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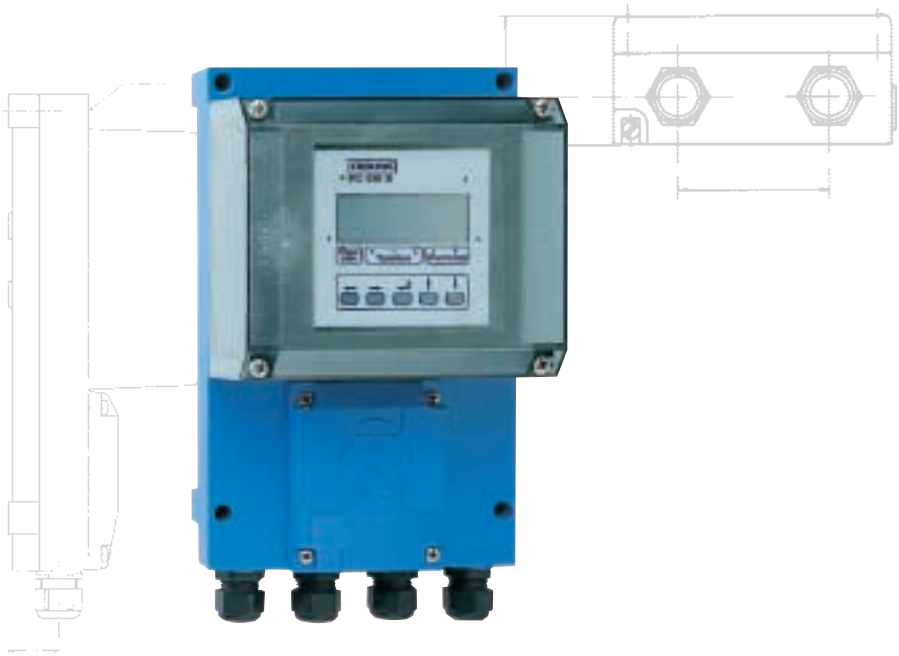
GR

IFC 010
Signal Converter

for electromagnetic flowmeters



- Easy to install
- Low-cost signal converter,
  measuring error < 0.5 % of the measured value
- Easy user-friendly operation
- Self-monitoring feature to rule out errors in operation
- Low power consumption

IFC 010
Signal Converter

for electromagnetic flowmeters

The modular KROHNE system will have the right electromagnetic flowmeter for your specific application – right from both the flowmetering and the economic viewpoint.

Available versions

- **IFC 010 _/B**
  signal converter without local display and control elements
  (**B** = basic version). All operating data factory-set to your specifications.
  For control and settings via DOS-PC, RS 232 adapter including PC software is available as option.
- **IFC 010 _/D**
  signal converter **with** local display and control elements **(D)**. All operating data factory-set to your specifications.

Calibrated on **EN 17 025**
accredited calibration rigs,
accuracy of calibration better
than 99.97% of the measured value

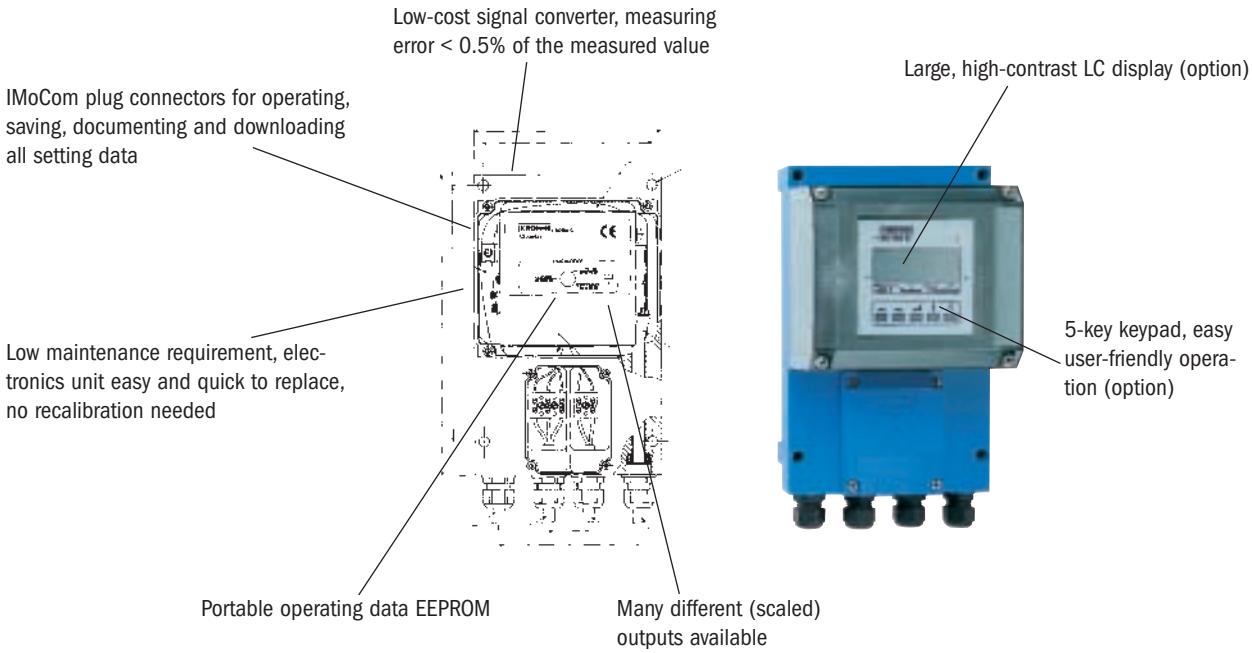
CE

TÜV CERT DIN ISO 9001

Standard-setting technology

- **µP-controlled signal converter** with digital signal processing ensures reliability and long-time stability
- **High-speed signal conversion system (patented)** allows flowmeter application even in difficult cases
- **Modular signal converter**, low-cost basic version without display or control panel, easy to set and document with every DOS-PC (notebook) and KROHNE software, error-free
- **can be optionally fitted** with local display and control panel
- **terminals and all signal converter modules pluggable**, easily replaceable without recalibration or resetting
- **plus all the numerous functions:**
  - current, pulse and status indication outputs
  - flow measurement in both directions
  - low-flow cutoff
  - limit signalling or direction identification
  - volume flow counting via passive, galvanically
  - isolated pulse output
- **available for AC or DC voltage operation**

Highlights



The modular KROHNE system with the IFC 010 IMoCom signal converter

The **IFC 010 signal converter** is compatible with all KROHNE primary heads.

Integral systems (K): Primary head and signal converter form a single unit and are solidly connected.

Remote systems (F): Primary head and signal converter are remote units and electrically connected by signal and field current cables.

Full data of the primary heads **(IFS .... .)** are specified in the relevant Data Sheets:
ALTOFLUX ..... / AQUAFLUX ..... / ECOFLUX ..... / PROFIFLUX ..... / VARIFLUX .....

Teflon® is a registered trademark of Du Pont.

Integral systems with regedly mounted **IFC 010 K**		**Remote systems** Primary heads		System with **IFC 010 F**		**Characterization of primary heads** Meter size	Flowtube / Connection
ECOFLUX	IFM 1010 **K**	ECOFLUX	IFS 1000 F	ECOFLUX	IFM 1010 **F**	DN 10-150 $^{3}/_{8}$"-6"	Teflon®-PFA liner, flangeless design
AQUAFLUX	010 **K**	AQUAFLUX	F	AQUAFLUX	010 **F**	DN 10-1000 $^{3}/_{8}$"-40"	Hard rubber liner (≥ DN 25 / ≥ 1"), flanged design
ALTOFLUX	IFM 4010 **K**	ALTOFLUX	IFS 4000 F	ALTOFLUX	IFM 4010 **F**	DN 10-1000 $^{3}/_{8}$"-40"	e.g. Teflon®-PFA liner, flanged design
PROFIFLUX	IFM 5010 **K**	PROFIFLUX	IFS 5000 F	PROFIFLUX	IFM 5010 **F**	DN 2.5-100 $^{1}/_{10}$"-4"	fused aluminium oxide tube, flangeless design
VARIFLUX	IFM 6010 **K**	VARIFLUX	IFS 6000 F	VARIFLUX	IFM 6010 **F**	DN 10-80 $^{3}/_{8}$"-3"	Teflon®-PFA liner, food-grade and sterile connections

Full-scale range $Q_{100\%}$

Flowrate for Q = 100 % — adjustable 6 liters/h to 33000 m³/h or 0.4 to 156000 US gallons/min, corresponding to flow velocity v = 0.3 to 12 m/s or 1 to 40 ft/s

Unit — adjustable m³/h, liters/s or US-gallons/min, and 1 user-defined unit e. g. m³/min or US million gallons per day

Flow tables

v = flow velocity in m/s

Meter size		Full-scale range $Q_{100\%}$ in m³/h		
DN		v = 0.3 m/s	v = 1 m/s	v = 12 m/s
mm	inch	(minimum)		(maximum)
2.5	1/10	0.0053	0.0177	0.2121
4	1/8	0.0136	0.4520	0.5429
6	1/4	0.0306	0.1018	1.222
10	3/8	0.0849	0.2827	3.392
15	1/2	0.1909	0.6362	7.634
20	3/4	0.3393	1.131	13.57
25	1	0.5302	1.767	21.20
32	–	0.8686	2.895	34.74
40	1 1/2	1.358	4.524	54.28
50	2	2.121	7.069	84.82
65	–	3.584	11.95	143.3
80	3	5.429	18.10	217.1
100	4	8.483	28.27	339.2
125	–	13.26	44.18	530.1
150	6	19.09	63.62	763.4
200	8	33.93	113.1	1357
250	10	53.02	176.7	2120
300	12	76.35	254.5	3053
400	16	135.8	452.4	5428
500	20	212.1	706.9	8482
600	24	305.4	1018	12215
700	28	415.6	1385	16625
800	32	542.9	1810	21714
900	36	662.8	2290	26510
1000	40	848.2	2827	33929

v = flow velocity in ft/s

Meter size		Full-scale range $Q_{100\%}$ in US gallons/min	
DN		v = 1 ft/s	v = 40 ft/s
mm	inch	(minimum)	(maximum)
2.5	1/10	0.0245	0.979
4	1/8	0.0383	1.530
6	1/4	0.1530	6.120
10	3/8	0.3735	14.93
15	1/2	0.8405	33.61
20	3/4	1.494	59.75
25	1	2.334	93.34
32	–	3.824	153.0
40	1 1/2	5.979	239.0
50	2	9.339	373.5
65	–	15.78	630.9
80	3	23.90	955.6
100	4	37.35	1493
125	–	58.38	2334
150	6	84.05	3361
200	8	149.43	5975
250	10	233.4	9334
300	12	336.2	13442
400	16	597.9	23899
500	20	933.9	37345
600	24	1345	53781
700	28	1919	76760
800	32	2507	100272
900	36	3173	126904
1000	40	3917	156672

Error limits for complete system at reference conditions

Pulse output

± F Error in % of flowrate (actual value):

Curve A: DN 10 – 600 / 3/8" – 24"

v ≥ 0.4 m/s or ≥ 1.3 ft/s: ± 0.5 % of measured value

v < 0.4 m/s or < 1.3 ft/s: ± 0.002 m/s or 0.0066 ft/s

Curve B: DN 2.5 – 6 / 1/10" – 1/4" (PROFIFLUX) and DN 700 – 1000 / 28" – 40"

v ≥ 0.25 m/s or ≥ 0.8 ft/s: ± 0.8 % of measured value

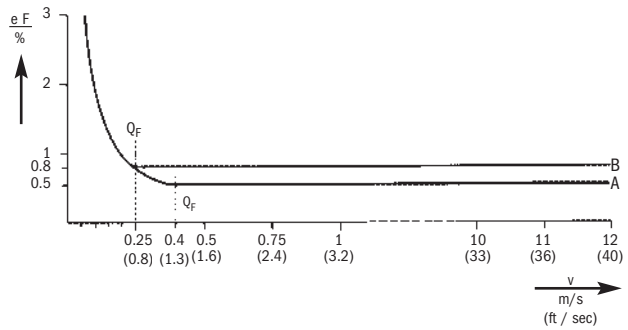
v < 0.25 m/s or < 0.8 ft/s: ± 0.002 m/s or 0.0066 ft/s

Q Actual flowrate

Q_F Flow for error limit vF = 0.25 m/s **or** 0.8 ft/s

v Flow velocity in m/s and ft/s

v_F Flow velocity in m/s and ft/s at QF



Reference conditions

Product	Water, 10 to 30°C/50 to 86 °F
Electrical conductivity	> 300 µS/cm (µmho/cm)
Power supply (line voltage)	U_N (± 2 %)
Ambient temperature	20 to 22°C/68 to 71.6°F
Warm-up time	30 minutes
Straight inlet run	> 10 x DN } DN =
Straight outlet run	> 3 x DN } meter size
Primary heads	properly grounded and centered

Current output same as above error limit for pulse output plus...

0 to 20 mA: ± 0.05 %

4 to 20 mA: ± 0.062 % } of full-scale range in each case

All KROHNE signal converters undergo burn-in tests, duration minimum 20 hours at varying ambient temepratures –20 to +60°C / –4 to +140°F. Function and accuracy are controlled by computers.

The responsibility as to the suitability, intended use and corrosion-resistance of the materials used in their construction rests solely with the purchaser.

Technical data

Versions	
B - version	**without** display / control unit (basic version)
D - version	**with** display / control unit
Add-on equipment (option)	- CONFIG-software and RS 232-adapter for control via MS-DOS-PC, connection to IMoCom interface - Hand-Held-Terminal for control of blind versions
Current output	
Function	– all operating data configurable, galvanically isolated
Current	0 – 20 mA or 4 – 20 mA
Active output	load max. 500 ohms
Passive output	external voltage: 15 ... 20 V DC / 20 ... 32 V DC load: min. ... max. 0 ... 500 Ω / 250 ... 750 Ω
Error identification	0 / 3.6 / 22 mA
Forward/reverse measurement	direction identified via status output
Pulse output	
Function	– all operating data settable – galvanically isolated – digital pulse division, interpulse period non-uniform, therefore if – frequency meters connected allow for minimum counting interval: gate time, totalizer ≥ $\frac{1000}{P_{100\%}\ [Hz]}$
Pulse rate for Q = 100 %	
Standard	10, 100 or 1000 pulses per second (= Hz), fixed or optionally adjustable in pulses per liter, m^3 or US gallons
Special version (option)	up to 10 kHz scaling
Active output:	connection: electronic totalizer (EC) internal voltage: approx. 15 V DC, from current output load rating: I_{max} < 23 mA when operated without current output I_{max} < 3 mA when operated with current output
Passive output:	connection electromechanical (EMC) or electronic (EC) totalizers external voltage: $U_{ext} \leq$ 30 V DC / ≤ 24 V AC load current: $I_{max} \leq$ 150 mA / special version 10 kHz: f ≤ 1 kHz $I_{max} \leq$ 150 mA, f > 1 kHz $I_{max} \leq$ 30 mA
Pulse width	50, 100, 200, 500 ms or 1 s, choice with frequencies below 10 Hz
Forward/reverse measurement	direction identified via status indication output
Status output (passive)	
Function	configurable as indicator for flow direction, errors or trip point
Connection	external voltage: extern, $U_{ext.} \leq$ 30 V DC / ≤ 24 V AC load current: $I_{max} \leq$ 150 mA
Time constant	0.2 to 99.9 seconds, settable in increments of 0.1 second
Low-flow cutoff	cutoff "on" value: 1 to 19 % cutoff "off" value: 2 to 20 % } of Q100%, adjustable in 1 % increments
Local display (D versions only)	3-line LCD
Display functions	actual flowrate, forward, reverse and sum totalizers (7-digit) or 25-character bar graph with percent display and status messages
Display units:actual flowrate	configurable in liter/s, m^3/h, US gallons/min or user-defined unit, e. g. hectoliter/day or US million gallons/day
totalizers	liter, m^3 or US gallons and 1 user-defined unit (e.g. hectoliter), choice of overflow time
Language of plain texts	English, German, French, others on request
Display: 1st (top) line	8-character, 7-segment numeral and sign display, symbols for key acknowledgement
2nd (middle) line	10-character, 14-segment text display
3rd (bottom) line	6 markers ▼ to identify display

Power supply	**1. AC-Version** Standard	**2. AC-Version** Option	**3. AC-Version** Option	**DC-Version** Option
1. Rated voltage	230 / 240 V	200 V	48 V	24 V
tolerance band	200 - 260 V	170 - 220 V	41 - 53 V	11 - 32 V
2. Rated voltage	115 / 120 V	100 V	24 V	-
tolerance band	100 - 130 V	85 - 110 V	20 - 26 V	-
Frequency	48 - 63 Hz	-	-	-
Power consumption (incl. primary head)	approx. 5 VA			approx. 4.5 W

When connected to a functional extra-low voltage, 11 - 32 V DC, protective separation (PELV) must be ensured (VDE 0100 / VDE 0106 and IEC 364 / IEC 536)

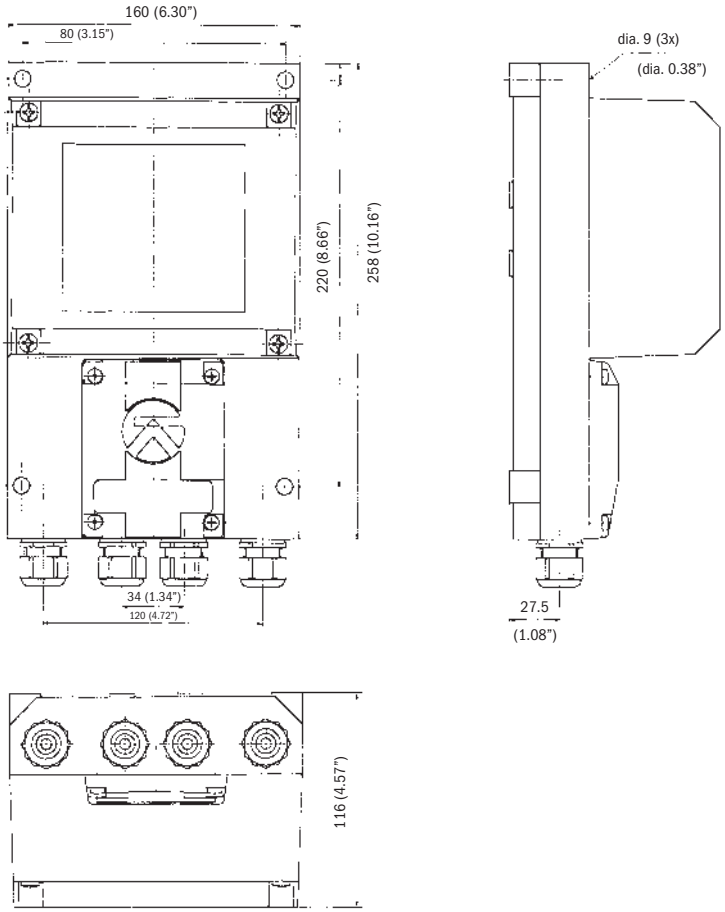
Housing	
Material	polyamide (PA) and die-cast aluminium
Protection category (IEC 529/EN 60529)	IP 67 equivalent to NEMA 6

Full primary head (flowmeter) data are specified in the relevant Data Sheets.

Dimensions and weights

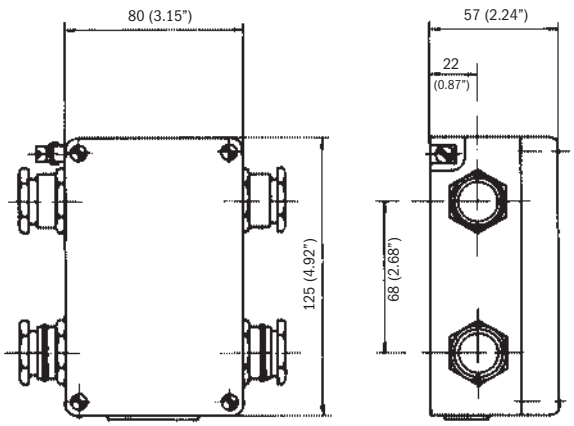
IFC 010 F signal converter

Dimensions in mm and (inches)
Weight approx. 3.8 kg (8.4 lb)



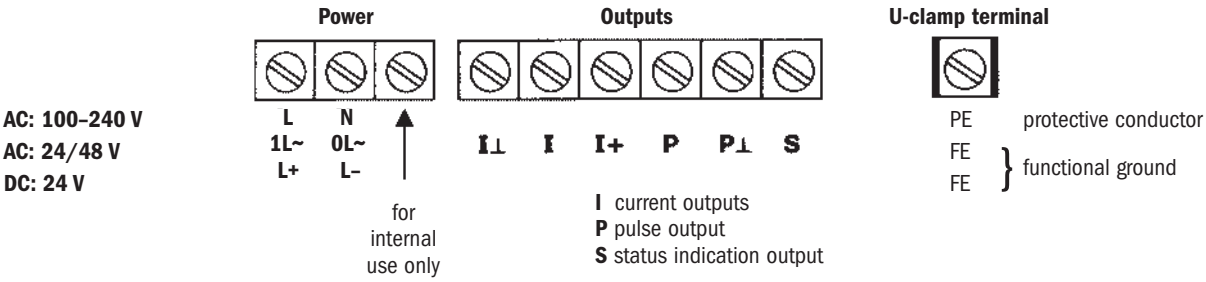
Housing for intermediate connection box ZD

for product temperature > 150 °C or 302 °F
Dimensions in mm and (inches)
Weight approx. 0.5 kg or 1.1 lbs



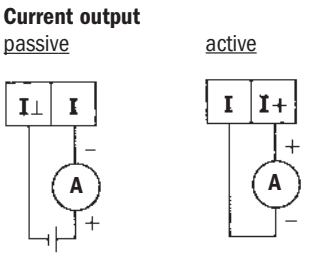
IFC 010 Electrical connection

Power supply and outputs

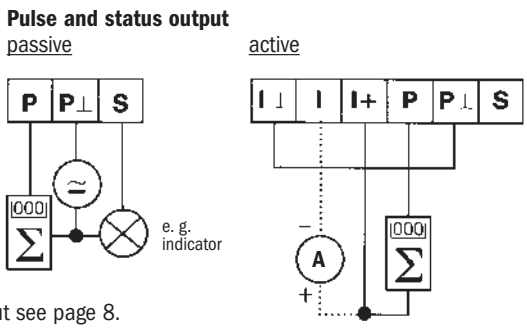


Electrical connection in conformity with VDE 0100 "Regulations governing heavy-current installations with mains voltages up to 1000 V" or equivalent national standard.
If to be connected to a functional extra-low voltage source (24 V DC / AC and 48 V AC) protective separation in conformity with VDE 0100, Part 410, or equivalent national standard, must be ensured.

Current output



Pulse and status output

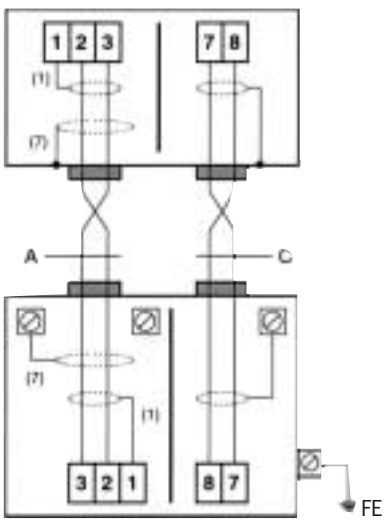


Technical Data of the pulse output see page 8.

IFC 010 F signal converter ↔ primary head

Connection diagram

IFC 010 F



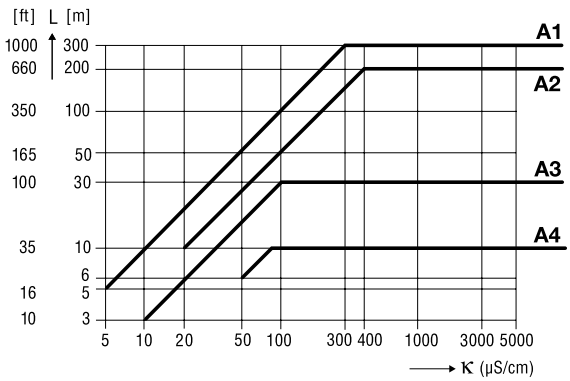
Primary head

The figures in brackets refer to the stranded drain wires for the shields, see sectional drawings of signal cable on page 8.

Field power supply cable C (not supplied)

Length	**Cable type**, single shielding
0 - 150 m / 5 to 500 ft	2 x 0.75 mm² Cu / 2 x 18 AWG
150 - 300 m / 1000 to 1600 ft	2 x 1.50 mm² Cu / 2 x 14 AWG

Length (L) of signal cable A
dependent on electrical conductivity k

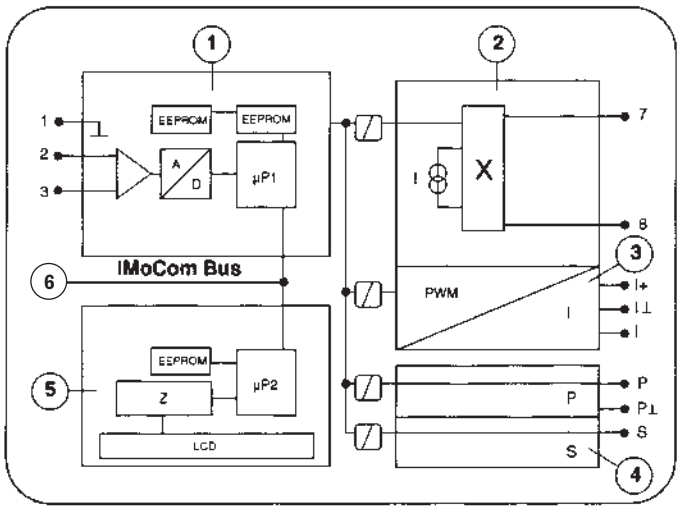


Primary head	**Meter size** DN mm	**Meter size** inches	**Signal cable**
ECOFLUX IFS 1000 F	10 - 15	3/8 - 1/2	A4
	25 - 150	1 - 6	A3
AQUAFLUX F	10 - 1000	3/8 - 40	A1
ALTOFLUX IFS 4000 F	10 - 150	3/8 - 6	A2
	200 - 1000	8 - 40	A1
PROFIFLUX IFS 5000 F	2.5 - 15	1/10 - 1/2	A4
	25 - 100	1 - 4	A2
VARIFLUX IFS 6000 F	10 - 15	1/8 - 1/2	A4
	25 - 80	1 - 3	A2

IFC 010 Description

The standard

- outstanding accuracy
- full set of standard equipment
- current and pulse outputs (galvanically isolated)
- status output, easy to set for numerous tasks: as
- trip point, to indicate flow direction, error messages
- IMoCom bus can be used for numerous internal and external tasks
- simplified, standard KROHNE operator control concept
- very low power consumption



1 Input amplifier

- overdrive-proof signal processing, rapidly and accurately
- digital signal processing and sequence control
- patented, high-resolution A/D converter, digitally controlled and monitored
- high signal-to-noise ratio through low-loss field power supply

2 Field power supply

- the low-loss field power supply generates the pulsed, electronically controlled DC current for the magnetic coils of the primary head

3 Current output

- galvanically isolated from all other groups
- converts the digital output signal from the µP 3 microprocessor into a proportional current

4 Binary outputs

- galvanically isolated from other groups
- selectable input/output combinations
- pulse output (B1), passive FET optocouplers allow connection of electronic and electromechanical totalizers
- status output (B2) for limit value, error identification, or flow direction in forward/reverse flow mode (F/R)

5 Display/operator control unit (option, D Version)

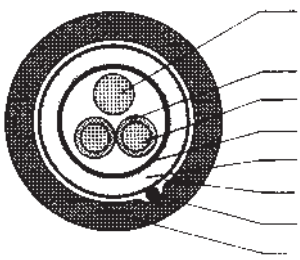
- large-size illuminated LC display
- 3 keys for operator control of the signal converter
- connection to the internal IMoCom bus
- unit can be retrofitted to basic devices (B Version)

6 IMoCom bus plug connector

for connection of external control and test devices such as:

- HHT handheld terminal (option), display/operator control unit for operation of basic versions
- adapter and CONFIG software for operation via MS-DOS PC

Signal cable A (type DS), with double shielding



1 Stranded drain wire, 1st shield, 1.5 mm² or AWG 14
2 Insulation
3 Stranded wire 0.5 mm² or AWG 20
4 Special foil, 1st shield
5 Insulation
6 Mu-metal foil, 2nd shield
7 Stranded drain wire, 2nd shield, 0.5 mm² or AWG 20
8 Outer sheath

Ordering Code

IFC 010 Signal converter for primary heads (flowmeter)
AQUAFLUX / ECOFLUX 1000 / ALTOFLUX 4000 / PROFIFLUX 5000 / VARIFLUX 6000

Code Signal converter

V311 0 1 IFC 010 K B
4 IFC 010 K D
6 modular IFC 010 B
8 modular IFC 010 D
A IFC 010 F B
D IFC 010 F D

Power supply

2 100 V AC (Japan)
4 24 V DC
5 24 V AC
7 100 V AC
8 115 / 120 V AC
B 200 V AC
C 230 / 240 V AC
D 48 V AC

Cable connection

2 PG 13,5 (2x)
3 1/2" NPT
4 PF 1/2
A PG 13,5 (3x) Swiss

Option

0 standard (none)
1 LA S2/S
2 LA S3/S
3 LA S4/S
A frequency output 10 kHz

Operation manual / Operating language

1 german / german
2 english GB / english GB
3 english US / english US
4 french / french

V311	0						**Complete ordering code**