TECHNICAL SPECIFICATIONS

Mass Flow Computers
Series 155

The Kurz 155 Mass Flow Computer is a versatile system transmitter that integrates the functions of flow and temperature measurement, flow totalization, alarms, data acquisition, input/ouput calibration, and closed-loop flow control.

Kurz Instruments is dedicated to manufacturing and marketing the best thermal mass flow meters available and to support our customers in their efforts to improve their businesses.

Applications

- Stack & flue gas
- Coal pulverizer air
- Cement plants
- Nuclear power plants
- EPA & AMS emissions monitoring

Kurz Instruments, Inc.
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SPECIFICATIONS

- **Input channels**
  18.2 bit resolution
  0 to 5 VDC, 13.2 bit accuracy, ±30 ppm/ºC
- **Analog outputs**
  12-bit resolution and accuracy;
  4-20 mA, isolated, 500 VAC or 707 VDC;
  7-50 V compliance at 24 VDC Rmax=850 Ω;
  Nonisolated, Rmax= 400 Ω, ±110 ppm/ºC;
  0-5 V, 250 Ω min. load impedence ±30 ppm/ºC
- **Measurement rate**
  0.1 seconds per channel + 0.2 seconds
- **Filter time constant**
  0-3600 seconds
- **Display update**
  Every 2 seconds
- **Serial port baud rate**
  9,600
- **Relays**
  5 A, 24 VAC/DC, sealed
- **Environment**
  -25ºC to 60ºC, 10-90% RH, noncondensing
- **Power**
  115/230 VAC ± 10% 50/60 Hz; 24 VDC ± 10%

APPROVALS

- **EMI approvals**
  CE compliance light industrial;
  EN 50081-2 for emissions;
  heavy industrial EN 50082-2 for immunity and
  EN 61000-4-5 for surges
- **Alarm output conformity**
  NAMUR NE43
- **European Union CE compliance**
  EMC, LVD, PED, ROHS, and WEEE
- **Nonincendive approvals**
  IEC 79-15, Ex nC II T4 (Class I, Div. 2,
  Groups A, B, C, D, T4); CSA

FEATURES

- **Up to 22 sensor inputs for mass flow rate, temperature and 4-20 mA reference inputs**
- **Multipoint calibration factor for each meter**
- **Ability to group one or more inputs as a meter and to define a meter as the sum/difference of other meters, for up to 16 meters**
- **User-defined meter ID and flow area**
- **User-selectable digital filtering for all input channels**
- **Built-in flow totalizers and elapsed time**
- **Built-in field calibrators**
- **Automatic sensor out-of-tolerance indication, alarm, and re-averaging for multipoint flow elements**
- **Up to eight 4-20 mA outputs.**
- **Up to eight 5-amp alarm relays**
- **Choice of optically isolated loop-powered or self-powered 4-20 mA outputs**
- **Velocity-temperature mapping (VTM) for wide ranging process temeprature and velocity**
- **RS-232C communication port for terminal operation and setup**
- **User-configurable English or metric units for mass flow rate, mass velocity, and process temperature**
  ºC, ºF, KGH, KGM, NCMH, NLPM, NMPS, PPH, PPM, SCFH, SCFM, SCMH, SFPM, SLPM, SMPS
- **Easy-to-use interface**
  Keypad — 20 button
  Display — 2-lines of 16-characters each
- **24-hour clock/calendar**

OPTIONS

- **Pulsed flow totalizer outputs**
- **RS-232C data port on all models; RS-485 on 115C-2, 155E-2, 155E-RM2**
- **NEMA 4, NEMA 4X, NEMA 7, and 19" EIA rack enclosures**
- **Flow Perfect sensor array configuration correction factor with kick-out count for multipoint averaging configurations**
- **Automatic isokinetic particulate sampling of up to four sample streams**
- **Mass flow control of up to four separate in-line mass flow elements**
- **Redundant configuration using two Series 155 Mass Flow Computers**

HART COMMUNICATION PROTOCOL

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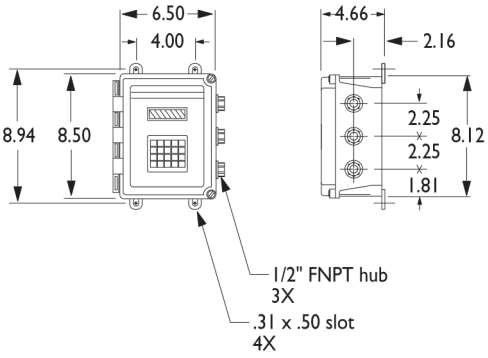
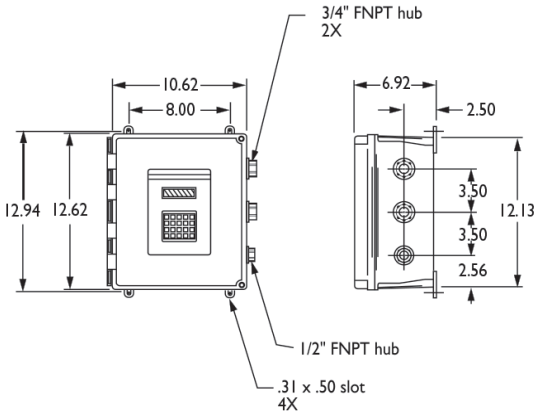


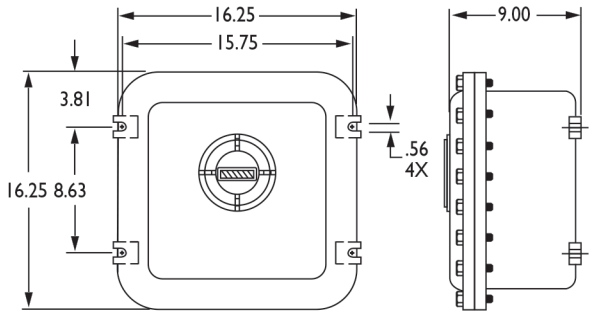
Model 155Jr
Parent Number 750101

NET WT. 4 lbs.
SHIP WT. 6 lbs.



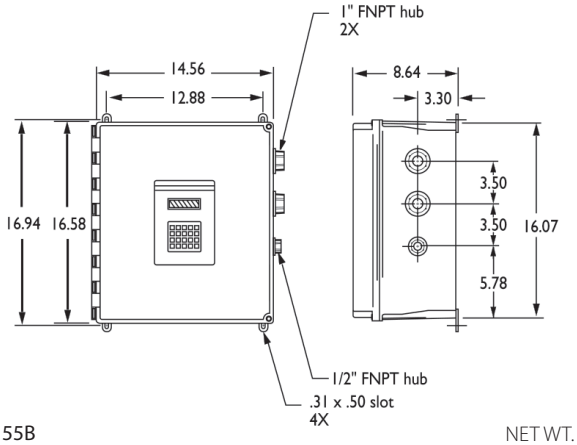
Model 155A
Parent Number 750206

NET WT. 11 lbs.
SHIP WT. 13 lbs.



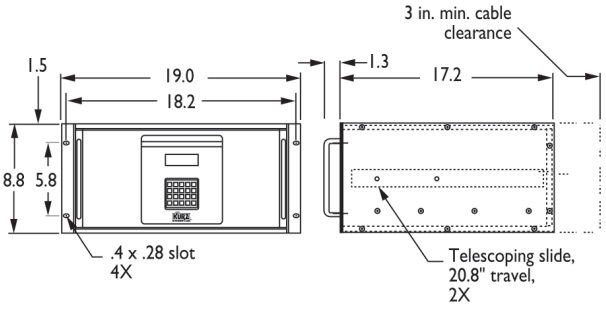
Model 155A-ExW
Parent Number 750208

NET WT. 72 lbs.
SHIP WT. 77 lbs.



Model 155B
Parent Number 750235

NET WT. 21 lbs.
SHIP WT. 27 lbs.



Model 155B-RM
Parent Number 750237

NET WT. 20 lbs.
SHIP WT. 25 lbs.

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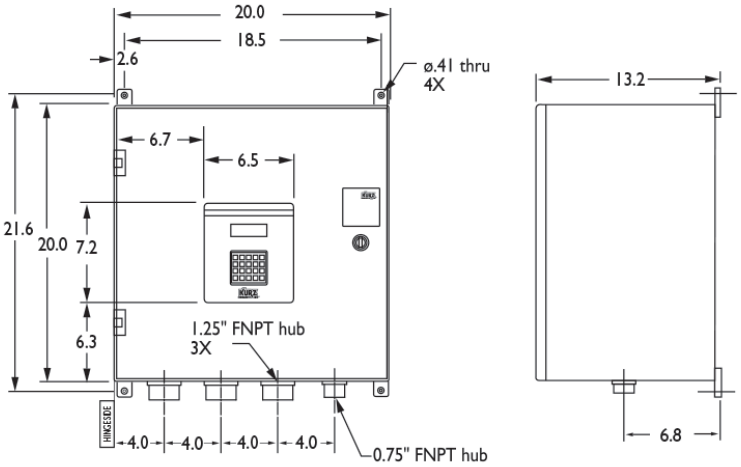
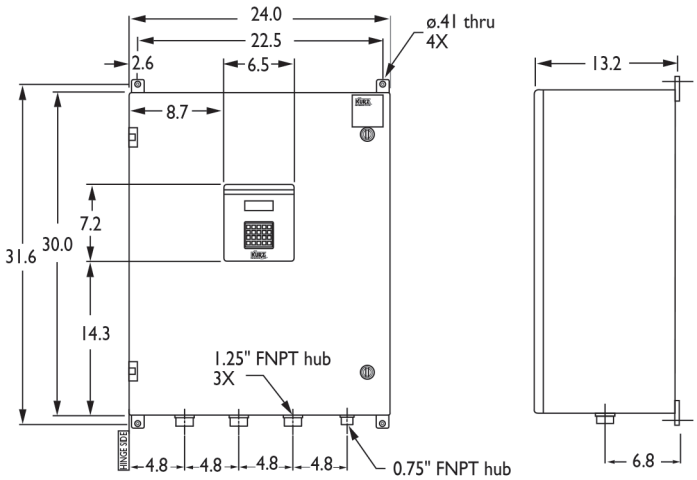


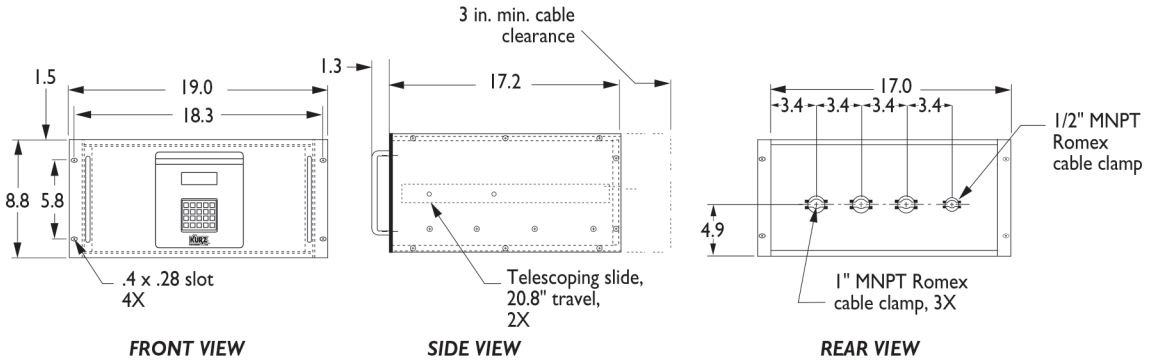
Model 155C-2
Parent Number 750257

NET WT. 48 lbs.
SHIP WT. 55 lbs.



Model 155E-2
Parent Number 750272

NET WT. 75 lbs.
SHIP WT. 90 lbs.



Model 155C-RM2
Parent Number 750258

Model 155E-RM2
Parent Number 750278

NET WT. 25 lbs.
SHIP WT. 32 lbs.

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SERIES 155 PARAMETERS

For the input power, when sizing the external 24 VDC power supply, add 500 mA to the required total sensor current.

Table 1: Series 155 Input, Output & Power Capabilities

Model #	Input Power	# of Input Channels	Optional Analog Inputs	Max # of Meters	Max. Current (mA)		
					40°C	50°C	60°C
155Jr	AC	2	1, 2	4	624	575	525
155A		6	1, 2	8	1,725	1,625	1,525
155B		6	1, 2	8	3,400	3,200	3,000
155B-RM		6	1, 2	8	3,400	3,200	3,000
155C-2		22	1, 2, 4, 6, 8	16	6,000	5,500	4,550
155E-2		22	1, 2, 4, 6, 8	16	11,000	11,000	11,000
155C-RM2		22	1, 2, 4, 6, 8	16	6,000	5,500	4,550
155E-RM2		22	1, 2, 4, 6, 8	16	11,000	11,000	11,000
155Jr	DC	6	1, 2	8	3,000	3,000	3,000
155A		6	1, 2	8	3,000	3,000	3,000
155B-RM		6	1, 2	8	3,000	3,000	3,000
155C-2		22	1, 2, 4, 6, 8	16	11,000	11,000	11,000
155C-RM2		22	1, 2, 4, 6, 8	16	11,000	11,000	11,000

Table 2: Mass Flow Element Selection

Model #	Sensor Type	Number of			Maximum Sensor Current (MA)
		Loop-Powered Flow Channels	4-20 mA Flow Channels	4-20 mA Temperature Channels	
454FTB 454FTB-WGF 504FTB-40 to -96 K-BAR 2000B	FD-MT FD-HHT	0	1	1	500
504FTB-6A to -32	MD	0	1	1	400

SERIES 155 NOMENCLATURE

- **Input Channel —** The current inputs to the Series 155 representing mass flow, temperature, and flow control reference inputs. Input channels are labeled A, B, C, etc.
- **Flow Perfect —** A patented configuration correction software algorithm used with velocity arrays for Kurz multipoint insertion mass flow elements. Flow Perfect automatically corrects for velocity sensors that are "kicked-out" of the average due to out-of-tolerance readings. Flow Perfect requires that field calibration data for each velocity sensor be entered in the Series 155.
- **Meter —** A "meter" can be a mass flow meter, temperature meter, a reference mass flow meter representing a flow control set-point, or a mass flow meter representing the sum and/or difference of several mass flow meters. A meter can be assigned an I.D., area, correction factors, outputs, or alarms.

SERIES 155 OPTIONS & ACCESSORIES

The calibration and EPA drift check feature is standard on all models except the Model 155Jr. This feature is designed to average elements from several single-point, in-line, or multipoint flow meters. An acknowledgement relay requires one additional input channel, alarm relay, and flow meter.

Table 3: Series 155 Options

Model #	Alarm Relays	Flow Control Loops	Redundancy
155Jr	4	1 (AC/DC), 2 (DC)	Yes
155A	4	1, 2 (AC/DC)	Yes
155B	4	1, 2 (AC/DC)	Yes
155B-RM	4	1, 2 (AC/DC)	Yes
155C-2	8	2, 4 (AC/DC)	Yes
155E-2	8	2, 4 (AC/DC)	Yes
155C-RM2	8	2, 4 (AC/DC)	Yes
155E-RM2	8	2, 4 (AC/DC)	Yes

Table 4: Series 155 Accessories

170098	Stainless steel identification tag; maximum four lines of 32 characters each; 1.25" x 3". Specify information with order.
700011-01	Rack mounting kit for one Model 155Jr Mass Flow Computer; 10.5"H x 19" EIA panel.
700011-02	Rack mounting kit for two Model 155Jr Mass Flow Computers; 10.5"H x 19" EIA panel.
700012-02	Dual mass flow computer redundancy kit; includes remote flow element terminal junction box, cables, conduit, and conduit fittings; enclosure must be located within two feet of the mass flow computers; Models 155C-2, 155C-RM2, 155E-2, 155E-RM2; AC or DC input power.
700012-04	Dual mass flow computer redundancy kit; Models 155Jr, , 155A, 155B-RM; AC or DC input power.
700185-01	Model 185-4, RFI, EMI, and surge protection enclosure for up to 5 two-wire circuits; NEMA 4 painted steel; 8"L x 6"W x 4"D.
700185-02	Model 185-8, RFI, EMI, and surge protection enclosure for up to 10 two-wire circuits; NEMA 4 painted steel; 8"L x 6"W x 4"D.
700185-03	Model 185-20, RFI, EMI, and surge protection enclosure for up to 20 two-wire circuits; NEMA 4 painted steel; 14"L x 12"W x 6"D.
700185-04	Model 185-2, RFI, EMI, and surge protection enclosure for up to 2 two-wire circuits; NEMA 4/7 painted aluminum; wall mounted.

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750 _ _ _	_ _	_ _	_ _	_ _	_ _	_ _	_ _	_ _	_ _	_ _	_ _
Parent number	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11

Parent Number	Model	Enclosure Type	Safety Approval
750101	155Jr	NEMA 4X, fiberglass, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2, GPS. A, B, C,D,T4); CSA
750206	155A	NEMA 4X, fiberglass, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2, GPS. A, B, C,D,T4); CSA
750208	155A-ExW	NEMA 4/7, aluminum with display window	Cl. I, Div. 1, GPS. B, C, D
750235	155B	NEMA 4X, fiberglass, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA
750237	155B-RM	Rack-mount, 19″ EIA, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA
750257	155C-2	NEMA 4, painted steel, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA
750258	155C-RM2	NEMA 4, painted steel, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA
750272	155E-2	NEMA 4, painted steel, display/keypad overlay	Ex nC II T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA
750278	155E-RM2	Rack-mount, 19″ EIA, display/keypad overlay	Ex nC IIC T4 (Cl. I, Div. 2 GPS. A, B, C,D,T4); CSA

F1	Option	4-20 mA Outputs (must equal Feature 2)	
88	0	All models	No 4-20 mA outputs
04	1		User-selected - loop-powered, AC/DC isolated or self-powered, AC non-isolated
05	2		
06	4	155C-2, 155C-RM2, 155E-2, 155E-RM2	
07	6		
08	8		

F2	Option	VDC Analog Outputs (must equal Feature 1)
88	0	All models
01	1	
02	2	
04	4	155C-2, 155C-RM2, 155E-2, 155E-RM2
06	6	
08	8	

F3	Option	Alarm Relays, Control Drivers, Pulsed Outputs
88	No alarms, relays, or control driver outputs. All models	
05	Four alarm relays (5 A. 24 VAC/VDC). Models 155Jr, 155A, 155B, 155B-RM	
06	Eight alarm relays (5 A. 24 VAC/VDC). Models 155C-2, 155C-RM2, 155E-2, 155E-RM2	
07	Four alarm relays (5 A. 24 VAC/VDC), one flow control driver for Kurz 730 control valve. Models 155Jr, 155A, 155B, 155B-RM	
08	Eight alarm relays, two flow control drivers for Kurz 730 control valves. Models 155C-2, 155C-RM2, 155E-2, 155E-RM2	
09	Four alarm relays, two flow control drivers for Kurz 730 control valves. Models 155Jr (DC), 155A, 155B, 155B-RM	
10	Eight alarm relays, four flow control drivers for Kurz 730 control valves. Models 155C-2, 155C-RM2, 155E-2, 155E-RM2	
11	Eight alarm relays, two flow control drivers with analog control signal for driving variable speed motors and position-input vanes and dampers, and valves 0-10 VDC up to 20 mADC output. Models 155C-2, 155C-RM2, 155E-2 and 155E-RM2	
12	Four alarm relays, two pulsed flow totalizer outputs. Models 155Jr, 155A, 155B, 155B-RM	
13	Four alarm relays, one flow control driver, and two pulsed flow totalizer outputs. Models 155Jr, 155A, 155B, 155B-RM	
14	Eight alarm relays, eight pulsed flow totalizer outputs. Models 155C-2, 155C-RM2, 155E-2, 155E-RM2	
15	Eight alarm relays, two flow control drivers, four pulsed flow totalizer outputs. Models 155C-2, 155C-RM2, 155E-2, 155E-RM2	

F4	Option	Built-In Calibrators
04	Built-in electronic calibrator. All versions of Model 155Jr.	
06	Built-in variable input (0-5 VDC) electronic calibrator with externally activated flow drift check circuit. User to initiate zero and span timing cycles by providing one contact closure for zero and one for span. Includes the ability to set one or two alarm relays to acknowledge the zero-span drift check circuit is operative (requires one additional relay, meters, and input channel). Meets EPA requirements for flow monitors. Models 155A, 155B, 155B-RM, 155C-2, 155C-RM2, 155E-2, 155-RM2 only.	

F5	Option	Input Power
01	115 VAC 50/60 Hz, all models	
02	230 VAC 50/60, all models	
03	Isolated, 24 VDC, models 155Jr, 155A, 155B-RM, 155C-2, 155C-RM2	

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F6	Option	Terminal Communication and Data Ports
	88	RS-232C termincal communication port; echoes display/ keypad and allows use of a computer terminal for programming; all models
	01	RS-232C data port with standard output format and RS-232C termincal communication port, as described in Option 88; protocol furnished; all models; option must be selected if Feature 7 printer is selected.
	03	RS-485 data port with standard output format and RS-232C terminal communication port as described in Option 88; protocol furnished; models 155C-2, 155C-RM2, 155E-2, and 155E-RM2 only.

F7	Option	Printer Option
	88	No printer.

F8	Option	Software Version / Chip Set
	01	Current software.; includes flow control, VTM; English units.
	11	Current software.; includes flow control, VTM; metric units.
	02	Current software; includes flow control, VTM; Flow Perfect multipoint array correction factor with kick-out count; English units.
	12	Current software; includes flow control, VTM; Flow Perfect multipoint array correction factor with kick-out count; metric units.

F9	Option	Number of Loop-Powered Mass Flow Sensor Input Channels
	__	Enter two digits for the number of input channels required for the loop-powered mass flow sensors being used with a Series 155. See the Input, Output & Power Capabilities table for the maximum number of input channels for each model and the power supply current capability; also see the Mass Flow Element Selection table.

F10	Option	Number of 4-20 mA Input Channels
	__	Enter two digits for the number of input channels required for the 4-20 mA mass flow, temperature, or reference inputs. Enter 00 if no 4-20 mA inputs are required. See the Input, Output & Power Capabilities table for the maximum number of input channels for each model. These inputs must be isolated from earth ground unless the Model 155 is used to supply the power.

F11	Option	Number of Meters
	__	Enter two digits for the total number of meters required for the application. See the Input, Output & Power Capabilities table for the maximum number of meters for each model.