Air velocity transmitter

KFSE

Description

The air velocity transmitter series KFSE is design to control the air velocity into air duct in HVAC systems and in VAV applications.

Technical specifications

Measurement range velocity	20 m/s or 5 m/s
Accuracy air velocity	±5% for 20 m/s
Measurement range °C	-30…+70°C and 0…100°C
Accuracy °C	<1,0°C at min. 1 m/s
Power supply	24 VAC (±5%) 50-60 Hz / 15...35 VDC
Power consumption	< 2,5 W
Electrical connection	Screw terminals max. 1,5 mm²
Housing	ABS
Dimensions	See drawing
Protection type	IP65 enclosure, IP10 probe
Working temperature °C	-25…+70°C
Storage temperature °C	-30…+85°C
Standards	CE conformity, RoHS EMC Directive EN 61326-1
Weight	265gr

Order matrix

Model	Max. range	Output 1 Air velocity		Output 2 Air velocity / temp.		Options	
KFSE	**2** 20 m/s	**0**	no output	**0**	no output	**T**	Temperature
	5 5 m/s	**1**	0...10 V	**1**	0...10 V	**M**	Modbus
		2	2...10 V	**2**	2...10 V	**D**	Display
		3	0...5 V	**3**	0...5 V	**R**	Relay 1x *
		4	1...5 V	**4**	1...5 V	**RR**	Relay 2x *
		5	4...20 mA	**5**	4...20 mA	**B**	Buzzer

1. AO1 is always for Air Velocity output.
2. AO2 is Air Velocity output as standard but it will be Temperature output, if option T choosed.
3. Temperature output option should be informed while ordering, it can not be changed after manufacturing.
4. For fine temperature measurements, air velocity should be higher than 2 m/s.
* Relay and Buzzer options have to be ordered with the Display option.

Response Time Setting

Please check if there is any special instruction on the enclosure or inside the cover.

DIP	Response Time
	5 sec
	1 sec

Range Settings

Please check if there is any special instruction on the enclosure or inside the cover.

DIP	KFSE.5 Ranges	DIP	KFSE.2 Ranges	DIP	Temp. Ranges
	0…5 m/s		0…20 m/s		-30 …+70°C
	0…3 m/s		0…15 m/s		0 …+100°C
	0…2 m/s		0…10 m/s		
	0…1 m/s		0…5 m/s		

Electrical Connections

1. Please be sure about current direction for current outputs and polarity for voltage outputs.
2. Relay contact is Normally Open and rating is max. 1A at 230VAC.
3. We kindly advise using 24V for avoiding high voltage harmonics and external power relay for bigger loads.
4. Please use shielded and twisted paired cables for Modbus connections.
5. Please observe RS485 termination rules, max. 32 devices in a single Modbus line.
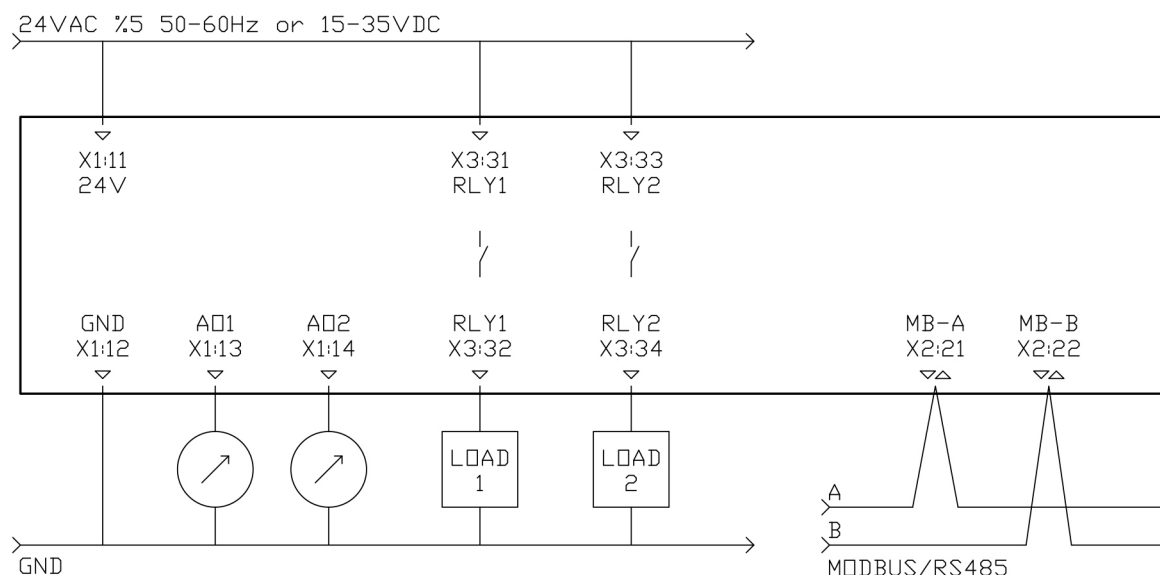
Transmitter hardware
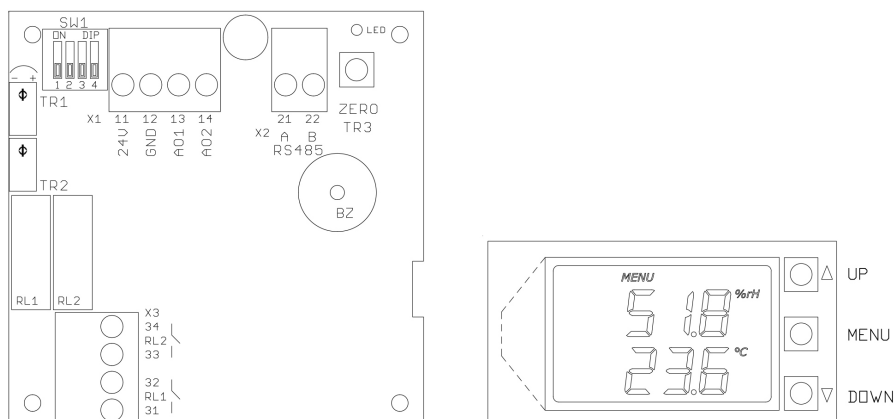
SW1		DIP Switch for configuration range and response time	
X1 TERMINAL			
11	24V	15...35 VDC or 24 VAC (± %5, 50-60 Hz)	
12	GND	ground for power and reference for outputs	
13	AO1	analog output 1	
14	AO2	analog output 2	
X2 TERMINAL			
21	A / RS485	modbus communication positive pair	
22	B / RS485	modbus communication negative pair	
LED		bead LED, periodically lights ON and OFF	
		modbus communication, blinks when there is a communication	
TR1		not used	
TR2		offset trimmer for temperature	
ZERO / TR3		not used	
RL1 & RL2		relay 1 and relay 2	
BZ		buzzer	
X3 TERMINAL			
31-32	NO - RL1	relay 1 dry contact max. rating 1A @ 220 VAC	
33-34	NO - RL2	relay 2 dry contact max. rating 1A @ 220 VAC	

Display & Buttons

UP	*press for increasing the value or choosing the next parameter*
MENU	*press and wait to enter MENU,*
	click to navigate between sub menus one by one
DOWN	*press for decreasing the value or choosing the previous parameter*
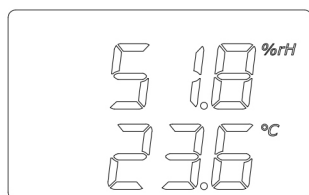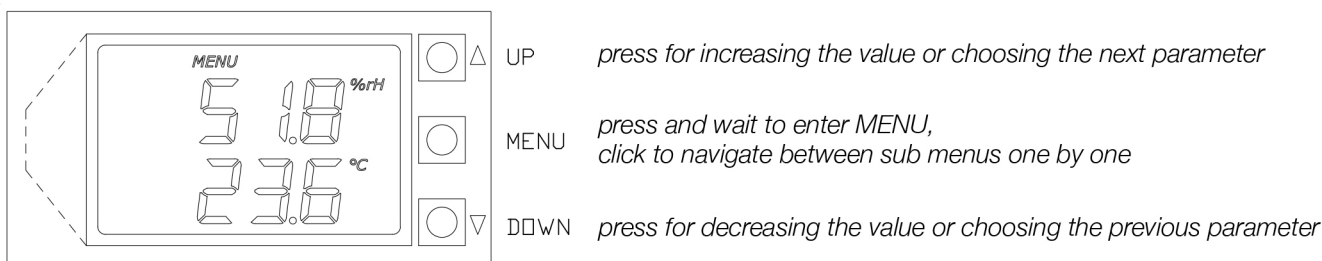
main screen
transmitter is working

keep pressing MENU button
transmitter is not working in MENU mode

Parameters for Relay & Buzzer

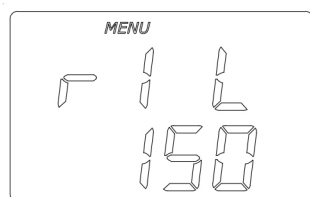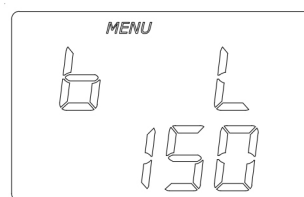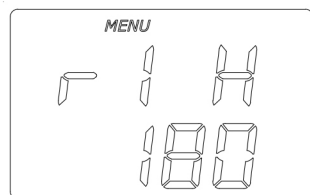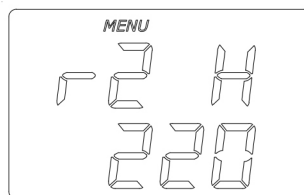Main Screen >>>>> r1 L > r1 H > r1 A > Main Screen
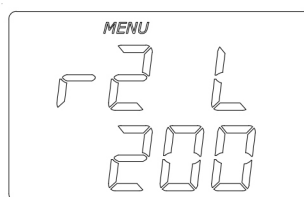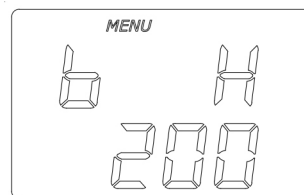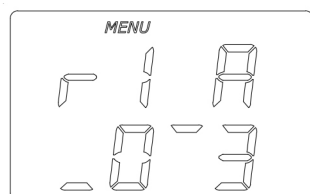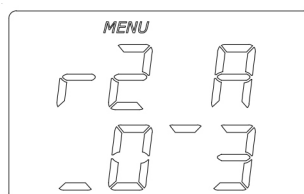
MENU `r 1 L` `150` — LOW set point for Relay 1	MENU `r 2 L` `200` — LOW set point for Relay 2	MENU `b L` `150` — LOW set point for Buzzer
MENU `r 1 H` `180` — HIGH set point for Relay 1	MENU `r 2 H` `220` — HIGH set point for Relay 2	MENU `b H` `200` — HIGH set point for Buzzer
MENU `r 1 A` `_0¯3` — ACTION selection for Relay 1	MENU `r 2 A` `_0¯3` — ACTION selection for Relay 2	MENU `b A` `_ _ _5` — ACTION selection for Buzzer
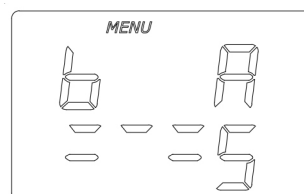
Actions for Relay & Buzzer

`___0` action 0, valid for relays and buzzer,
relay contact is always OPEN
buzzer is always SILENCE

`_Π_1` action 1, valid for relays and buzzer,
relay contact is CLOSED between points, OPEN under LOWpoint and OPEN over HIGHpoint
buzzer is WARNING between points, SILENCE under LOWpoint and SILENCE over HIGHpoint

`¯U¯2` action 2, valid for relays and buzzer,
relay contact is OPEN between points, CLOSED under LOWpoint and OPEN over HIGHpoint
buzzer is SILENCE between points, WARNING under LOWpoint and SILENCE over HIGHpoint

`_0¯3` action 3, valid for relays and buzzer,
relay contact is CLOSED over HIGHpoint, OPEN under LOWpoint, hysterisis between points
buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint, hysterisis between points
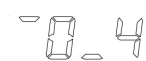
`¯0_4` action 4, valid for relays and buzzer,
relay contact is OPEN over HIGHpoint, CLOSED under LOWpoint, hysterisis between points
buzzer is SILENCE over HIGHpoint, WARNING under LOWpoint, hysterisis between points

`¯¯¯5` action 5, valid only for buzzer,
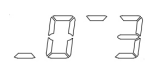buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint,
buzzer is WARNING intermittently between points,

`___6` action 6, valid only for buzzer,
buzzer is WARNING under LOWpoint, SILENCE over HIGHpoint,
buzzer is WARNING intermittently between points,

`r1 7` action 7, valid only for buzzer,
buzzer is following relay 1 contact,
buzzer is WARNING when relay 1 contact is CLOSED, SILENCE when the contact is OPEN

`r2 8` action 8, valid only for buzzer,
buzzer is following relay 2 contact,
buzzer is WARNING when relay 2 contact is CLOSED, SILENCE when the contact is OPEN

ACTIONS	under LOW	between LOW & HIGH	over HIGH
0 : 0.0.0	Open / Silence	Open / Silence	Open / Silence
1 : 0.I.0	Open / Silence	Closed / Warning	Open / Silence
2 : I.0.I	Closed / Warning	Open / Silence	Closed / Warning
3 : 0.X.I	Open / Silence	Hysteresis	Closed / Warning
4 : I.X.0	Closed / Warning	Hysteresis	Open / Silence
5 : 0.-.I	Silence	Pre Alarm	Warning
6 : I.-.0	Warning	Pre Alarm	Silence
7 : = r1	Silence when RL1 is Open, Warning when RL1 is Closed		
8 : = r2	Silence when RL2 is Open, Warning when RL2 is Closed		

0 : Relay Contact is OPEN, Buzzer is in Silent mode
I : Relay Contact is CLOSED, Buzzer is in Warning mode
X : Relay Contact is at HYSTERESIS position, OPEN if previous position open, CLOSED if previous position closed
   : Buzzer is in HYSTERESIS mode, Silent if previous mode is silent, Warning if previous mode is warning
- : Buzzer is in PRE ALARM mode, Buzzer is warning intermittently

Modbus RS485 protocol

Default Settings: Modbus ID:1, 9600, 8bit, None, 1. Register Table starts from Base 1.
Use Function 3 for Reading and Function 6 for Writing Holding Registers. Whenever writing to any Modbus Parameter, the new parameter is activated instantly and you should have to configure the master device according to new parameters. For every reboot/initializing, Modbus is activated with default parameters for 3 seconds. After 3 seconds, Modbus is reconfigured according to your parameter settings.
Unlisted registers are for analog output calibrations and some system parameters. Please do not change unlisted registers.

Register	R/W	Range	Description
1	R & W	1…254	Modbus Address
2	R & W	0…1	Baudrate, 0: 9.600, 1: 19.200
3	R & W	0…3	Bit_Parity_Stop, 0: 8bit_None_1, 1: 8bit_None_2, 2: 8bit_Even_1, 3: 8bit_Odd_1
4	R	0…2.000	AV as m/s x100, divide by 100 for exact value
5	R	-3.000…10.000	TEMP as C x100, divide by 100 for exact value
6	R	0 or 1	Relay 1, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed
7	R	0…1.000	Relay 1, LOW point
8	R	0…1.000	Relay 1, HIGH point
9	R	0…4	Relay 1, ACTION
10	R	0 or 1	Relay 2, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed
11	R	0…1.000	Relay 2, LOW point
12	R	0…1.000	Relay 2, HIGH point
13	R	0…4	Relay 2, ACTION
14	R	0 or 1	Buzzer, 0: OK-Silence, 1: PreAlarm - warning intermittently, 2: WARNING continuously
15	R	0…1.000	Buzzer, LOW point
16	R	0…1.000	Buzzer, HIGH point
17	R	0…4	Buzzer, ACTION

Register	R/W	Range	Description
18-28			set-up parameters, never use, never change..!
29	R	0…2.000	AV as m/s x100, divide by 100 for exact value
30	R	0…3.937	AV as feet/min
31	R	-3.000…10.000	TEMP as C x100, divide by 100 for exact value
32	R	-30…100	TEMP as C
33	R	-2.200…21.200	TEMP as F x100, divide by 100 for exact value
34	R	-22…212	TEMP as F

Air Velocity Calibration Procedure

Set-up for Calibration
1. Power the unit and connect the unit with Modbus/RS485,
2. Check response time, response time can be set 1 sec. or 5 sec., it is recommended to set 1 second for any calibration, check page 2 for response time setting,

ZERO Calibration
3. Close the probe with the original cap and keep the unit working,
4. Wait for about 10 minutes, for measuring the raw value of 0 m/s,
5. Read U0 value from MR_48, note this value to your records,
6. Write U0 value to MR_41,
7. Write 9 to MR_27, this is a must for saving the parameters, MR_27 value turns to 0 automatically,
8. Remove the cap and you are ready for span calibrations,

SPAN-1 Calibration, for low AV values
9. After ZERO please do not loose much time,
10. Apply air velocity as much as:
    for KFSE.2 series, 5 m/s,
    for KFSE.5 series, 1 m/s,
11. You do not need to wait too much, just be sure that you have a stable measurement,
12. Read U50-1 value from MR_48, note this value to your records,
13. Write U50-1 value to MR_42,
14. This calibration value is used for the sub-ranges for:
    for KFSE.2 series, 5 and 10 m/s,
    for KFSE.5 series, 1 and 2 m/s,
15. Write 9 to MR_27, this is a must for saving the parameters, MR_27 value turns to 0 automatically,

SPAN-2 Calibration, for high AV values
16. After SPAN-1 calibration, please do not loose much time,
17. Apply air velocity as much as:
    for KFSE.2 series, 10 m/s,
    for KFSE.5 series, 2,5 m/s,
18. You do not need to wait too much, just be sure that you have a stable measurement,
19. Read U50-2 value from MR_48, note this value to your records,
20. Write U50-2 value to MR_45,
21. This calibration value is used for the sub-ranges for:
    for KFSE.2 series, 15 and 20 m/s,
    for KFSE.5 series, 3 and 5 m/s,
22. Write 9 to MR_27, this is a must for saving the parameters, MR_27 value turns to 0 automatically,

Other Parameter Setting
23. Please calculate the values for = square root of (V50) X 1.000
24. Typical V50-1 values:
    for KFSE.2 series: V50-1 for 5 m/s is 2.236, write it to MR_43,
    for KFSE.5 series: V50-1 for 1 m/s is 1.000, write it to MR_43,
25. Typical V50-2 values:
    for KFSE.2 series: V50-2 for 10 m/s V50 is 3.162, write it to MR_46,
    for KFSE.5 series: V50-2 for 2,5 m/s is 1.581, write it to MR_46,
26. Write 9 to MR_27, this is a must for saving the parameters, MR_27 value turns to 0 automatically,
27. Calibration is done.

Notes:
28. Please do not un-power the unit while calibration,
29. Please use filtered clean air while applying air velocity,
30. Please re-power the unit and check the parameters that you set,

Air Velocity Calibration Parameters

Register	R/W	Range	Description
27	R & W		Write 9 for saving calibration parameters
41	R	U_0	Raw Value at 0 m/s
42	R & W	U_{50-1}	Raw Value for the lower calibration point
43	R & W	V_{50-1}	Air Velocity for the lower calibration point
44	R	k_{av-1}	K constant for the lower calibration point, calculated automatically
45	R & W	U_{50-2}	Raw Value for the higher calibration point
46	R & W	V_{50-2}	Air Velocity for the higher calibration point
47	R	k_{av-2}	K constant for the higher calibration point, calculated automatically
48	R	U_x	Raw Value of the sensing element
49	R	AV	Air Velocity x1.000, divide 1.000 for actual value, in m/sec.
50	R		blank

Temperature Calibration
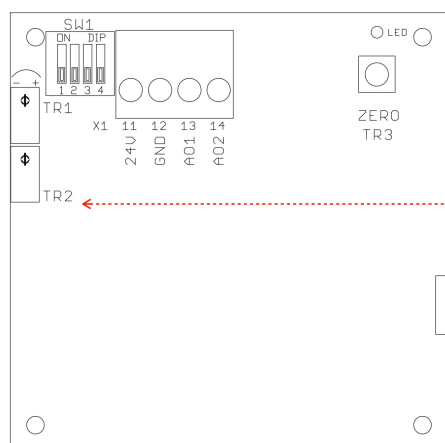
TR2, offset for Temperature

OFFSET for Temperature
1. Apply air flow min. 1 m/sec
2. Adjust the TR2 trimmer while reading analog out or display

Dimensions (mm)

M16

45,50
81,50
98,00
13,00
225,00
40,00