

# HYDRUS 2.0

## ULTRASONIC METER

**DIEHL**  
Metering



### APPLICATION

HYDRUS 2.0 is a static ultrasonic water meter designed for all applications of domestic cold water supply enabling accurate measuring with long-term stability under difficult conditions (no measurement of air and insensitive to sedimentation). Developed within the framework of the MID, it complies with the European regulations and holds sanitary conformity certificates (AoC DEU, ACS, WRAS and others). The integrated communication function supports meter data provision via mobile reading (walk-by/drive-by/passive drive-by) or fixed network (upgrade without on-site configuration). In combination with Diehl Metering's IZAR fixed network system, which stands out with excellent coverage, high data granularity and timeliness will be maintained. This is what makes it a high responsive infrastructure to take actions immediately. The integrated LoRaWAN® communication enables private or public operated fixed network reading.

### FEATURES

- ▶ DN 15 to 50
- ▶ MID approved with dynamic range up to R 800
- ▶ IP 68 suitable for outdoor installations
- ▶ Integrated radio communication based on Open Metering telegram
- ▶ OMS over LoRaWAN® for fixed Network with wM-Bus for mobile network
- ▶ M-Bus/Pulse/Pulse, wM-Bus, wM-Bus along with L-Bus/Pulse
- ▶ Display with error and alarm codes including leakage detection
- ▶ Battery lifetime up to 16 years
- ▶ U0 / D0, no need for calming sections

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### GENERAL

HYDRUS 2.0		
Medium temperature range	°C	+0.1 ... +90
Ambient operating temperature	°C	-10 ... +55
Ambient storage temperature	°C	-10 ... +70 (>35 °C max. 4 weeks)
Environmental class		O (Outdoors)
Mechanical environmental class		M2
Electromagnetic environmental class		E2
Housing material		With thread connection: CW724R (lead-free); with flange connection: CC770S
Nominal pressure	PN bar	16
Power supply		Two 3.6 VDC lithium batteries
Battery lifetime T30 <sup>1</sup> /T50 <sup>1</sup>		Up to 16 years
Battery lifetime T70 <sup>1</sup> /T90 <sup>1</sup>		Up to 16 years
Communication interfaces		Optical, OMS wM-Bus / Long range radio (R4, R4+, mioty® for Metering) 434 or 868 MHz, M-Bus, L-Bus and Pulse, LoRaWAN® 868 MHz
Data storage		For errors, alarms and measuring values, data logging capabilities to record up to 1024 daily values +32 monthly values and two annual due dates
Protection class		IP 68

<sup>1</sup> Depends on the sending interval of the radio telegram, the telegram length and the ambient temperature at the installation

### TECHNICAL DATA DISPLAY

HYDRUS 2.0	
Display indication	LCD, 9-digit, additional symbols/display counter/unit
Units displayed DN 15 - DN 50	Volume (m <sup>3</sup> + 3 decimal places) and flow rate (m <sup>3</sup> /h + 3 decimal places)
Values displayed	Display test - volume - battery lifetime - firmware version - software checksum - flow - current/continuous/historical error - alarm status - high resolution volume - due date - due date volume - reverse volume - display counter - low battery indication - leakage indication - metrological log access - radio signal ON/OFF - alarm indication - billing value indication - and more display loop options to choose from.

### INTERFACES - OVERVIEW

HYDRUS 2.0	
Optical	For switching the display loop and configuring / reading the meter via IZAR@MOBILE
wM-Bus (R3)	434 or 868 MHz, Open Metering radio as standard (R3) for mobile reading sent every 14 / 64 seconds (default)
Long range radio R4 / R4+ / mioty® for Metering	434 or 868 MHz, OMS for fixed network sent every 5 / 15 / 60 minutes
LoRaWAN®	868 MHz - OMS over LoRaWAN® for fixed network sent every 3 h / 5 h / 6 h (default) and OMS wM-Bus for mobile network sent every 64s (default); Complies to v1.0.3, certified to v1.0.2, Class A, supports Adaptive data rate (ADR)
M-Bus	2400 baud, cable length 1.5 m, power supply only via built-in battery - can be combined with two Pulse outputs
L-Bus	In combination with radio, cable length 1.5 m (only one interface communicating at the same time)
Pulse (Open drain)	Two Pulse outputs, or one Pulse and one L-Bus output, Pulse cable length 1.5 m

### SECURITY

HYDRUS 2.0	
wM-Bus (R3), R4, R4+, mioty® for Metering	OMS Generation 3 or OMS Generation 4 Profile B, selectable
LoRaWAN®	Fixed Network uses internal LoRaWAN® transport encryption; Mobile Network uses OMS Generation 4 Profile B Individual keys

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### PRIVACY

The HYDRUS 2.0 saves 1024 consumption values with a daily interval. This data can be read locally and accessed only by using the IZAR@MOBILE. As a second logging, a small amount of 32 consumption values can be stored. The HYDRUS 2.0 has a minimal sending interval of about 14 seconds and uses the OMS Generation 3 (not available with radio meters with C1 mobile mode or LoRaWAN®/C2) or 4, Profile B security level. Both, the radio protocol and the optical interface are encrypted by default.

### VOLUME / PULSE OPEN DRAIN

HYDRUS 2.0		
Max. input voltage	V	30
Max. input current	mA	27
Max. voltage drop at active output	V/mA	2/27
Max. current through inactive output	µA/V	5/30
Max. reverse voltage without destroying outputs	V	6 (in case current does not exceed 27 mA)
Pulse rates	l/pulse	Decadic 1 / 10 (depending on nominal diameter)
Pulse output 1 variants		Total volume or forward volume
Pulse output 2 variants		Flow direction or error, reverse volume
Pulse frequency		Max. frequency 10 Hz
Pulse width		50 - 125 ms

### POSSIBLE COMMUNICATION INTERFACES

HYDRUS 2.0	
wM-Bus/Pulse/L-Bus	3 wire
wM-Bus only	without wire
R4 / R4+ / mioty® for Metering	without wire
LoRaWAN® and OMS radio	without wire
M-Bus only	2 wire
M-Bus/Pulse/Pulse	5 wire
Pulse/Pulse	3 wire

### REACH

Information pursuant to Article 33 (1) of Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006:

This product series contains components with the following substances in a concentration of more than 0.1% weight by weight (w/w):

- Lead (only for the flange variants) - (CAS no.: 7439-92-1)
- Lead titanium zirconium oxide (CAS no.: 12626-81-2)

# HYDRUS 2.0 DN 15 - 20

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### TECHNICAL DATA

Nominal diameter	DN	mm	15	15	20 <sup>3</sup>	20	20
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	2.5	2.5	2.5	2.5	2.5
Overall length	L	mm	110	165	105	130	190
Dynamic (Q <sub>3</sub> /Q <sub>1</sub> )	R		800	800	400	800	800
Overload flow rate	Q <sub>4</sub>	m <sup>3</sup> /h	3.125	3.125	3.125	3.125	3.125
Transitional flow rate	Q <sub>2</sub>	l/h	5	5	10	5	5
Minimum flow rate	Q <sub>1</sub>	l/h	3.13	3.13	6.25	3.13	3.13
Starting flow rate		l/h	1.4	1.4	1.4	1.4	1.4
Pressure loss at Q <sub>3</sub>		bar	0.46	0.46	0.16	0.4	0.4
Pressure loss at Q <sub>4</sub>		bar	0.72	0.72	0.25	0.63	0.63
Maximum flow rate <sup>2</sup>	Q <sub>high</sub>	m <sup>3</sup> /h	4.37	4.37	7	4.37	4.37
Flow rate at ΔP = 1 bar			3.69	3.69	6.3	3.95	3.95

Nominal diameter	DN	mm	20 <sup>4</sup>	20	20	20
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	4	4	4	4
Overall length	L	mm	105	130	165	190
Dynamic (Q <sub>3</sub> /Q <sub>1</sub> )	R		400	800	800	800
Overload flow rate	Q <sub>4</sub>	m <sup>3</sup> /h	5	5	5	5
Transitional flow rate	Q <sub>2</sub>	l/h	16	8	8	8
Minimum flow rate	Q <sub>1</sub>	l/h	10	5	5	5
Starting flow rate		l/h	3.0	2.5	2.5	2.5
Pressure loss at Q <sub>3</sub>		bar	0.55	0.4	0.4	0.4
Pressure loss at Q <sub>4</sub>		bar	0.86	0.63	0.63	0.63
Maximum flow rate <sup>2</sup>	Q <sub>high</sub>	m <sup>3</sup> /h	7	7	7	7
Flow rate at ΔP = 1 bar			5.39	5.39	5.39	5.39

<sup>2</sup> Outlet pressure minimum 3 bar, maximum 100 hours per year, closed pipeline network

<sup>3</sup> Available with non-return valve

<sup>4</sup> Only available without non-return valve

### APPROVAL

DN 15 - 20		
Approval		MID DE-19-MI001-PTB012
Dynamic range (Q <sub>3</sub> /Q <sub>1</sub> )	R	Up to 800
Standards		EN 4064, EN 14154, OIML R49
Sanitary conformity		AoC DEU, ACS, WRAS, Belgaqua, KIWA Netherlands, OTH, PZH, SVGW
LoRaWAN® certification		1.0.2

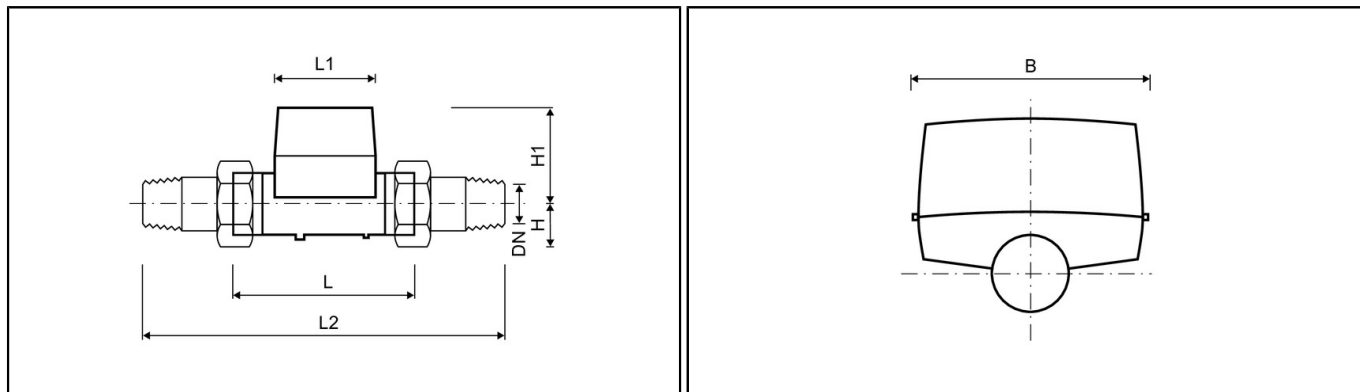
### DYNAMIC RANGE (R=Q<sub>3</sub>/Q<sub>1</sub>)

DN 15 - 20		
Q <sub>3</sub> 2.5 m <sup>3</sup> /h - T30 / T50	R	160; 800 (400 for L 115 mm)
Q <sub>3</sub> 2.5 m <sup>3</sup> /h - T70 / T90	R	160; 400; 800H / 400 V (250 for L 115 mm)
Q <sub>3</sub> 4 m <sup>3</sup> /h - T30	R	160; 400; 800 (630 for L 105 mm and 115 mm)
Q <sub>3</sub> 4 m <sup>3</sup> /h - T50 / T70 / T90	R	160; 400; 800H / 400V (630H for L 105 mm and 115 mm)

# HYDRUS 2.0 DN 15 - 20

## ULTRASONIC METER

### DIMENSIONS

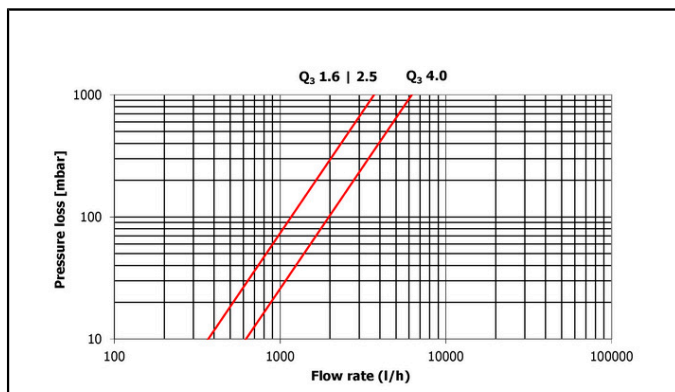


Nominal diameter	DN	mm	15	15	20 <sup>3</sup>	20	20
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	2.5	2.5	2.5	2.5	2.5
Overall length	L	mm	110	165	105	130	190
Counter length	L1	mm	89	89	89	89	89
Counter width	B	mm	89	89	89	89	89
Overall length with coupling	L2	mm	190	245	205	230	290
Connection thread on meter		Inch	G <sup>3</sup> / <sub>4</sub> B	G <sup>3</sup> / <sub>4</sub> B	G1B	G1B	G1B
Connection thread of coupling		Inch	R <sup>1</sup> / <sub>2</sub>	R <sup>1</sup> / <sub>2</sub>	R <sup>3</sup> / <sub>4</sub> <sup>5</sup>	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>
Height	H1	mm	71	71	74	74	74
Weight without coupling (approx.)		kg	0.7	0.8	0.8	0.8	0.9
Weight with coupling (approx.)		kg	1.1	1.2	1.2	1.2	1.3
Height	H	mm	18	18	21	21	21

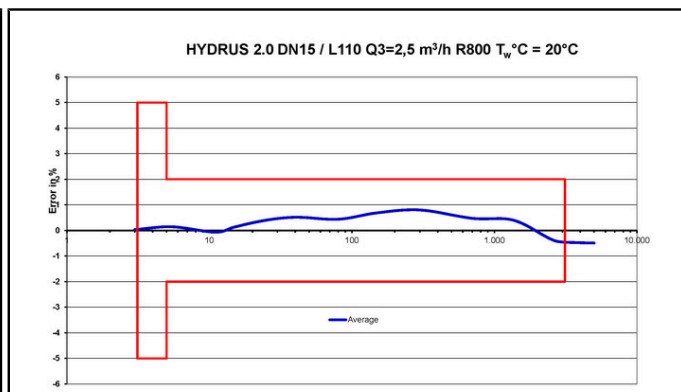
Nominal diameter	DN	mm	20 <sup>4</sup>	20	20	20
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	4	4	4	4
Overall length	L	mm	105	130	165	190
Counter length	L1	mm	89	89	89	89
Counter width	B	mm	89	89	89	89
Overall length with coupling	L2	mm	205	230	295	290
Connection thread on meter		Inch	G1B	G1B	G1 <sup>1</sup> / <sub>4</sub> B	G1B
Connection thread of coupling		Inch	R <sup>3</sup> / <sub>4</sub> <sup>5</sup>	R <sup>3</sup> / <sub>4</sub>	R1	R <sup>3</sup> / <sub>4</sub>
Height	H1	mm	74	74	74	74
Weight without coupling (approx.)		kg	0.8	0.8	1.0	0.9
Weight with coupling (approx.)		kg	1.2	1.2	1.6	1.3
Height	H	mm	21	21	27	21

<sup>5</sup> Wrench size should not be bigger than 38 mm

### PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph

Diehl Metering GmbH · Industriestrasse 13 · 91522 Ansbach · Germany  
 Phone: +49 981 1806-0 · Fax: +49 981 1806-615 · metering-germany-info@diehl.com · www.diehl.com/metering  
 Subject to technical adjustments

# HYDRUS 2.0 DN 25 - 50

## ULTRASONIC METER

### TECHNICAL DATA

Nominal diameter	DN	mm	25	25	25	25	25	32	40
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	6.3	6.3	6.3	10	10	10	10
Overall length	L	mm	135	150	260	150	260	260	200
Dynamic (Q <sub>3</sub> /Q <sub>1</sub> )	R		400	400	400	800	800	800	400
Overload flow rate	Q <sub>4</sub>	m <sup>3</sup> /h	7.87	7.87	7.87	12.5	12.5	12.5	12.5
Transitional flow rate	Q <sub>2</sub>	l/h	25.2	25.2	25.2	20	20	20	40
Minimum flow rate	Q <sub>1</sub>	l/h	15.8	15.8	15.8	12.5	12.5	12.5	25
Starting flow rate		l/h	5	5	5	5	5	5	8.7
Pressure loss at Q <sub>3</sub>		bar	0.22	0.22	0.22	0.54	0.54	0.33	0.22
Pressure loss at Q <sub>4</sub>		bar	0.34	0.34	0.34	0.84	0.84	0.53	0.34
Maximum flow rate <sup>2</sup>	Q <sub>high</sub>	m <sup>3</sup> /h	11.02	11.02	11.02	17.5	17.5	17.5	17.5
Flow rate at ΔP = 1 bar			13.43	13.43	13.43	13.43	13.43	10.95	21.32

Nominal diameter	DN	mm	40	40	40	50	50	50	50
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	10	16	16	16	16	25	25
Overall length	L	mm	300	200	300	270	300	270	300
Dynamic (Q <sub>3</sub> /Q <sub>1</sub> )	R		400	800	800	250	250	400	400
Overload flow rate	Q <sub>4</sub>	m <sup>3</sup> /h	12.5	20	20	20	20	31.25	31.25
Transitional flow rate	Q <sub>2</sub>	l/h	40	32	32	102	102	100	100
Minimum flow rate	Q <sub>1</sub>	l/h	25	20	20	64	64	62.5	62.5
Starting flow rate		l/h	8.7	8.7	8.7	25	25	25	25
Pressure loss at Q <sub>3</sub>		bar	0.22	0.2	0.2	0.14	0.14	0.33	0.33
Pressure loss at Q <sub>4</sub>		bar	0.34	0.31	0.31	0.22	0.22	0.52	0.52
Maximum flow rate <sup>2</sup>	Q <sub>high</sub>	m <sup>3</sup> /h	17.5	28	28	32.13	32.13	32.13	32.13
Flow rate at ΔP = 1 bar			21.32	36.0	36.0	44.0	44.0	44.0	44.0

<sup>2</sup> Outlet pressure minimum 3 bar, maximum 100 hours per year, closed pipeline network

### APPROVAL

DN 25 - 50	
Approval	MID DE-19-MI001-PTB012
Dynamic range (Q <sub>3</sub> /Q <sub>1</sub> )	R Up to 800
Standards	EN 4064, EN 14154, OIML R49
Sanitary conformity	AoC DEU, ACS, WRAS, Belgaqua, KIWA Netherlands, OTH, PZH, SVGW
LoRaWAN® certification	1.0.2

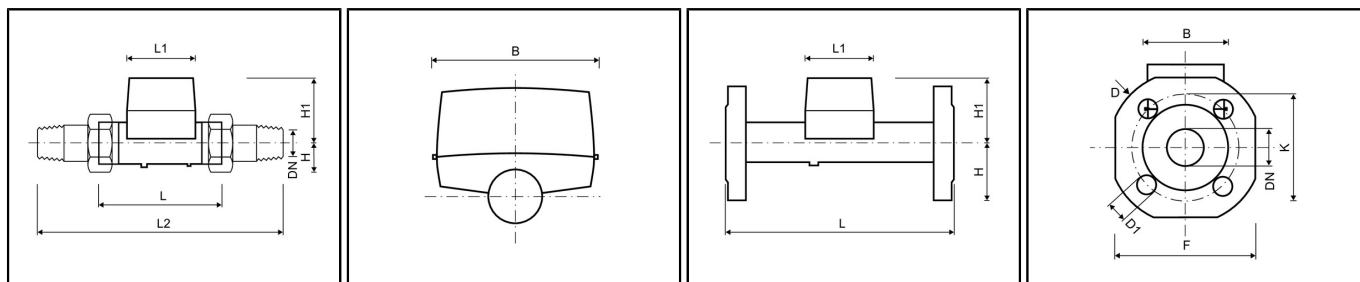
### DYNAMIC RANGE (R=Q<sub>3</sub>/Q<sub>1</sub>)

DN 25 - 50	
Q <sub>3</sub> 6.3 m <sup>3</sup> /h - T30	R 160; 400
Q <sub>3</sub> 6.3 m <sup>3</sup> /h - T50 / T70 / T90	R 160; 400H / 250V
Q <sub>3</sub> 10 m <sup>3</sup> /h - DN 25, DN 32 - T30	R 160; 400; 800
Q <sub>3</sub> 10 m <sup>3</sup> /h - DN 25, DN 32 - T50 / T70 / T90	R 160; 400; 800H / 400V
Q <sub>3</sub> 16 m <sup>3</sup> /h - DN 40 - T30	R 160; 400; 800
Q <sub>3</sub> 16 m <sup>3</sup> /h - DN 40 - T50 / T70 / T90	R 160; 400; 800H / 400 V
Q <sub>3</sub> 16 m <sup>3</sup> /h - DN 50	R 250
Q <sub>3</sub> 25 m <sup>3</sup> /h - DN 50	R 400

# HYDRUS 2.0 DN 25 - 50

## ULTRASONIC METER

### DIMENSIONS



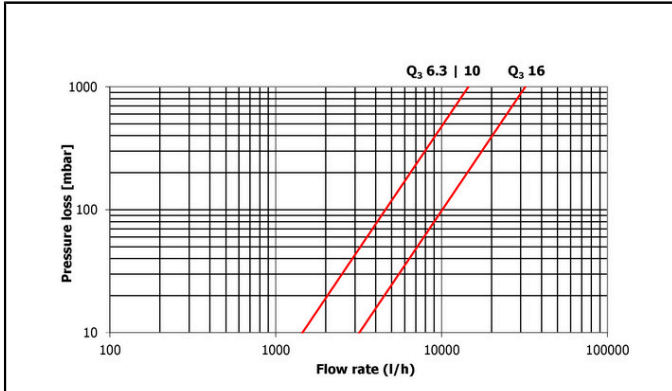
Nominal diameter	DN	mm	25	25	25	25	25	32	40
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	6.3	6.3	6.3	10	10	10	10
Overall length	L	mm	135	150	260	150	260	260	200
Counter length	L1	mm	89	89	89	89	89	89	96
Counter width	B	mm	89	89	89	89	89	89	89
DIMENSIONS - THREAD									
Overall length with coupling	L2	mm	255	270	380	270	380	380	340
Connection thread on meter		Inch	G1¼B	G1¼B	G1¼B	G1¼B	G1¼B	G1½B	G2B
Connection thread of coupling		Inch	R1	R1	R1	R1	R1	R1¼	R1½
Height	H1	mm	78	78	78	78	78	78	82
Weight without coupling (approx.)		kg	1.0	1.0	1.4	1.0	1.4	1.5	1.8
Weight with coupling (approx.)		kg	1.6	1.6	2.0	1.6	2.0	2.1	3.0
Height	H	mm	27	27	27	27	27	30	36
DIMENSIONS - FLANGE									
Flange diameter	D	mm	-	-	115	-	115	140	-
Hole circle diameter	K	mm	-	-	85	-	85	100	-
Number of screwholes		pcs	-	-	4	-	4	4	-
Screwhole diameter	D1	mm	-	-	14	-	14	18	-
Height	H	mm	-	-	50	-	50	62.5	-
Height	H1	mm	-	-	84	-	84	84	-
Width	F	mm	-	-	100	-	100	125	-
Weight with flanges (approx.)		kg	-	-	3.4	-	3.4	4.6	-
Nominal diameter	DN	mm	40	40	40	50	50	50	50
Permanent flow rate	Q <sub>3</sub>	m <sup>3</sup> /h	10	16	16	16	16	25	25
Overall length	L	mm	300	200	300	270	300	270	300
Counter length	L1	mm	96	96	96	92	92	92	92
Counter width	B	mm	89	89	89	94	94	94	94
DIMENSIONS - THREAD									
Overall length with coupling	L2	mm	440	340	440	390	420	390	420
Connection thread on meter		Inch	G2B	G2B	G2B	G2½B	G2½B	G2½B	G2½B
Connection thread of coupling		Inch	R1½	R1½	R1½	R2	R2	R2	R2
Height	H1	mm	82	82	82	90	90	90	90
Weight without coupling (approx.)		kg	2.6	1.8	2.6	3.9	4.05	3.9	4.05
Weight with coupling (approx.)		kg	3.8	3.0	3.8	5.5	5.65	5.5	5.65
Height	H	mm	36	36	36	41	41	41	41
DIMENSIONS - FLANGE									
Flange diameter	D	mm	148	-	148	-	-	-	-
Hole circle diameter	K	mm	110	-	110	-	-	-	-
Number of screwholes		pcs	4	-	4	-	-	-	-
Screwhole diameter	D1	mm	18	-	18	-	-	-	-
Height	H	mm	69	-	69	-	-	-	-
Height	H1	mm	87	-	87	-	-	-	-
Width	F	mm	138	-	138	-	-	-	-
Weight with flanges (approx.)		kg	6.3	-	6.3	-	-	-	-

Diehl Metering GmbH, Industriestraße 13 · 91822 Ansbach · Germany  
 Phone: +49 981 1806-0 · Fax: +49 981 1806-615 · metering-germany-info@diehl.com · www.diehl.com/metering  
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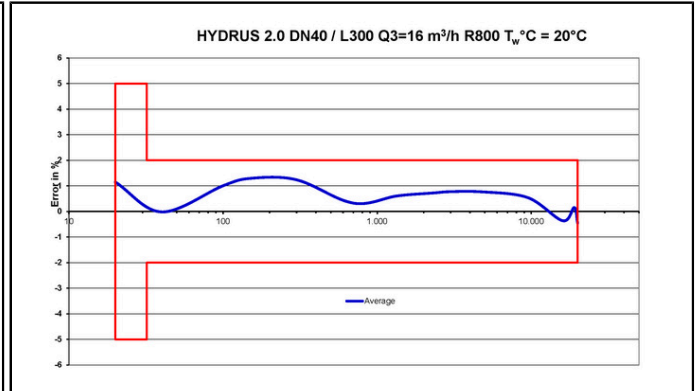
# HYDRUS 2.0 DN 25 - 50

## ULTRASONIC METER

### PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph