



MINOCAL®

Electronic heat meters



Minol
Messtechnik

WATER METERS

HEAT METERS

HEAT COST ALLOCATORS

Helping conserve the environment, Creating convenient comfort in the home

Creating efficient workable solutions based on sound experience

Our climate is on the change – this much is beyond dispute. The question is the degree to which each and every one of us can act to conserve precious resources and reduce the consumption of water, electric power and gas to a sensible minimum.

Those with a will to conserve resources must know beforehand precisely how much they consume and where. It is only through the use of accurate measurement technology that this type of data can be precisely logged and controlled. It is here that Minol addresses every requirement of the consumer, providing a sound technological basis for the ecologically responsible use of energy and for keeping costs to a reasonable minimum.

And as regards convenience, with Minol's pioneering appliance technology, economical consumption and precise accounting are simplicity itself.



For over 50 years, Minol has been setting new standards in the field of heat measurement technology with a proven range of products and services – with an ever-watchful eye on quality, customer proximity and a highly developed awareness of absolute precision. Because it is only through the use of precise, reliable instruments that reliable consumption measurement can be guaranteed. The appreciation felt by our partners and customers for this corporate philosophy is demonstrated by many decades of trust in our products.

Right from the beginning, Minol directed its energies towards innovative products in line with the latest developments in dialogue with consumers.

The result is a series of matured, meticulously engineered measuring instruments which have proven highly successful in practical application millions of times over. It is now our turn to express our gratitude to our customers: Because their benefit is the measure of our success.

If you are interested in finding out more on the subject of the environment and on saving energy, simply visit on www.minol.com in the Internet. We look forward to welcoming you!

Heat meter



Minocal® Combi MK in measuring capsule design

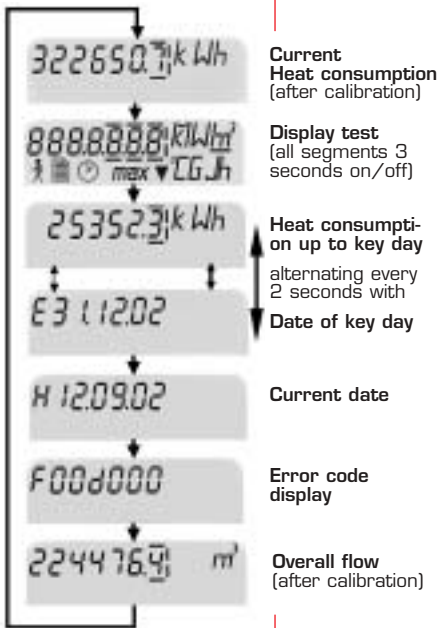
The Minocal® Combi MK provides exact recording of heat consumption as of the key date. With a range of application for temperatures from 15°C to 150°C and nominal flow rates of 0.6, 1.5 and 2.5 m³/h, it is optimally suited for heat measurement in home-living areas. The device proves itself through consistent measuring precision and a high level of operational safety. The precise multi-function display always indicates the current consumption value. All essential equipment and consumption data can be called up in four display levels by means of a sensor key. The Minocal® can be programmed to a customer-specific annual key date. In addition, the consumption values for 12 monthly key dates can be called up via the display.

A 20 cm cable connects the flow metering unit with the processing unit. This ensures trouble-free, separate assembly of the processing unit. A multi-jet design measuring capsule is used to measure the volume flow. It stands out primarily due to its dependable mode of operation, high level of measuring stability and extraordinary ease of assembly. When replacing the meter, only the heat meter needs to be replaced. The one-pipe connecting piece remains in the piping. Access to the pipeline system is not required. Fast, easy replacement is thus ensured and the costs can be lowered as well.

The one-pipe connecting piece can be equipped with an internal screw thread Rp 1/2 or Rp 3/4 as well as with an external screw thread G³/4 B or G1 B. The external screw thread version is also suitable for a soldered connection.



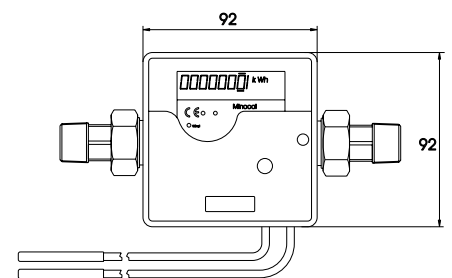
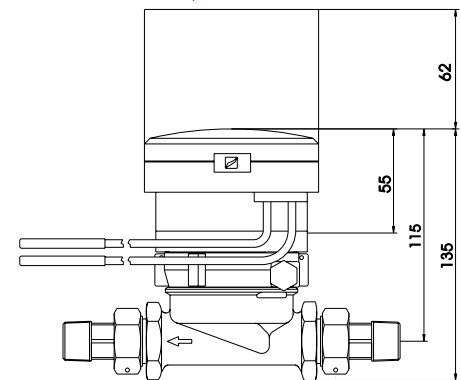
Display sequence (Main loop)





Overview of the performance features Minocal® Combi MK

- Nominal flow rate of 0,6/1,5/2,5 m³/h
- Total temperature range of 15°C - 150°C
- Temperature difference in the range of 3 K - 100 K
- Installation of the flow metering unit in the return flow line (optionally in forward flow line)
- Processing unit is removable from the flow metering unit
- Infrared interface for programming
- Type approval in accordance with metrological class C
- Reversible LCD multi-function display with 4 display levels
- Customer-specific annual key date and 12 monthly key dates
- Storage of maximum values of energy and flow with date
- Replaceable 6-year long-term battery
- Temperature sensor Pt500
- Symmetrical or asymmetrical installation of temperature sensor
- Installation of the sensors directly into the medium or in the immersion sleeve
- Optional M-bus interface with transmission of all measured values
- Also available in 2" type for the replacement of various external heat meter types
- Also available in single-jet design for cramped installation conditions



Technical data for processing unit with temperature sensors

Temperature range	15°C - 150°C
Temperature difference	3 K - 100 K
Display	LCD-multi-function display with 4 display levels
Display unit	kWh
Sensor technology	2-conductor technology
Temperature sensor	Pt500 (firmly attached), cable length 1.5 m, optional 3 m
Data interfaces	Infrared (standard), M -Bus (optional)
Key dates	Annual key date and 12 monthly key dates
Ambient class	C in accordance with DIN EN 1434
Power supply	Replaceable 6-year battery
EMC	Requirements in accordance with DIN EN 1434

Technical data for the flow metering unit (see MD1 page 9)



Minocal® split processing unit

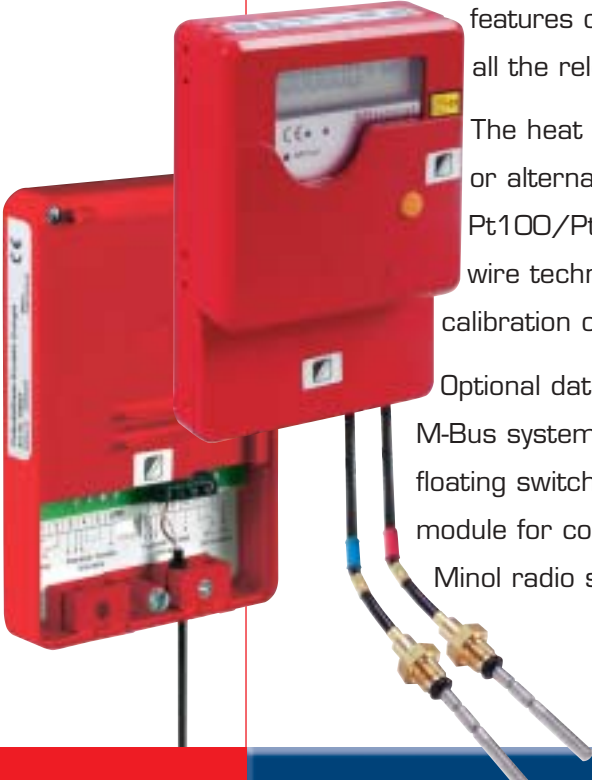


Minocal® split processing unit VR1

The Minocal® split processing unit makes available state-of-the-art electronic microprocessor intelligence for heat measurement in every measurement range. It can not only be combined with contact water meters for apartment use and multiple contact water meters for housing applications, but also with Woltman contact water meters for large-scale and district heating systems.

The split processing unit is available in four different versions. Impulse values of 1, 10, 25 and 250 litres per impulse permit precise flow measurement right across the measurement range spectrum.

The split processing unit from Minocal® offers all the performance features of the compact processing unit. Using a sensor key, here too all the relevant measured data can be accessed in four display loops.



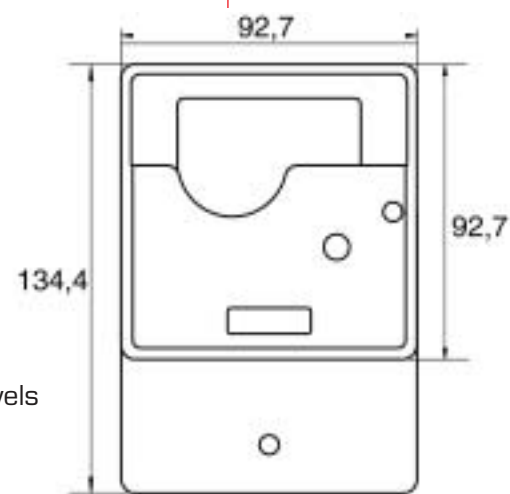
The heat meter processing unit is available with permanently connected or alternatively with exchangeable platinum temperature sensors Pt100/Pt500 with cable lengths of 3 m and 10 m (making use of 4-wire technology). Exchangeable temperature sensors permit separate calibration of the processing unit and the temperature sensors.

Optional data interfaces permit the processing unit to be integrated into M-Bus systems. Energy and volume data can be read out remotely via floating switching contacts at any time using a retrofittable supplementary module for connection to external data acquisition systems, for example the Minol radio system.



Performance features of the Minocal® split processing unit

- Processing unit for split heat meters of any optional size
- Temperature range 5°C - 150°C
- Temperature differential in the range from 2 K – 100 K
- Installation of the flow metering units in the return flow line (optionally in the forward flow line)
- Infrared interface for data communication
- LCD multifunction display with switchover function and 4 display levels
- Customer-specific annual key date and 12 monthly key dates
- Exchangeable 6-year long-life battery
- Temperature sensor Pt100/Pt500 using 2 and 4-wire technology
- Temperature sensor permanently connected, alternatively exchangeable
- Installation of sensors directly in the medium or in an immersion sleeve
- Optional data interfaces for M-Bus, contacts, analogue outputs

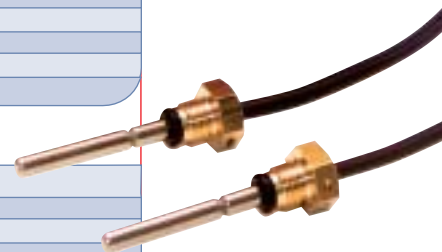


Specifications for the split processing unit

Purpose	Split unit for split heat meters
Temperature range	5°C - 150°C
Temperature differential	3 K - 100 K (2 K - 100 K with permanently connected temperature sensors)
Display	LCD multifunction display with 4 display levels
Display units	kWh / MWh
Flow metering unit interface	Models with contact transmitter or active impulse output
Temperature sensor	Pt500, optionally Pt100 (permanently connected, optionally exchangeable)
	Cable length 3 m, optionally 10 m (4-wire technology)
Data interfaces	Infrared (standard), M-Bus, contacts (energy and volume)
Key date	Annual key date and 12 monthly key dates
Ambient class	C as per DIN EN 1434
Power supply	Exchangeable 6-year battery
EMC	Requirements as per DIN EN
Dimensions (mm)	92.7 x 134.4 x 40 (W x H x D)

Specifications for the temperature sensor

Sensor type	Platinum resistance thermometer Pt100 / Pt500
Standard	DIN EN 751 Class B
Temperature range	5°C - 150°C
Cable lengths	3 m, 10 m
Cable technology	2-wire technology, alternatively 4-wire technology
Installation method	directly in the medium (e.g. ball stop valve) or in an immersion sleeve





Flow metering units 0.6 – 2.5



Multi-jet impeller meter MD1 in measuring capsule design

The Minocal® split measuring capsule MD1 works according to the multi-jet principle. The advantage of this system lies in the uniform load of the impeller, which also provides a high level of measuring stability and measuring precision as well as running smoothness.

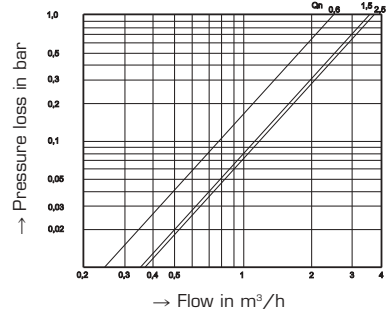
The measuring capsule is connected to the Minocal® split processing unit with a 3 m impulse cable. As an alternative, the measuring capsule can be equipped with a 10 m cable at the factory. The multi-jet impeller meter MD1 is available for nominal flow rates of 0,6, 1,5 and 2,5 m³/h.



The one-pipe connecting piece (EAS) can be equipped with an internal screw thread Rp 1/2 or Rp 3/4 as well as with an external screw thread G 3/4 B or G1 B. The EAS (one-pipe connecting piece) with external screw thread also allows for solder assembly in conduits of 18 or 22 mm pipe diameter.

The one-pipe connecting piece (EAS) also remains permanently in the pipe in the case of the Minocal® split MK design. Thus even in the case of a later replacement of the MD1, access to the pipeline system is not required. This makes even the split design of the Minocal particularly easy to assemble.

Pressure drop diagram for the impeller multi-jet meter MD1





Technical data for the impeller multi-jet water meter MD1

Type designation		0.6 MK	1.5 MK	2.5 MK
Nominal flow rate	Qn m ³ /h	0.6	1.5	2.5
Metrological classes in accordance with typeapproval				
- horizontal fitting position		A - C	A - C	A - C
- vertical fitting position		A - B	A - C	A - C
Lower measurement range limit				
- Class A Qmin	l/h	24	60	100
- Class B Qmin	l/h	12	30	50
- Class C Qmin	l/h	6	15	25
Reaction times				
- Horizontal fitting position	l/h	3	5	7
- Vertical fitting position	l/h	4	7	10
Flow rate at 0.1 bar pressure loss	m ³ /h	0.4	1.1	1.7
Pressure stage PN	bar	16	16	16
Temperature range	°C		10 - 90	

The impeller multi-jet water meter MD1 is also available in 2" type for the replacement of various external meter types.



Impeller multi-jet water meter MD1 and Minocal® processing unit WR1

Multiple-jet principle for stable measurement

Multiple-jet contact water meter

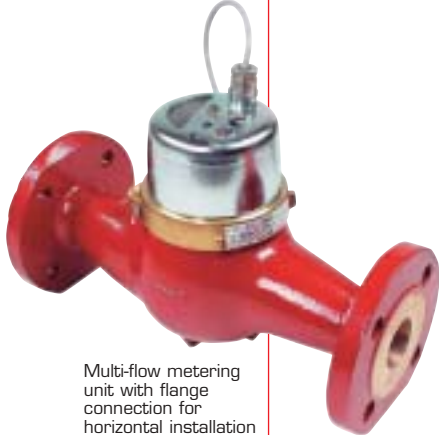
For Minocal® 3.5 – 15, multiple-jet contact water meters are used. The multiple-jet impeller meter is a completely dry runner designed with a carbide bearing for the impeller and a magnetic coupling. Impulse transmission of the flow values takes place using a reed contact. The multiple-jet contact water meter offers the benefit that an even load is applied on the impeller, making this meter largely insensitive to faults on the inlet and outlet side. Meters designed for horizontal mounting comply with the connecting and construction dimensions stipulated by DIN ISO 4064. The operating pressure PN 16 complies with DIN 2401 (PN 25 and 40 on request) and the flange measurements correspond to DIN 2501. Rising or down pipe (vertical mounting) version meters come with connection and construction dimensions in accordance with DIN 19648 Part 3.



Multi-jet flow metering unit for horizontal installation

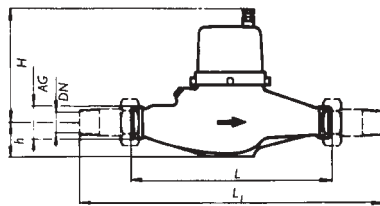


Multi-jet flow metering unit for installation in ascending and descending pipes

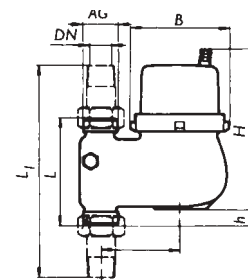


Multi-flow metering unit with flange connection for horizontal installation

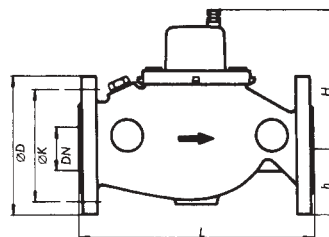
3.5 – 10 M-TX



3.5 – 10 M-TSX/TFX

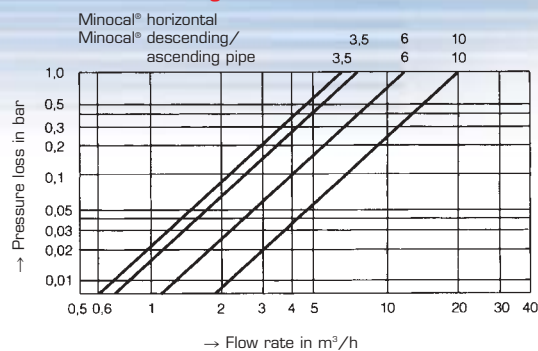


3.5 - 15 M-TXFL

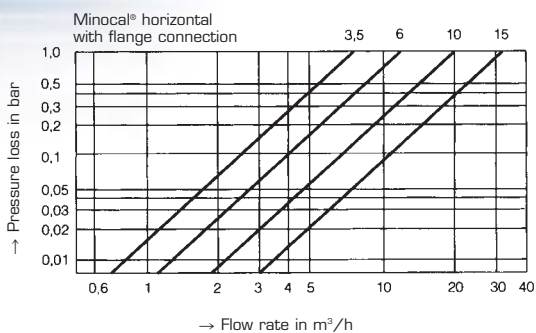




Pressure loss diagram



Pressure loss diagram



Specifications of the multi-jet contact water meter

Type designation M-TX und M-TX flange	3.5	6	10	15	3.5 F/S	6 F/S	10 F/S
Fitting position	horizontal				vertical F = descending pipe S = ascending pipe		
Nominal width DN	25	25	40	50	25	25	40
Nominal flow rate Q _n m ³ /h	3.5	6	10	15	3.5	6	10
Flow rate m ³ /h for 0.1 bar pressure loss	2.2	3.8	6.3	9.5	2.2	3.8	6.3
Maximum flow rate short term Q _{max} m ³ /h	7	12	20	30	7	12	20
Cut off point Q _t m ³ /h	0.35	0.6	1.0	1.5	0.35	0.6	1.0
Lower measurement range limit Q _{min} l/h	65	90	160	200	65	90	160
Reaction times l/h	25	35	60	90	25	35	60
Operating pressure PN according to DIN 2401 ¹⁾	bar	16	16	16	16	16	16 16
Temperature-load max. °C	120	120	120	120	120	120	120
Connecting thread on meter AG	G 1 1/4 B	G 1 1/4 B	G 2 B	-	G 1 1/4 B	G 1 1/4 B	G 2 B
Length L mm	260	260	300	270	150	150	200
Length with screw connection LI mm	378	378	438	-	268	268	338
Height H mm	140	140	155	180	140	140	160
Height h mm	45	45	50	83	22	22	46
Width A mm	-	-	-	-	95	95	120
Width B mm	102	102	137	166	102	102	136
Flange-diameter mm	115	115	150	165	-	-	-
Flange hole diameter mm	85	85	110	125	-	-	-
Weight kg	4.4	4.4	7.1	14.5	4.6	4.6	7.5

¹⁾ PN 25 and PN 40
(for horizontal installation)
upon request

Selection of immersion sleeve
according to pipe dimension
at installation point,
installation depth
recommended to middle of
pipe in accordance with
DIN EN.



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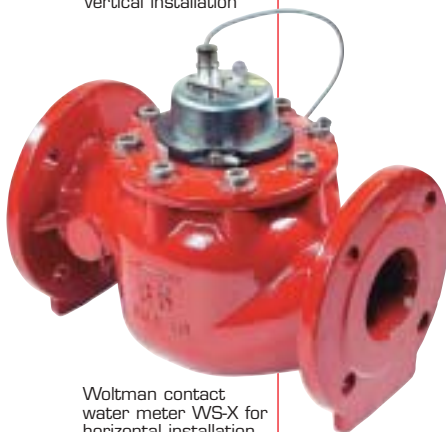
Outstanding measurement accuracy even under extreme loads



Woltman contact water meter WP-X for horizontal and vertical installation



Woltman contact water meter WP-X for horizontal and vertical installation



Woltman contact water meter WS-X for horizontal installation

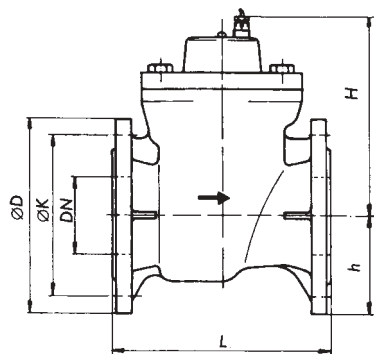
Woltman contact water meters

Woltman contact water meters are characterized by extremely low start-up values coupled with high measurement accuracy and excellent measuring stability even when subjected to extreme loads. This applies both to the upper and the lower measurement ranges. The impeller is mounted in a sapphire ring and carbide bearing, affording easy exchangeability of the measuring insert.

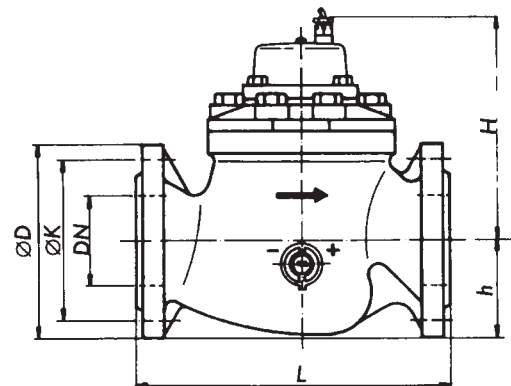
The meters are available in two different versions:

- WS-X for mounting in horizontal pipes. This meter type is particularly suitable for use with highly fluctuating flow rates in heating circuits with variable volumetric flow. Its outstanding benefit is a substantially increased measurement range for low flow rates. The meter has type approval for metrological class C.
- WP-X for horizontal or vertical mounting. This meter type is characterized by high loading capacity with low pressure drop, a short overall length and a low weight. It is ideal for use in heating circuits with almost constant volumetric flow rates (secondary heating circuits).

15 – 150 WP-X



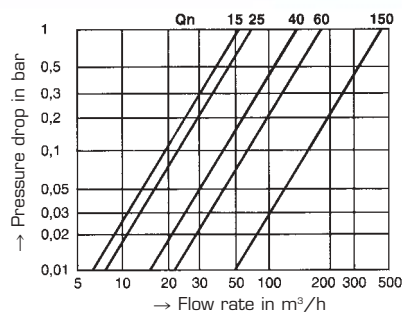
15 – 150 WS-X



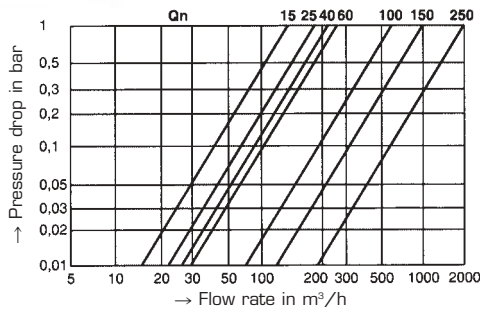


Pressure drop diagrams

Minocal WS-X, horizontal mounting



Minocal WP-X, optional mounting



Specifications for the Woltman contact water meter

Type designation	Minocal 15 - 150 WS-X					Minocal 15 - 150 WP-X					
	15	25	40	60	150	15	25	40	60	100	150
Mounting position	horizontal					optional					
Nominal width DN	50	65	80	100	150	50	65	80	100	125	150
Nominal flow rate Q	15	25	40	60	150	15	25	40	60	100	150
Flow rate with a 0.1 bar pressure drop	19	21	42	70	160	40	70	85	95	200	310
Maximum short-term flow rate Qmax	50	50	110	140	350	70	100	150	180	250	350
Cut-off point Qt	1.5	1.5	1.6	2.4	22.5	2.25	3.75	6	9	15	22.5
Lower measurement range limit Qmin	0.2	0.2	0.3	0.4	2	0.6	1.6	1.6	2	3	4.5
Start-up values	60	60	90	90	1000	250	250	500	500	-	-
Operating pressure PN as per DIN 2401 ¹⁾	16	16	16	16	16	16	16	16	16	16	16
Temperature stress max. ²⁾	120	120	120	120	120	120	120	120	120	120	120
Height H	155	155	190	226	400	200	200	200	200	200	217
Height h	84	97	102	116	155	75	80	92	110	125	145
Length L	270	300	300	360	500	200	200	225	250	250	300
Flange-diameter D	165	185	200	220	285	165	185	200	220	250	285
Flange hole diameter K	125	145	160	180	240	125	145	160	180	210	240
No. of screws	4		8			4		8			
Weight ³⁾	14.2	18	25.5	31.5	79.5	14.3	15.5	18.2	19.8	22.4	32.5

Selection of immersion sleeve depending on pipe dimension at the mounting location, mounting depth to centre pipe in accordance with DIN EN 1434 recommended.

Required

steadying zones:

- between the hot water filter and Woltman meter on the inlet side $\geq 5 \times \text{DN}$
- between the water meter and the shut-off valve on the outlet side $\geq 2 \times \text{DN}$ in the nominal width of the meter

¹⁾ Operating pressure PN 40 on request

²⁾ 130°C optional

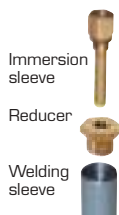
³⁾ Weights for complete heat meter including electronic processing unit and mounting components



Meter installation

Mounting accessories for sensor installation

Immersion sleeve set with welding sleeve



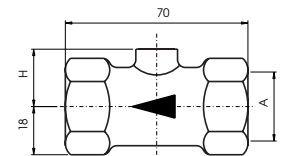
DN	PIPE EXTERNAL DIAMETER mm	IMMERSION SLEEVE mm	WELDING SLEEVE mm SIZE
15	20 - 23	L80	4
20 - 25	25 - 35	L80	3
32 - 50	40 - 65	L80	2
65 - 100	75 - 120	L150	1
150	125 - 170	L150	0

Immersion sleeve housing with soldered connection (immersion sleeve length L50)



SOLDERED CONNECTION A mm	Length L mm	Height H mm	Height H1 mm
18 ¹⁾	70	24	18
22	70	22	18

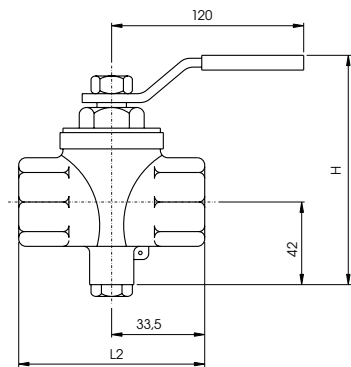
¹⁾ Löt 15 mit Reduzierstücken möglich



Immersion sleeve housing with threaded connection (immersion sleeve length L50)



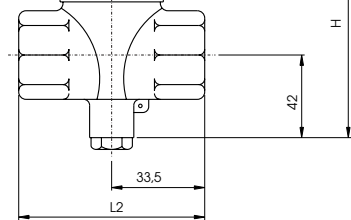
THREADED CONNECTION A Inch	Length L mm	Height H mm	Height H1 mm
Rp 1/2	70	22	18
Rp 3/4	70	18.5	18



Ball valve with M10 connection for temperature sensor



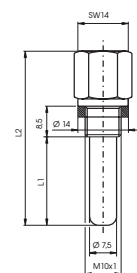
THREADED CONNECTION Inch	Length L2 mm	Height H mm
Rp 1/2	63	81
Rp 3/4	63	81
Rp 1	75	75



Immersion sleeves



TYPE	Length L1 mm	Length L2 mm
L50	24.5	48.2
L60	34.5	58.2
L80	55.0	78.7
L150	124.5	148.2



Assembly accessories for Minocal 3.5 – 150 as well as other accessories upon request.



Accessories for meter installation

One-pipe connecting piece EAS

CONNECTION	G 3/4 B SOLDER 18	G1B SOLDER 22	RP 1/2	RP 3/4
L	110 139	130		110
H1	28.5	28.5		28.5
H2	18.0	18.0		18.0



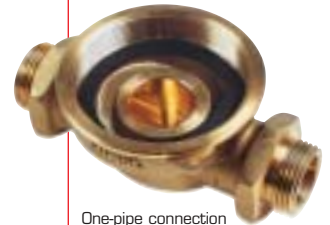
Wall mounting set for compact processing unit



Socket wrench

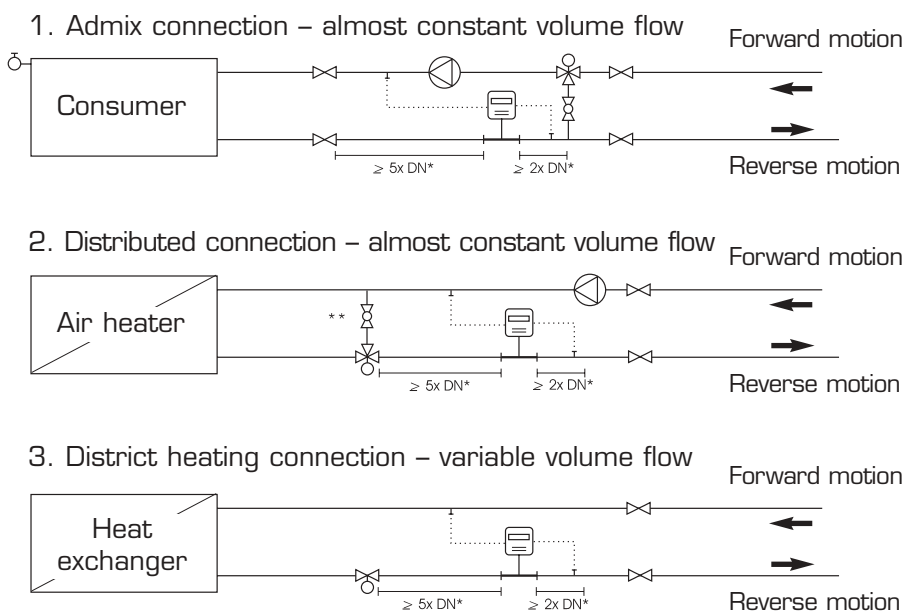


One-pipe connection piece EAS with internal screw thread



One-pipe connection piece EAS with external screw thread

Arrangement of heat measurement in regulating scheme



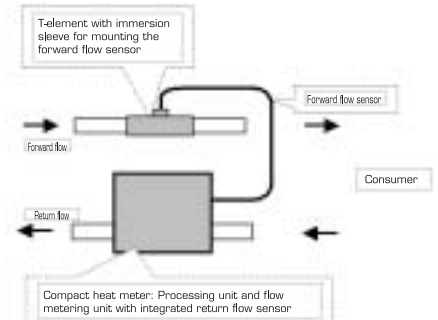
* Smoothing route in DN of meter for Woltman meter (design of meter from DN 50)

** Bypass at half throttle to about 6% from QN



Mounting variants

Non symmetrical



Symmetrical

