

Tecofi Φ

VALVE MANUFACTURER - FRANCE

TECHNICAL MANUAL



TecInstrument
Measure

FLANGED TYPE SENSORS WITH CONVERTER MC608A HV
MUT2200EL_PN10 / MUT2200EL_PN16 / MUT2200EL_PN25 / MUT2200EL_PN40

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1. THE ELECTROMECHANICAL FLOWMETER



The electromechanical flowmeter is composed of a MUT2200EL sensor couples to a hybrid-type MC608A converter allowing the management of a wide range of needs related to the control operation of fluid transfer systems or circuits. The converter can be installed directly on the sensor (compact version) or remote from it, connected by two cables (remote version).

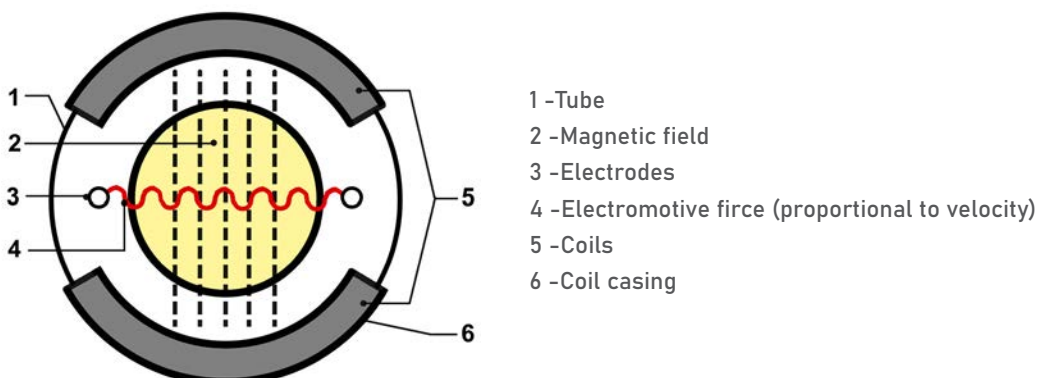
1.1. Principle of operation

The operation of the flowmeter is based on the principle of electromagnetic induction introduced by the physicist FARADAY. When a conductive fluid flows through a constant magnetic field perpendicular to its flow direction, its passage generates an electromotive force that is proportional to its flow velocity.

On the electromagnetic flowmeter, the magnetic field is obtained thanks to the action of two magnetic coils positioned on two sides of the measuring tube. Two electrodes intended to measure the voltage produced during the passage of the fluid are positioned on the internal wall of the tube parallel to the direction of the magnetic field. The required electrical conductivity of the fluid must be at least $5 \mu\text{S}/\text{cm}$.

The value of the induced voltage is proportional to the flow velocity of the fluid and therefore to its volumetric flow.

The response time of the flowmeters is extremely fast, the measurement is reliable and highly accurate. The design without obstruction elements of the flowmeter guarantees a total absence of pressure drop.



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1.2. Areas of use



- Water treatment stations
- Wastewater
- Irrigation
- Energy production
- Pulp and paper industry
- Chemical industry
- Food industry
- Cooling industry
- Seawater desalination / reverse osmosis
- Metallurgical and mining industry (liquids with high solids content)
- Industrial processes
- Sludge

1.3. Fluids

The electromagnetic flowmeter, whose construction has no moving parts, is very suitable for fluids such as waste water or any dirty liquids with a certain conductivity or containing water. Saturated hydrocarbons, distilled water and many non-aqueous solutions, due to too low conductivity are not very compatible.

1.4. Operating temperatures

For normal and efficient operation of the flowmeter, the ambient temperature must be : -25°C / +60°C

Maximum working temperature :

The working temperature depends on the nature of the internal insulating coating used and the location of the converter in relation to the sensor (compact version or remote version).

Two coating are used : EBONITE and PTFE (high temperature PTFE optional).

DN	Coating	Version	Minimum temperature (°C)	Maximum temperature (°C)
DN125-2000	EBONITE	Compact	-40°C	-80°C
DN15-100 in standard DN125-2000 on request	PTFE	Compact	-40°C	-80°C
	PTFE	Remote	-40°C	130°C
	PTFE High temperature (on request)	Remote	-40°C	180°C

1.5. Approvals, standards

- Fiscal measure (MID MI-001, OIML R49)
- EN / IEC 60529, IP68 for permanent immersion in water up to 1,5 m
- Certified for drinking water, WRAS (n° 1402523), FDA and DM174
- Atex - IECEx (remote version)
- 2014/35 / UE - EN 61010-1: 2013 (LVD)
- ACS (n° 21 A CC LY 968)



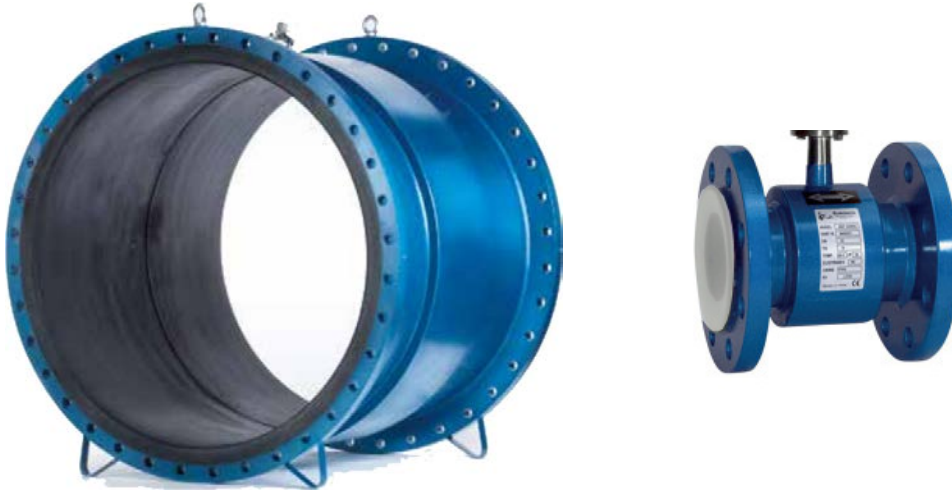
1.6. Assembly

The sensor with flanges allows mounting according to EN 1092 standard : PN10, PN16, PN25, PN40 et ASME B16.5 class 150.

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THE SENSOR

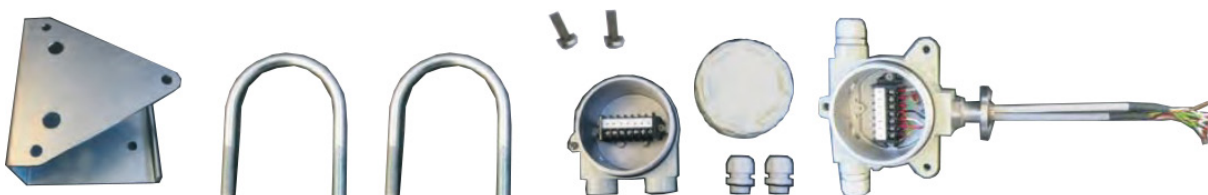
The sensor is the main component of the flowmeter. It consists of a tube, two pipe connection flanges, a sleeve closing two electromagnetic coils, two electrodes and a converter mounting support.



2.1. General characteristics of the sensors

Ranges : from DN15 to DN2000.

- Flanges and sleeve in steel coated with an innovative paint coat based on pigmented polyurethane with phosphate registered trademark **SIGMAFAST™ 210 HS** : RAL5017, thickness : 75 ± 150 µm.
- PTFE internal coating from DN125 to DN2000 and/or ebonite from DN15 to DN100.
- Stainless steel AISI 304 tube.
- With Hastelloy C 276 electrodes: - 2 electrodes (DN15-DN20) / - 3 electrodes (DN25-DN40) / - 4 electrodes beyond
- Possibilities: Titanium, Tantalum or Platinum electrodes
- Power supply : 90-265 VAC, 4-20mA + 485 MODBUS output.
- IRCOM interface.
- IP68 protection index up to 1.5 mCE (4 mCE on request).
- Remote version on request with a minimum of 100 meters of cables (per 5 meter increments) – Ready-assembled assembly in the factory and supply of stainless steel deportation kit for wall mounting (MUT2200KITDEPORT)



Deportation kit

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2.2. Flows

DN		Flows (m3/h)				
mm	inch	Q1 (minimum)	Q2 (Transition)	Q3 (Permanent)	Q4 (surcharge)	Ratio Q3/Q1
15	1.2"	-	-	-	-	-
20	3/4"	-	-	-	-	-
25	1"	0.08	0.128	10	12.5	125
32	1"1/4	0.08	0.128	10	12.5	125
40	1"1/2	0.128	0.205	16	20	125
50	2"	0.2	0.32	25	31.25	125
65	2"1/2	0.32	0.512	40	50	125
80	3"	0.504	0.806	63	78.75	125
100	4"	0.8	1.28	100	125	125
125	5"	1.28	2.048	160	200	125
150	6"	2	3.2	250	312.5	125
200	8"	3.2	5.12	400	500	125
250	10"	5.04	8.064	630	787.5	125
300	12"	8	12.8	1000	1250	125
350	14"	12.8	20.48	1600	2000	125
400	16"	12.8	20.48	1600	2000	125
500	20"	25	40	2500	3125	100
600	24"	50	80	4000	5000	80
700	28"	50	80	4000	5000	80
800	32"	100	160	6300	7875	63
900	36"	100	160	6300	7875	63
1000	40"	200	320	10000	12500	50
1200	48"	320	512	16000	20000	50
1400	56"	500	800	25000	31250	50
1500	60"	800	1280	40000	50000	50
1600	64"	1260	2016	63000	78750	50
1800	72"	2000	3200	100000	125000	50
2000	80"	3200	5120	160000	200000	50

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3. THE MC608A CONVERTER

The MC608A converter has been designed to meet all the needs of modern water management systems. The aluminium housing is robust and reliable (IP68).

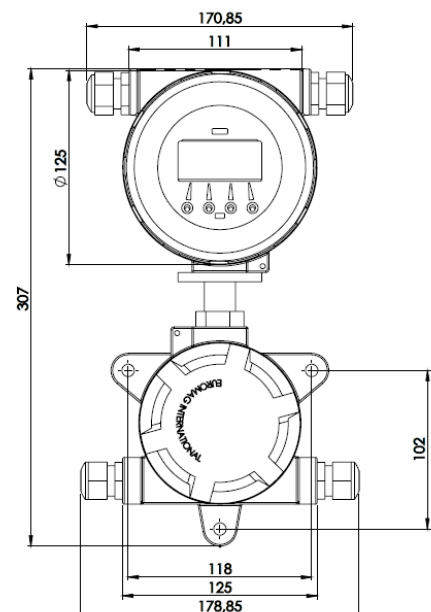
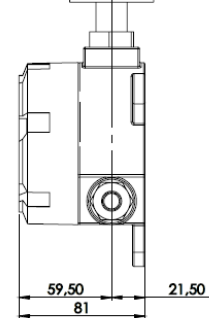
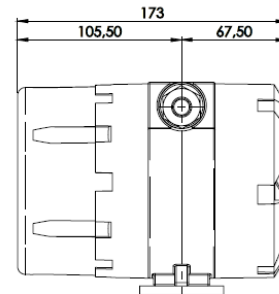
The system guarantees excellent data security thanks to the internal EEPROM memory and a large data storage capacity with 200.000 lines (more than 6 years of factory set data).

The unit is supplied with software allowing users to communicate with the MC608 via RS232 or RS485 Modbus serial interfaces to a windows operation computer or tablet.

Downloading and managing data is fast, the MC608A guarantees ease of programming, an advanced self-diagnostic system that automatically performs a wide range of essential checks. It has a multi-level password system ensuring accessibility and privacy.

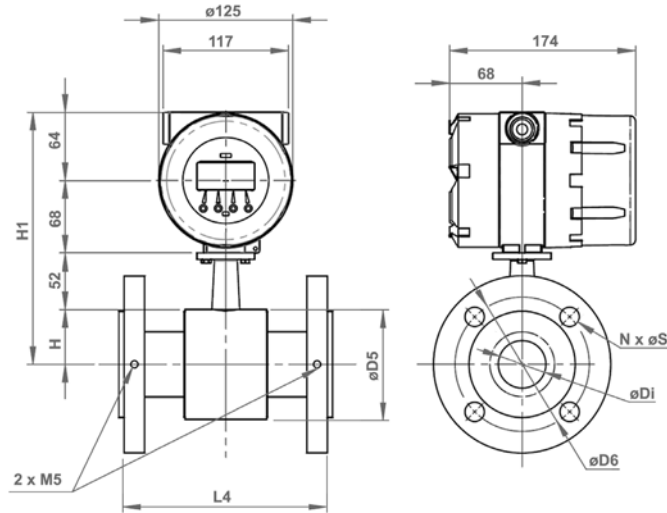
3.1. General characteristics of the converter

- Alimentation 90...264 VAC / 12/24 VAC/DC.
- Compact or separate installation.
- Outputs : analog 4-20mA // pulse // Optional Hart protocol // programmable // digital frequency 0-10 Hz
- Communication : IrCOM // RS 485 - MODBUS RTU interface
- Screen : LCD 128x64 pixels, visible area 50x25mm, white light
- Programming : by buttons, IrCOM output or RS485- MODBUS RTU
- Process memory : 4 Mb flash memory, 200 000 lines of data
- Flow units : ml, cl, dl, l, dal, hl, m3 , in3, ft3, gal, USgal, bbl, oz + user programmable unit
- Optional modules : GSM/GPRS
- Totalizers : 5 (2 positive, 2 negative, 1 NET)
- Alarms and status icons : Status icons displayed on the screen and alarms logged in the data logger
- Self-diagnosis : alarms available for interrupted excitation, empty pipe with 4-th electrode, high temperature, superimposed pulses measurement error.
- External verification : available of field verifier for on-site verification of electronics calibration and condition.



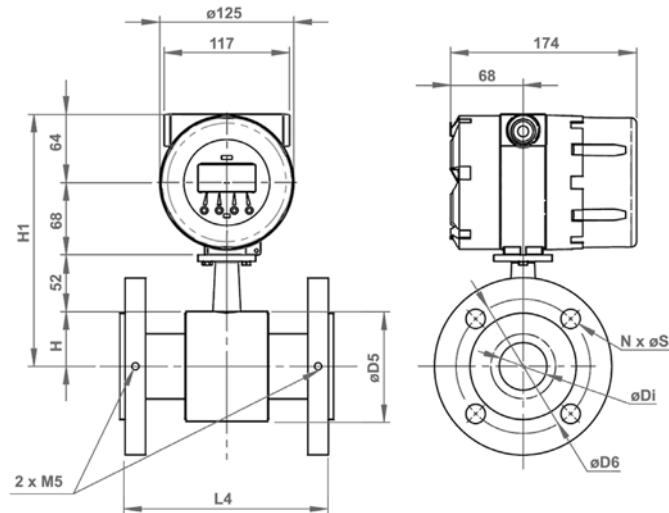
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4. FLOWMETER DIMENSIONS MUT2200EL PN10 EN1092-1



DN		ØD5	L4	DI	D6	N	ØS	H	H1
mm	inch								
15	1/2"	84	200	11.3	65	4	14	42	226
20	3/4"	84	200	16.9	75	4	14	42	226
25	1"	74	200	23.7	85	4	14	37	221
32	1 1/4"	83	200	31.8	100	4	18	41.5	225,5
40	1 1/2"	83	200	37.3	110	4	18	41.5	225,5
50	2"	102	200	47.3	125	4	18	51	235
65	2 1/2"	114	200	63.1	145	4	18	57	241
80	3"	127	200	74.3	160	4	18	63.5	247,5
100	4"	161	250	97	180	8	18	80.5	264,5
125	5"	187	250	122	210	8	18	93.5	277,5
150	6"	210	300	148	240	8	22	105	289
200	8"	261	350	195	295	8	22	130.5	314,5
250	10"	319	450	245	350	12	22	159.5	343,5
300	12"	371	500	296	400	12	22	185.5	369,5
350	14"	404	550	325,6	460	16	22	202	386
400	16"	455	600	374,4	515	16	25	227.5	411,5
450	28"	519	450	441	656	20	26	259.5	443,5
500	20"	570	500	492	620	20	26	285	469
600	24"	684	600	594	725	20	30	342	526
700	28"	783	700	695	840	24	30	391.5	575,5
800	32"	885	800	795	950	24	33	442.5	626,5
900	36"	996	900	894	1050	28	33	498	682
1000	40"	1098	1000	996	1160	28	36	549	733
1200	48"	1312	1200	1200	1380	32	39	656	840
1400	56"	1512	1400	1398	1590	36	42	756	940
1500	60"	1612	1500	1500	-	-	-	806	990
1600	64"	1712	1600	1596	1820	40	48	856	1040
1800	72"	1922	1800	1694	2020	44	48	961	1145
2000	80"	2122	2000	1992	2230	48	48	1061	1245

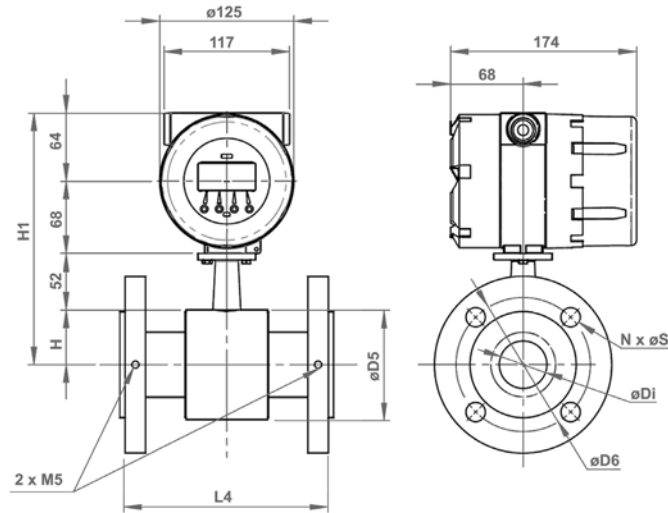
5. FLOWMETER DIMENSIONS MUT2200EL PN16 EN1092-1



DN		ØD5	L4	DI	D6	N	ØS	H	H1
mm	inch								
15	1/2"	84	200	11.3	65	4	14	42	226
20	3/4"	84	200	16.9	75	4	14	42	226
25	1"	74	200	23.7	85	4	14	37	221
32	1"1/4	83	200	31.8	100	4	18	41.5	225,5
40	1"1/2	83	200	37.3	110	4	18	41.5	225,5
50	2"	102	200	47.3	125	4	18	51	235
65	2"1/2	114	200	63.1	145	4	18	57	241
80	3"	127	200	74.3	160	8	18	63.5	247,5
100	4"	161	250	97	180	8	18	80.5	264,5
125	5"	187	250	122	210	8	18	93.5	277,5
150	6"	210	300	148	240	8	22	105	289
200	8"	261	350	195	295	12	22	130.5	314,5
250	10"	319	450	245	350	12	25	159.5	343,5
300	12"	371	500	308	400	12	25	185.5	369,5
350	14"	404	550	339.6	470	16	25	202	386
400	16"	455	600	390.4	525	16	30	227.5	411,5
450	28"	519	450	439	585	20	30	259.5	443,5
500	20"	570	500	490	650	20	33	285	469
600	24"	684	600	590	770	20	36	342	526
700	28"	783	700	691	840	24	36	391.5	575,5
800	32"	885	800	791	950	24	39	442.5	626,5
900	36"	996	900	888	1050	28	39	498	682
1000	40"	1098	1000	992	1170	28	42	549	733
1200	48"	1312	1200	1192	1390	32	48	656	840
1400	56"	1512	1400	1390	1590	36	48	756	940
1500	60"	1612	1500	1492	-	-	-	806	990
1600	64"	1712	1600	1588	1820	40	56	856	1040
1800	72"	1922	1800	1686	2020	44	56	961	1145
2000	80"	2122	2000	1982	2230	48	62	1061	1245

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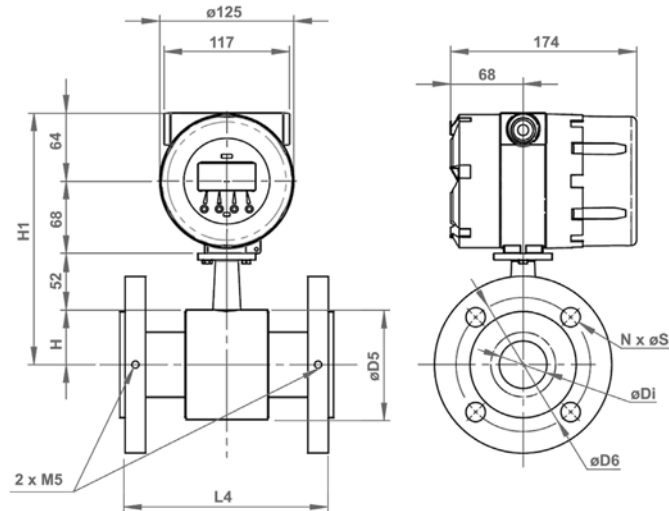
6. FLOWMETER DIMENSIONS MUT2200EL PN25 EN1092-1



DN		ØD5	L4	DI	D6	N	ØS	H	H1
mm	inch								
15	1/2"	84	200	11.3	65	4	14	42	226
20	3/4"	84	200	16.9	75	4	14	42	226
25	1"	74	200	23.7	85	4	14	37	221
32	1 1/4"	83	200	31.8	100	4	18	41.5	225,5
40	1 1/2"	83	200	37.3	110	4	18	41.5	225,5
50	2"	102	200	47.3	125	4	18	51	235
65	2 1/2"	114	200	63.1	145	8	18	57	241
80	3"	127	200	74.9	160	8	18	63.5	247,5
100	4"	161	250	97	190	8	22	80.5	264,5
125	5"	187	250	122	220	8	25	93.5	277,5
150	6"	210	300	148	250	8	25	105	289
200	8"	261	350	201	310	12	25	130.5	314,5
250	10"	319	450	255	370	12	30	159.5	343,5
300	12"	371	500	306	430	16	30	185.5	369,5
350	14"	404	550	337.6	490	16	33	202	386
400	16"	455	600	386.4	550	16	36	227.5	411,5
450	28"	519	450	437	600	20	36	259.5	443,5
500	20"	570	500	486	660	20	36	285	469
600	24"	684	600	586	770	20	39	342	526
700	28"	783	700	685	875	24	42	391.5	575,5
800	32"	885	800	785	990	24	48	442.5	626,5
900	36"	996	900	882	1090	28	48	498	682
1000	40"	1098	1000	984	1210	28	56	549	733
1200	48"	1312	1200	1182	-	-	-	656	840
1400	56"	1512	1400	1380	-	-	-	756	940
1500	60"	1612	1500	1482	-	-	-	806	990
1600	64"	1712	1600	1574	-	-	-	856	1040
1800	72"	1922	1800	1674	-	-	-	961	1145
2000	80"	2122	2000	1966	-	-	-	1061	1245

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7. FLOWMETER DIMENSIONS MUT2200EL PN40 EN1092-1



DN		ØD5	L4	DI	D6	N	ØS	H	H1
mm	inch								
15	1/2"	84	200	11.3	65	4	14	42	226
20	3/4"	84	200	16.9	75	4	14	42	226
25	1"	74	200	23.7	85	4	14	37	221
32	1"1/4	83	200	31.8	100	4	18	41.5	225,5
40	1"1/2	83	200	37.3	110	4	18	41.5	225,5
50	2"	102	200	47.3	125	4	18	51	235
65	2"1/2	114	200	63.1	145	8	18	57	241
80	3"	127	200	74.9	160	8	18	63.5	247,5
100	4"	161	250	99	190	8	22	80.5	264,5
125	5"	187	250	124	220	8	25	93.5	277,5
150	6"	210	300	152	250	8	25	105	289
200	8"	261	350	199	320	12	30	130.5	314,5
250	10"	319	450	251	385	12	33	159.5	343,5
300	12"	371	500	302	450	16	33	185.5	369,5
350	14"	404	550	333.6	510	16	36	202	386
400	16"	455	600	382.4	585	16	39	227.5	411,5
450	28"	519	450	431	610	20	39	259.5	443,5
500	20"	570	500	480	670	20	42	285	469
600	24"	684	600	578	795	20	48	342	526
700	28"	783	700	677	900	24	48	391.5	575,5
800	32"	885	800	775	-	-	-	442.5	626,5
900	36"	996	900	870	-	-	-	498	682
1000	40"	1098	1000	970	-	-	-	549	733
1200	48"	1312	1200	1166	-	-	-	656	840
1400	56"	1512	1400	1362	-	-	-	756	940
1500	60"	1612	1500	1462	-	-	-	806	990
1600	64"	1712	1600	1554	-	-	-	856	1040
1800	72"	1922	1800	1650	-	-	-	961	1145
2000	80"	2122	2000	1942	-	-	-	1061	1245