

**TECHNICAL COMPARISON BETWEEN
KURZ SERIES 452 INSERTION MASS FLOW ELEMENTS
WITH A SERIES 155 MASS FLOW COMPUTER AND
FCI GF 90**

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MASS FLOW ELEMENTS		
FEATURES	KURZ SERIES 452 (Note 1)	FCI GF 90 PROBE
Sensor material	Alloy C-276, all TIG welded	316SS with nickel braze
Attitude sensitivity	Very small due to constant temperature operation	Large at low velocity because of much larger free convection due to constant power operation
Sensitivity to velocity angle of incidence	±2% error over ±20° due to circular sensor design and high sensor length-to-diameter ratio	Very sensitive to rotation and yaw, non-symmetric behavior because of non-circular sensor design. ±2% error form 0-2° of rotation, error for larger rotation angles and yaw not supplied
Hook-up	2-Wire loop-powered, current output	6 to 8 wires required, voltage output
Temperature compensation range/method	Standard: -40°C to +125°C or 0°C to +200°C. All sensors are tested in a wind tunnel at least 2 temperatures at constant mass flow	Standard: ±30°F referenced to customer specified temperature (i.e.: 120°F ±30°F). Method unknown
Accuracy	±[(1% + .025%/°C) reading + (20 SFPM + .25 SFPM/°C)] above or below 25°C. Velocity calibration performed with Kurz N.I.S.T. traceable wind tunnel	±1% of full scale of ±3% of reading, whichever provides better accuracy of reading at flow rate for process temperature change of ±30°F (±16.5°C). ±2% of full scale or ±5% of reading at flow rate for process temperature change of ±100°F (±55.5°C) referenced to customer's specified temperature
Response time to velocity and temperature (one T/C)	Velocity: 1 second. Temperature: 1-3 seconds 6000 SPFM baseline velocity	Slow, to both temperature and velocity changes, 15-30 seconds at 4000 FPM
Velocity range	.25 to 300 SFPS at standard conditions	Listed at .25 to 1600 SFPS. Up to 200 FPS max. actual velocity



MASS FLOW ELEMENTS--CONTINUED		
FEATURES	KURZ SERIES 452 (Note 1)	FCI GF 90 PROBE
Repeatability	.25% reading	.5% reading
Turn-Down Ratio	15 SFPM to 18,000 SFPM, 1200:1	100:1 advertised. 1000:1 under special conditions
Operating principle	Constant temperature difference control circuit, with ability to set temperature set-point, and slope for temperature compensation; 2-wire, current output up to .5 amperes	Constant power, RTD temperature difference output with ability to set temperature set-point, voltage mode only, low voltage signals are very small at high velocity
Number of sensor elements	Two nearly identical RTD's thermally isolated from each other and the probe structure	Two, 2-100 Ω RTD's, one heater element plus mass balance cylinder for reference temperature element
Sensor lead wire compensation, including temperature	Completely compensated for lead wire resistance up to 1 ohm (300 feet of #18 GA wire)	Unknown
Sensor blockage corrector factor for 6" I.D. pipe	.974 (2.6% error) Kurz computes this correction factor for customer	.928 (error is about three times Kurz error), method of using correction is unknown
Pressure drop	Negligible--See Kurz DCN 367027	Not negligible because of larger blockage effect. (About 9% more than Kurz)
EMI Approvals	CE Compliance: light industrial (EN 5008-2) for emissions, heavy industrial (EN 50082-2) for immunity and EN 61000-4-6 for surges	Unknown
Safety Approvals	FM, CSA, CENELEC Non- Incendive and Explosion-Proof options	Explosion-Proof Approvals

Note: 1: Please refer to Series 452 Brochure/DCN 367027 for details.

MASS FLOW COMPUTER COMPARISON		
FEATURE	KURZ 155 JR	FCI GF 90
Keypad/LCD	Weatherproof, Keypad/LCD on cover for complete access. 2 line, 16 characters	LCD display visible, keypad inside, need to open cover to use. 4 line, 20 characters
Access Code	2, User and Technician	One
Display mode, Programming Diagnostics	User can scroll display to see all data, inputs, alarms, calibration data, I.D. etc. from LCD/Keypad on cover	Must open cover to see all data. Display mode only allows same 4 lines of data, input data not easy to see
Sensor Inputs	1 Series 452, 2-Wire Mass Flow Element, one separate Temperature Element	1 Flow Element. (LT81 type probe) 6 to 8 wires (voltage)
Analog 4-20 mA	2	2
Alarm relays	4	2
P.I.D. control loop	1, for mass flow control	None
“Kick-Out” sensor check/relay	Yes, display plus a relay may be set	Not available
Variable velocity correction factors	Yes, 7 factors. Lagrangian interpolation for flow blockage and velocity profile correction, etc.	One fixed correction factor for all velocities
Laptop Upload/Download via RS232C “Echo”	Yes, allows Quality Assurance, changing of data for other sensors, records, and echos keypad LCD, etc.	No
RS232C data port	Yes, two	Yes
Built-In Input signal calibration	Built-in Zero/Span circuit for all channels, no pots!	Not available
Output units	SFPM, SCFM, SCFH, PPH, °F	FPS, CFM, °F
Number of Meters	4 (flow, temperature, sum and difference)	1 flow, 1 temperature



MASS FLOW COMPUTER COMPARISON		
FEATURE	KURZ 155 JR	FCI GF 90
Velocity/Temperature Mapping Compensation	Yes, range of -40 to 500°C, all velocities	No computer velocity/temperature compensation
Totalizer	Yes, one for each METER	Yes, one
Elapsed Time	Yes	No
Clock/Calendar	Yes (24 hour)	No
Assignable METER ID	Yes, 12 characters	No
Built-In Output calibration (4-20 mA)	Yes, both outputs. No pots!	No
Automatic Zero/Span input calibration	Yes, performed every .400 seconds	No
Set-Up Menu	User friendly, with Help Screens, direct nomenclature. Same menu for all models. See User's Guide	Hard to use. No help screens, number codes instead of direct nomenclature
Number in field	5,000 in use since 1989 in process, utilities, nuclear power plants.	New unit. Finally introduced to market after 3 to 4 years of development.
Enclosure size/rating	8" x 6" x 4", NEMA 4X	11.19" x 9.85" x 6.13" NEMA 4X
Safety rating	Class 1, Div. 2, A, B, C, D	In process
Calibration data entry	Easy entry of N.I.S.T. data points (up to 15) for each input channel; by Kurz or user (access code only)	Factory entered, only allows zero, span adjustment to output
Input resolution	18.2 bits	Unknown
Accuracy 4-20 mA	12 bit	Unknown
Temperature rating	-25°C to 60°C	-18°C to 65.6°C
Digital filtering of input channels	Programmable from 1 to 64 "box cars" for each input channel. Setting time = (.2 + .1 per channel) x (box car size), seconds	Unknown



TECHNICAL COMPARISON OF KURZ AND FCI

MASS FLOW COMPUTER COMPARISON		
FEATURE	KURZ 155 JR	FCI GF 90
Mass Flow Element interchangeability	Fully programmable to any 2-Wire Kurz Mass Flow Element by user	Unknown
EMI Approval	CE Compliance: light industrial (EN 50081-2) for emissions, heavy industrial (EN 50082-2) for immunity and EN 61000-4-5) for surges	Unknown