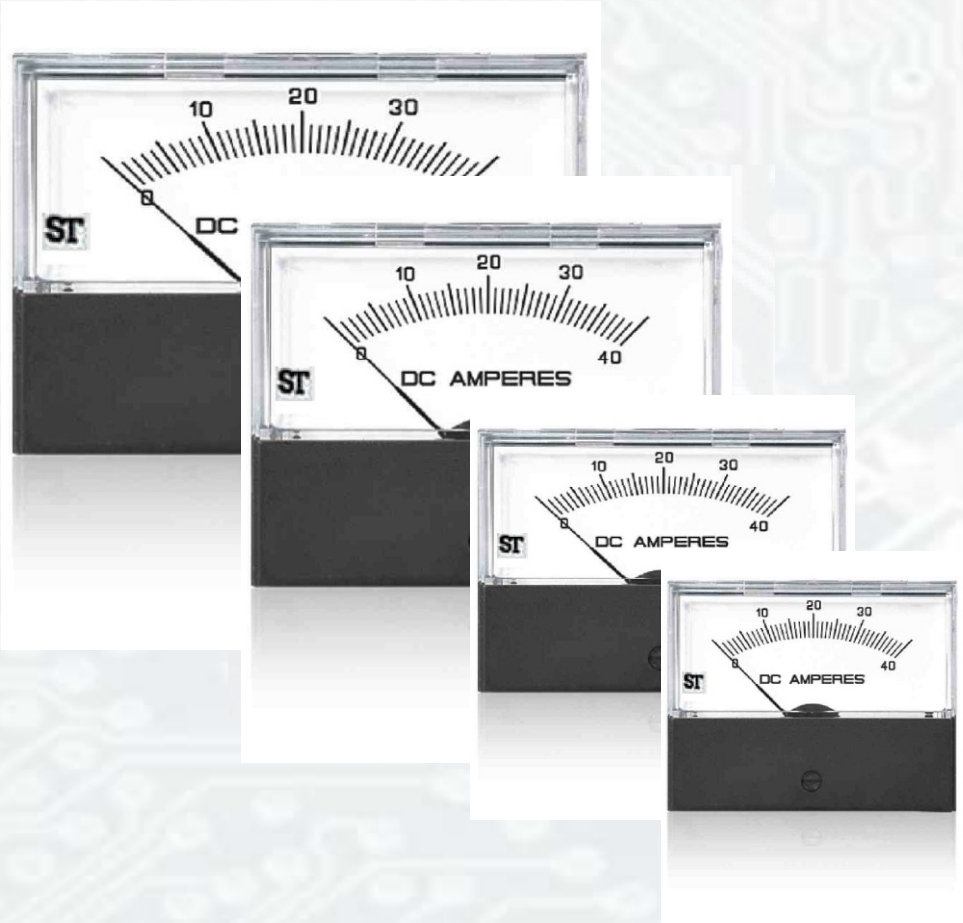
Technical Data Sheet

Contender Series Meter

E471457

263805



The moving iron & moving coil panel meters sizes $1^{1/2}$", $2^{1/2}$" $3^{1/2}$", $4^{1/2}$" are housed in a moulded polycarbonate cases which are suitable for the measurement of AC & DC current, voltage & frequency utilizing a high torque pivot and jewel movement.

Special Features

- Surface or window mounting.
- Near linear scale.
- Glass filled Polycarbonate housing (UL 94 V-0).
- Tube Knife edge pointer

Application

The contender range of analog panel meters offers accurate measurement and indication of most electrical & electronics parameters in industry standard $1^{1/2"}$, $2^{1/2"}$, $3^{1/2"}$ $4^{1/2"}$ case sizes. This innovative design features a detachable lower fascia plate which allows the flexibility of either surface or window mounting. The fascia is simply unclipped to achieve the completely flush panel appearance of panel window mounting. A range of short scale panel meters that comply with Internationally recognised specifications. Their rugged design will suit demanding environmental applications.

Functional Areas

- Marine
- Switchgear
- Distribution systems
- Control panels
- Embedded Generation
- Energy managment
- Building managment
- Utility power managment
- Process control
- Motor monitoring

Features

- Measuring and Indication of AC amps, volts, frequency and DC signals.
- Surface or window mounting.
- Rear zero adjuster on moving coil meters.
- High torque pivot and jewel movement.
- Dust & Water jet protected IP54/NEMA 3 (From front).
- True RMS measurement meters.
- *AC and DC Inputs.
- Up to 30A AC direct connected.
- Up to 30A DC direct connected.

  (Not applicable for model 112)*

Benefits

- AC moving iron and moving coil mechanisms.
- ANSI standard case sizes.
- Detachable lower fascia plate
- Easy to modify for distributions.

Operation

Moving Coil Meter

These meters offers a centre cored, self shielding moving coil movements using pivots, hairspring and spring jewels. Variations in movement are limited by design. All DC voltmeters are 1000 ohms per volt, moving coil rectified voltmeters run at 900 ohms per volt. Milivolt meter use the 5 miliamps/50mV resistance. Refer # standard measuring ranges table for details (page 3 of 9).

Moving Iron Meter

This clapper type repulsion design utilizes a pivot, hairspring and jewel movement. The bottom jewel is oil filled to provide damping while th top is spring for resilience.All voltmeters are manufactured with internal voltage dropper resistor.

Frequency Meter

Frequency meters use a 1 mA/35ohm movement driven by an EMC hard frequency conversion circuit.

Dials, Pointers and Scales

Standard dials are matt white black printed scales and a tubular knife- edge black are balanced within 1% of scale length and feature a highly repeatable flattened scale shape, ensuring consistently accurate measurement reading. Dials are interchangable between the contendor range of products using the same input within the published specification of the meter. Options for non standard customer specific dials are available upon request.

Technical Specifications

Applicable Standards	
Terminal bolts/leads	DIN 46200/46282
Safety requirements and protective measures for Electrical indicating instruments and their accessories	IEC 529, IEC 61010-1
Performance specifications for direct acting indicating analog electrical measuring instruments and their accessories	IS 1248 ANSI C39.1 1981 (IEC 51)
UL Compatibility	UL 94 V-0

Comply with following European directives

2004 / 108 / EC (EMC directive), 2006 / 95/EC (low voltage directive) & amendment 93/68/EEC, For CE Marking.

Scale and Pointer				
Pointer	Tube Knife - Edge Pointer			
Pointer deflection	90°			
Scale characteristics	(A) Near Linear above 10% of nominal full Scale value for moving iron (B) Linear scale for moving coil , frequency, moving coil with rectifier			
Scale division	Coarse - Fine			
Scale length	112	212	312	412
	32.56 mm	49.03 mm	57.22 mm	90.14 mm

Nominal Range of use

Ambient Temperature	0 ...40 °C
Position of use	Vertical ± 5°
Frequency	FN ± 10%
External Magnetic Field	At 0.4 kA/m

Mechanical Data

Case details	Moulded case suitable for mounting in Control / switchgear panels Machinery consoles.
Case material	Polycarbonate , flame retardant and drip proof as per UL 94 V-0.
Front window	Polycarbonate (Shatterproof & transparent)
Colour of front cover	Black
Position of use	Vertical
Panel fixing	Fixing stud
Panel thickness	≤ 10 mm

Terminals	
Voltmeters and Ammeters & Frequency meters	Terminal 10-32 UNF, Washer 10-32 UNF(Recommended lug M5 ring type)
Fixing	Surface mounting : 4 corner studs 4-40 UNC
	Rear of panel mounting: 2 through hole mounts (Except model 112)

Reference Conditions

Accuracy	According to ANSI C39.1(IEC 51)/ DIN EN 60051
DC Ammeters & Voltmeters	1.5% 0 to 100% of full scale deflection
AC Ammeters & Voltmeters	Moving iron: 1.5% 10 to 100% of full scale deflection Moving coil: 1.5% 0 to 100% of full scale deflection
Frequency Meters	0.5% of end scale value
Ambient temperature	23 C ± 2°C
Position of use	Nominal position ±1°
Input Waveform	Rated value of measured quantity sine wave, distortion factor ≤ 5%
Frequency	45 - 65Hz
Other Conditions	According to IEC 51/DIN EN 60051

Electrical Data

DC moving coil Ammeters	50 mA to 30 A
DC moving coil Voltmeters	50 mV to 600 V
AC moving coil Ammeters(VQ)	1 mA to 100 mA
AC moving coil Voltmeters(VQ)	40V to 600 V
AC moving coil Ammeters(EQ)	100 mA to 30 A
AC moving coil Voltmeters(EQ)	6V to 600 V
Frequency Meters	45-50-55Hz, 55-60-65Hz, 45-55-65Hz, 360-440 Hz
Overload	Continuous 1.2 times

Options

Case	
Front Window	Shatterproof Polycarbonate (Transparent)
Color of front cover	Black

Dial	
Blank dial	With initial and end values marked
Special markings	Numbering/Lettering
Division dials	Basic divisions without numbering
Color markings/bands	Red or green
Over range (Moving Iron Ammter)	Two, three and five times over range

Accessories

Safety Precautions

1) Instruments with damaged window or glasses must be disconnected from the mains.
2) Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing. If non - insulated connector wires are used.
3) Instruments to be used in grounded panel.

Environmental Conditions

Climatic Suitability	Climate category II as per IEC 60051 (climatic class 3 according to VDE/VDI 3540)
Operating Temperature	0°C... + 40°C
Storage temperature	- 20°C ...+55°C
Relative humidity	25% to 80% nominal range of use
Shock resistance	15 g. for pulse duration 11ms
Vibration resistance	ANSI C39.1 cl. 5. 13

Standard Measuring Ranges

DC moving coil Ammeters (PQ)	50 mA to 30 A (Approx. mV drop = 60 mV)
DC moving coil Voltmeters (PQ)	50 mV* to 600 V** (*=0.16Kohm/V & **=1Kohm/V)
***AC moving iron Ammeters (EQ)**	100 mA to 30 A
***AC moving iron Voltmeters (EQ)**	6 V to 600 V
Frequency Meters	45-50-55Hz, 55-60-65Hz, 45-55-65Hz, 360-440 Hz
Elapsed Time Meters (ETM)	110/130 V, 60 Hz

AC moving coil Ammeters (VQ)

AC Current		AC Voltage	
Rated	Approx Vtg. Drop	Rated	Sensitivity(+/10%)
1mA	2.4V	40V	900 ohm/V
1.5mA	1.4V	60V	
4mA		100V	
6mA		150V	
10mA		250V	
15mA	1.7V	400V	
25mA		500V	
40mA		600V	
60mA			
100mA			

*112 size not applicable

Specifications

A.C. AMMETERS - PIVOT & JEWEL - MOVING IRON TYPE (EQ)

Rating	Scale	212	312
1A	0-1A	PK-260-240-LALA	PK-260-340-LALA
5A	0-5A	PK-260-240-LSLS	PK-260-340-LSLS
10A	0-10A	PK-260-240-MTMT	PK-260-340-MTMT
15A	0-15A	PK-260-240-NDND	PK-260-340-NDND
20A	0-20A	PK-260-240-NGNG	PK-260-340-NGNG
30A	0-30A	PK-260-240-NLNL	PK-260-340-NLNL
1A	Transformer Rated	PK-260-240-LAXX	PK-260-340-LAXX
5A	Transformer Rated	PK-260-240-LSXX	PK-260-340-LSXX

A.C. VOLTMETERS - PIVOT & JEWEL - MOVING IRON TYPE (EQ)

Rating	Scale	212	312
150V	0-150V	PK-260-244-PZPZ	PK-260-344-PZPZ
300V	0-300V	PK-260-244-RXRX	PK-260-344-RXRX
600V	0-600V	PK-260-244-SJSJ	PK-260-344-SJSJ
150V	Transformer Rated	PK-260-244-PZXX	PK-260-344-PZXX

D.C. AMMETERS - PIVOT & JEWEL - MOVING COIL TYPE (PQ)

Rating	Scale	212	312
0-1 mA	0-1 mA	PK-260-200-FAFA	PK-260-300-FAFA
0-5 mA	0-5 mA	PK-260-200-FXFX	PK-260-300-FXFX
0-10 mA	0-10 mA	PK-260-200-GZGZ	PK-260-300-GZGZ
0-20 mA	0-20 mA	PK-260-200-HFHF	PK-260-300-HFHF
0-50 mA	0-50 mA	PK-260-200-HYHY	PK-260-300-HYHY
0-100 mA	0-100 mA	PK-260-200-JRJR	PK-260-300-JRJR
0-200 mA	0-200 mA	PK-260-200-KAKA	PK-260-300-KAKA
0-500 mA	0-500 mA	PK-260-200-KMKM	PK-260-300-KMKM
4-20 mA	4-20 mA	PK-260-200-HEHE	PK-260-300-HEHE
0-1A	0-1A	PK-260-200-LALA	PK-260-300-LALA
0-1.5A	0-1.5A	PK-260-200-LCLC	PK-260-300-LCLC
0-3A	0-3A	PK-260-200-LJLJ	PK-260-300-LJLJ
0-5A	0-5A	PK-260-200-LSLS	PK-260-300-LSLS
0-10A	0-10A	PK-260-200-MTMT	PK-260-300-MTMT
0-15A	0-15A	PK-260-200-NDND	PK-260-300-NDND
0-20A	0-20A	PK-260-200-NGNG	PK-260-300-NGNG
0-30A	0-30A	PK-260-200-NLNL	PK-260-300-NLNL
0-50mV	Shunt Rated	PK-260-224-ECXX	PK-260-324-ECXX
0-100mV	Shunt Rated	PK-260-224-GBXX	PK-260-324-GBXX

D.C. VOLTMETERS - PIVOT & JEWEL - MOVING COIL TYPE (PQ)

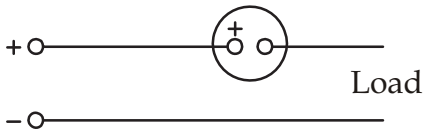
Rating	Scale	212	312
0-15 V	0-15 V	PK-260-220-NDND	PK-260-320-NDND
0-50 V	0-50 V	PK-260-220-NTNT	PK-260-320-NTNT
0-75 V	0-75 V	PK-260-220-PBPB	PK-260-320-PBPB
0-150 V	0-150 V	PK-260-220-PZPZ	PK-260-320-PZPZ
0-400 V	0-400 V	PK-260-220-SCSC	PK-260-320-SCSC
0-600 V	0-600 V	PK-260-220-SJSJ	PK-260-320-SJSJ

FREQUENCY METERS, 120V - PIVOT & JEWEL (Self Contained)

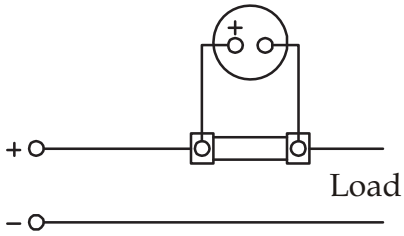
Rating	Scale	212	312
55 Hz	45-65 Hz	PK-264-250-AJAJ	PK-264-350-AJAJ
60 Hz	55-65 Hz	PK-264-250-ANAN	PK-264-350-ANAN

Electrical Connections

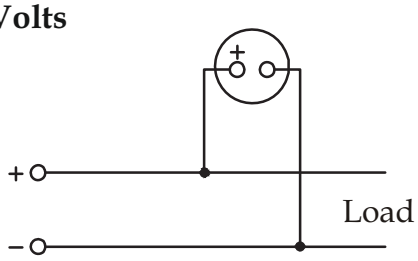
DC Amps - Self Contained



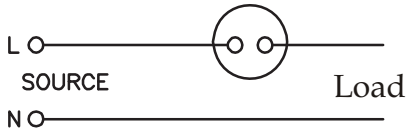
DC Amps - For use with external shunt



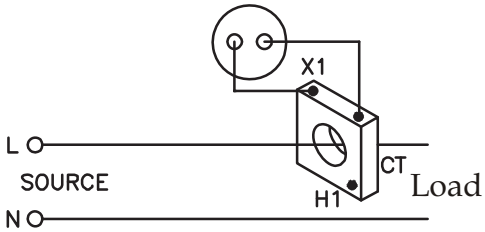
DC Volts



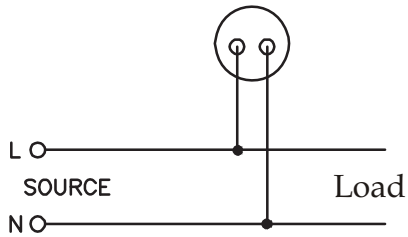
AC Amps - Self Contained



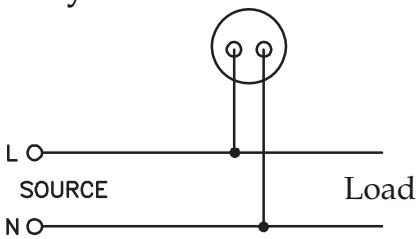
AC Amps - For use with current Transformer



AC Volts

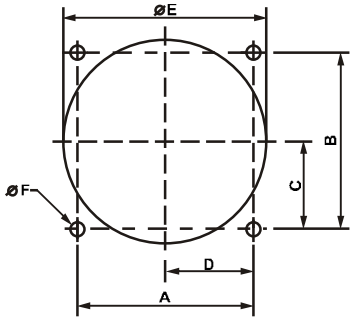


Frequency Meter



Dimensions

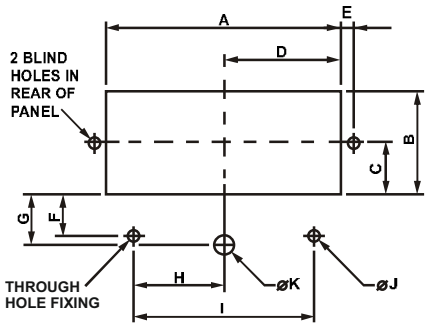
Surface Mount Cut Out



Surface Mount Cut Out

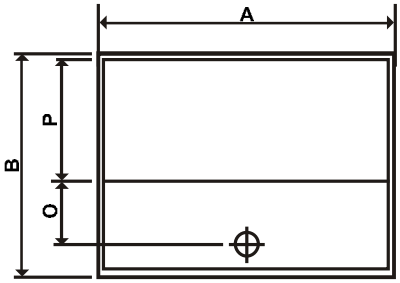
	A	B	C	D	E	F
112 (inch)	1.31	1.31	0.66	0.66	1.56	0.14
112 (mm)	33.27	33.27	16.76	16.76	39.62	3.56
212 (inch)	1.88	1.88	0.94	0.94	2.16	0.14
212 (mm)	47.75	47.75	23.88	23.88	54.86	3.56
312 (inch)	2.25	2.25	0.92	1.12	2.16	0.14
312 (mm)	57.15	57.15	23.37	28.45	54.85	3.56
412 (inch)	4	3.56	1.54	2	2.69	0.14
412 (mm)	101.6	90.42	39.12	50.8	68.33	3.56

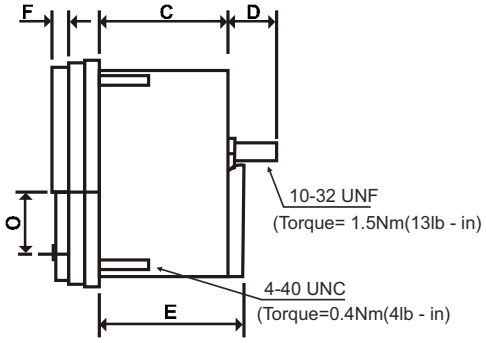
Window Mounting Cut Out

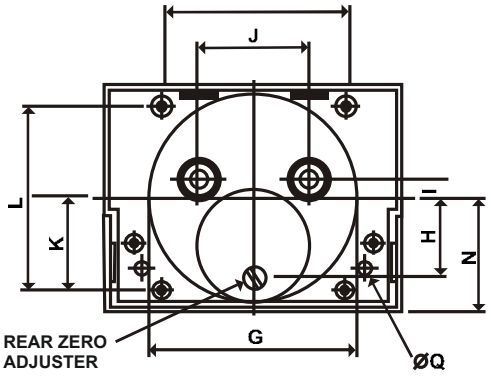


Window Mounting Cut Out

	A	B	C	D	E	F	G	H	I	J	K
112 (inch)	2.17	0.94	0.47	1.08	0.16	-	0.47	-	-	-	0.23
112 (mm)	55.12	23.88	11.94	27.43	4.06	-	11.94	-	-	-	5.84
212 (inch)	2.92	1.28	0.63	1.46	0.16	0.64	0.81	1.13	2.26	0.14	0.23
212 (mm)	74.17	32.51	16.0	37.08	4.06	16.26	20.57	28.70	57.40	3.56	5.84
312 (inch)	3.63	1.61	0.8	1.82	0.16	0.67	0.8	1.48	2.96	0.14	0.23
312 (mm)	92.20	40.89	20.32	46.23	4.06	17.20	20.35	37.59	75.18	3.56	5.84
412 (inch)	5.05	2.36	1.18	2.52	0.19	0.85	1.07	2.11	4.22	0.14	0.23
412 (mm)	128.27	59.94	29.97	64.01	4.83	21.59	21.9	53.59	107.19	3.56	5.84







Model

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
112 (inch)	2.26	1.75	1.3	0.5	-	0.13	1.50	0.57	0.15	0.95	0.65	1.30	1.30	0.85	0.53	0.9	0.14
112 (mm)	57.4	44.45	33.0	12.7	-	3.55	38.1	14.48	3.81	24.13	16.60	33.02	33.02	21.60	13.46	22.86	3.56
212 (inch)	3.0	2.30	1.3	0.5	1.46	1.46	2.12	0.81	0.2	1.12	0.94	1.88	1.88	1.16	0.63	1.27	0.156
212 (mm)	76.2	73.9	33.0	12.7	37.08	37.08	53.8	20.57	5.08	28.4	23.88	47.75	47.75	29.46	16	32.26	4
312 (inch)	3.75	2.91	1.3	0.5	1.46	1.46	2.12	0.81	0.2	1.12	0.92	2.25	2.25	1.25	0.81	1.42	0.23
312 (mm)	95.25	73.91	33.0	12.7	37.08	37.08	53.8	20.57	5.08	28.45	23.37	57.15	57.15	31.75	20.57	36.07	5.84
412 (inch)	5.10	4	1.3	0.5	1.46	1.46	2.65	1.02	-	1.12	1.53	4	4	2	0.96	2.30	0.23
412 (mm)	129.54	101.6	33.0	12.7	37.08	37.08	67.31	25.91	-	28.45	38.86	101.6	101.6	45.5	21.9	58.42	5.84

Contender Series Coding

PK – **260** **2** **40** **LS** **LS**

Digits 1, 2, and 3 Style

260/264 - Surface Mount Contender Amps/Volts (AC/DC)
261/265 - Window Mount Contender Amps/Volts (AC/DC)

Digit 4

Size

1 - 1 1 2″
2 - 2 1 2″
3 - 3 1 2"
4 - 4 1 2″

Digits 5 and 6

Elec. And Mechanical Variables

00 - DC Amps Zero-Left
01 - DC Amps Zero-Center
04 - DC Volts/Ext. Res. Zero-Left
05 -DC Volts/Ext. Res. Zero-Center
10 -AC Amps Recti ed
20 -DC Volts Zero-Left
21 -DC Volts Zero-Center
24 -DC Millivolts Zero-Left
25 -DC Millivolts Zero-Center
30 -AC Volts Recti ed
37 - AC Expanded Scale Voltmeter
38 -DC Expanded Scale Voltmeter
40 -AC Amps (I/V)* 60 Hz
44 -AC Volts (I/V)* 60 Hz
45 -AC Volts 400 Hz (I/V)* 50 - Frequency

Digits 7 and 8
Elec. Rating

LA = 1 Amps
LC = 1.5 Amps
LJ = 3 Amps
LS = 5 Amps
MJ = 8 Amps
more codes available in lookup table below

Digits 9 and 10

Scale

LS = 0-5 Amps
MT = 0-10 Amps
NG = 0-20 Amps

more codes available in lookup table below

Lookup Table for Codes (Digits 7 and 8 and Digits 9 and 10)

Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
CF	0-20 µ	**CY**	0-50 µ								
DR	0-100 µ										
EA	0-200 µ	**EM**	0-500 µ	**EW**	0-800 µ						
FA	0-1 m	**FD**	0-1.5 m	**FG**	0-2 m	**FN**	0-3 m	**FX**	0-5 m		
GZ	0-10 m										
HC	0-15 m	**HF**	0-20 m	**HJ**	0-25 m	**HM**	0-30 m	**HY**	0-50 m		
JJ	0-80 m	**JR**	0-100 m	**JX**	0-150 m						
KA	0-200 m	**KD**	0-250 m	**KG**	0-300 m	**KM**	0-500 m	**KU**	0-750 m	**KW**	0-800 m
LA	0-1	**LC**	0-1.5	**LJ**	0-3	**LS**	0-5				
MJ	0-8	**MT**	0-10								
ND	0-15	**NG**	0-20	**NL**	0-30	**NP**	0-40	**NT**	0-50	**NW**	0-60
PB	0-75	**PD**	0-80	**PK**	0-100	**PZ**	0-150				
RL	0-200	**RS**	0-250	**RX**	0-300						
SC	0-400	**SF**	0-500	**SJ**	0-600	**SM**	0-750	**SN**	0-800	**SS**	0-1000
TC	0-1500	**TM**	0-2000								
VA	0-1 kilo	**VB**	0-1.2 kilo	**VC**	0-1.5 kilo	**VE**	0-2 kilo	**VJ**	0-3 kilo		

For more details and product codes, please contact our local office

Sifam Tinsley Instrumentation Inc.

Address: 2105 Barrett Park Dr, Unit 105, Kennesaw, GA 30144

Tel.: 800-879-6171 I **E-mail:** info@sifamtinsley.com I **Web:** www.sifamtinsley.com