains connection (👉📖 Figure 2, page 12), which can be pried off with a small screwdriver.

8.2.5 Repair

Defective products must be sent to JEVATEC. JEVATEC cannot assume any responsibility or warranty if the operator or third persons opens the JEVAflow[®] FCU-4.

9. Shelving and Waste Disposal

9.1 Packaging

Please keep the original packaging. You will need this packaging for storage of the JEVAflow[®] FCU-4 or shipping to JEVATEC.

9.2 Shelving

The JEVAflow[®] FCU-4 must only be stored in dry room. During storage, the following ambient conditions need to be maintained:

- Ambient temperature: -20...+60 °C
- Humidity of the air: As low as possible.
Preferably in a sealed plastic bag with desiccant.

9.3 Waste Disposal

Regarding waste disposal the branch specific and local waste disposal and environment protection regulation for systems and electronics components are valid. In case of return, JEVATEC will execute professional resource separation and disposal.

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