



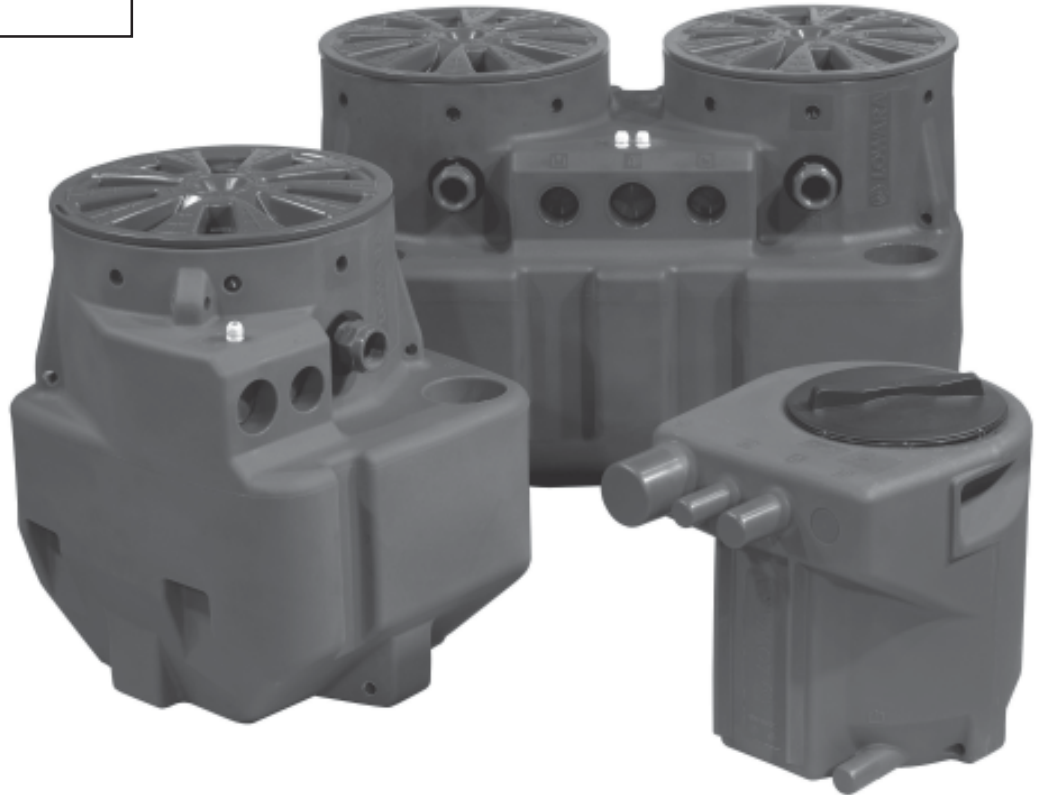
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MINIBOX, MIDIBOX SINGLEBOX PLUS, DOUBLEBOX PLUS Series

Prefabricated lifting stations
for wastewater in compliance
with the European legislation

50 Hz



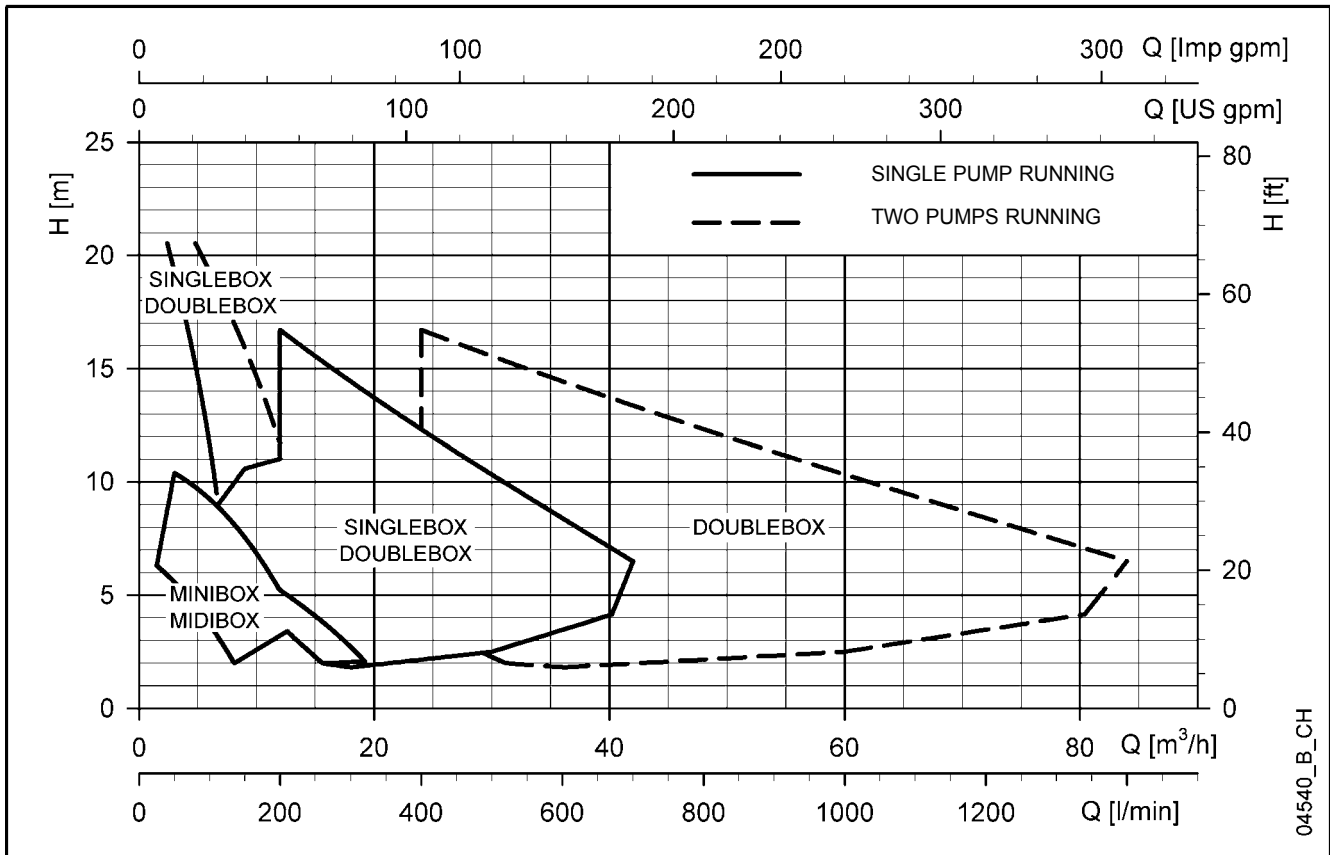
Engineered for life



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MINIBOX, MIDIBOX SINGLEBOX PLUS, DOUBLEBOX PLUS SERIES HYDRAULIC PERFORMANCE RANGE AT 50 Hz





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Prefabricated lifting stations for clear waters

MINIBOX Series



MARKET SECTORS

DOMESTIC.

APPLICATIONS

- Suitable for delivering clean water to main sewer lines located at a higher level, or where gravity drainage is not possible.

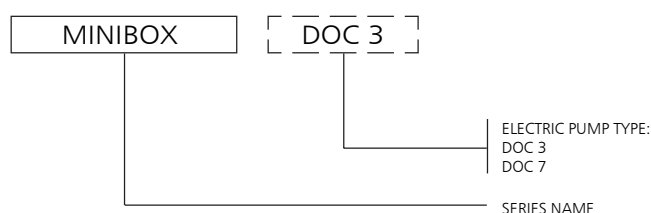
SPECIFICATIONS

- The station is equipped with:
 - **DOC submersible pump**, with flow rate up to 230 l/min and head up to 11 m. Passes suspended solids up to 10 mm diameter. Equipped with float switch for automatic operation.
 - 85 litres high density polyethylene **tank**.
 - 1"1/4 **flexible pipe** equipped with a check valve; left or right-hand connection.
 - **Power cord** outlet.
 - Three types of 40 mm diameter pipe inlets.
 - **Screens**.
 - **Basin** to be filled with sand or gravel to filter solid particles.
- The Minibox station can be equipped with a **DOC3** (0,25 kW rating) or a **DOC7** (0,55 kW rating).
- **Installation is quick and easy**: just connect the pipes and plug it in.
- Minibox can be installed on the floor or buried in a suitable structure (to withstand vehicle or foot traffic).

ACCESSORIES

- An **optional watertight lid** (substituting the screens) can be installed for indoor use.

IDENTIFICATION CODE



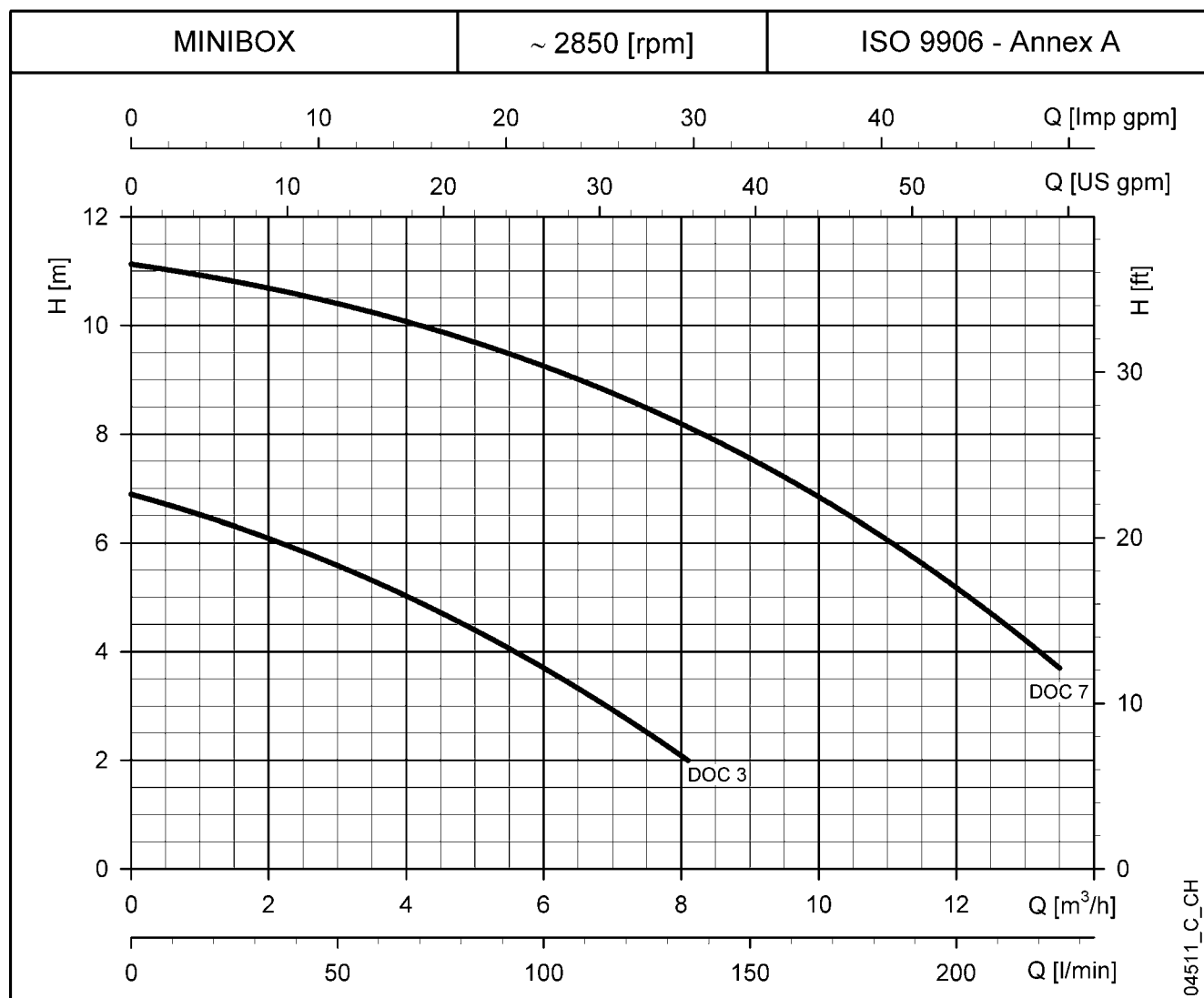
EXAMPLE : MINIBOX DOC 3
Lifting station MINIBOX series with DOC 3 submersible electric pump.



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MINIBOX SERIES OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

PUMP TYPE	RATED POWER		Q = DELIVERY								
			l/min	0	25	50	75	100	125	135	175
	m³/h	0	1,5	3	4,5	6	7,5	8,1	10,5	13,5	
	kW	HP	H = TOTAL HEAD METRES COLUMN OF WATER								
DOC3	0,25	0,33	6,9	6,3	5,6	4,7	3,7	2,5	2,0		
DOC7	0,55	0,75	11,1	10,8	10,4	9,9	9,3	8,5	8,1	6,5	3,7

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

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ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE		220-240 V	
	kW	A	$\mu\text{F} / 450 \text{ V}$
DOC 3	0,31	1,43	6,3
DOC 7	0,78	3,47	16

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE		220-240 V	380-415 V
	kW	A	A
-	-	-	-
-	-	-	-

*Maximum values within operating range.

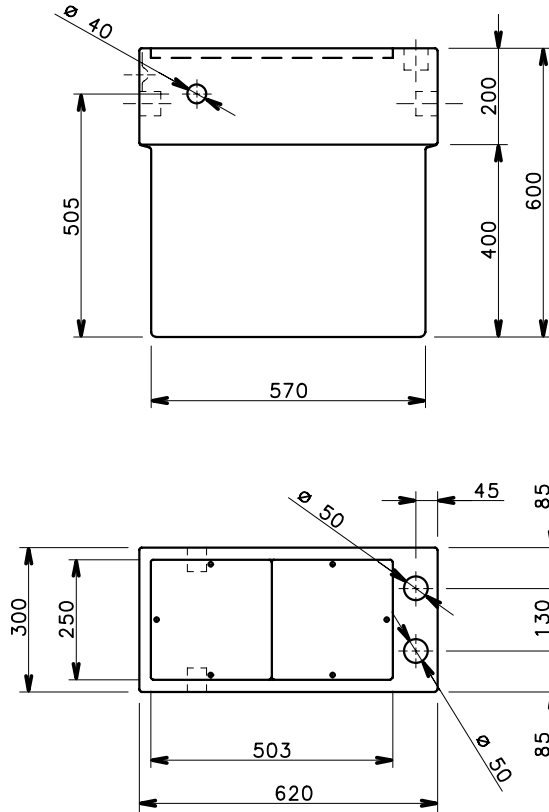
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MINIBOX SERIES DIMENSIONS AND WEIGHTS



MODEL	WEIGHT kg
MINIBOX (with pipes)	13
MINIBOX DOC3	18
MINIBOX DOC7	20

minibox-en_a_td

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Prefabricated lifting station for clean and gray water in compliance with EN 12050-2 standard

MIDIBOX Series



MARKET SECTORS

DOMESTIC.

APPLICATIONS

- Suitable for delivering clean and gray water to main sewer lines located at a higher level, or where gravity drainage is not possible.

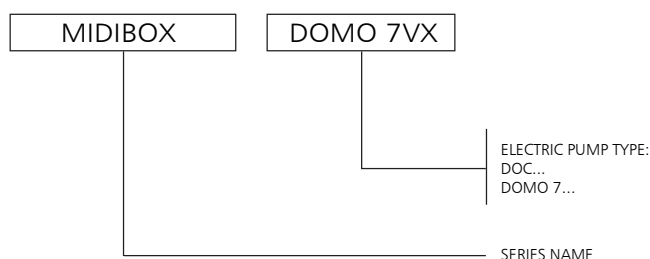
SPECIFICATIONS

- The station is equipped with:
 - Polyethylene **basin** with a capacity of 110 litres, equipped with a threaded cover.
 - **Cable glands** for power supply cables (and floats).
 - Rp 1 1/4 or 1 1/2 **delivery pipes** with fast connection and ring nut for easy disassembly of the pump.
 - **3 fast connections**:
 - 1 x DN110 for inlet,
 - 1 x DN50 for ventilation and
 - 1 x DN65 for cable connection.
 - **1 x DN50** fast connection for the manual pump.
 - **DOC or DOMO 7 submersible pump**, vortex or channel impeller type.
 - **QDR control panel** for three-phase versions.
- Versions with **vortex impeller** suitable for:
 - clean water, effluent, sewage containing suspended solids and fibres but non-faecal wastewater.
- Versions with **single or twin channel impeller** suitable for:
 - clean water, effluent, sewage not containing suspended fibres and faecal wastewater.
- **Midibox** can be installed on the floor or buried in a suitable structure following instructions in the "Instructions and Operative Manual".
- **Easy installation**:
 - installation is quick and easy: for the single-phase versions you just connect the pipes and the electrical cables; for the three-phase versions you also need to connect the control panel.
 - The new **Midibox** is provided side handles for ease of handling.
 - Pre-installed delivery pump and unions.
- **Ecological solution**:
 - tank made from 100% recyclable polyethylene.
- **Easy maintenance and repair**.
 - Tried and tested pump technology.
 - Pump quick and easy to remove thanks to the ring nut located near the cover.

ACCESSORIES

- Available accessories:
 - Ball check valves.
 - Alarm kit.
 - Connector kit.
 - Manual pump.

IDENTIFICATION CODE



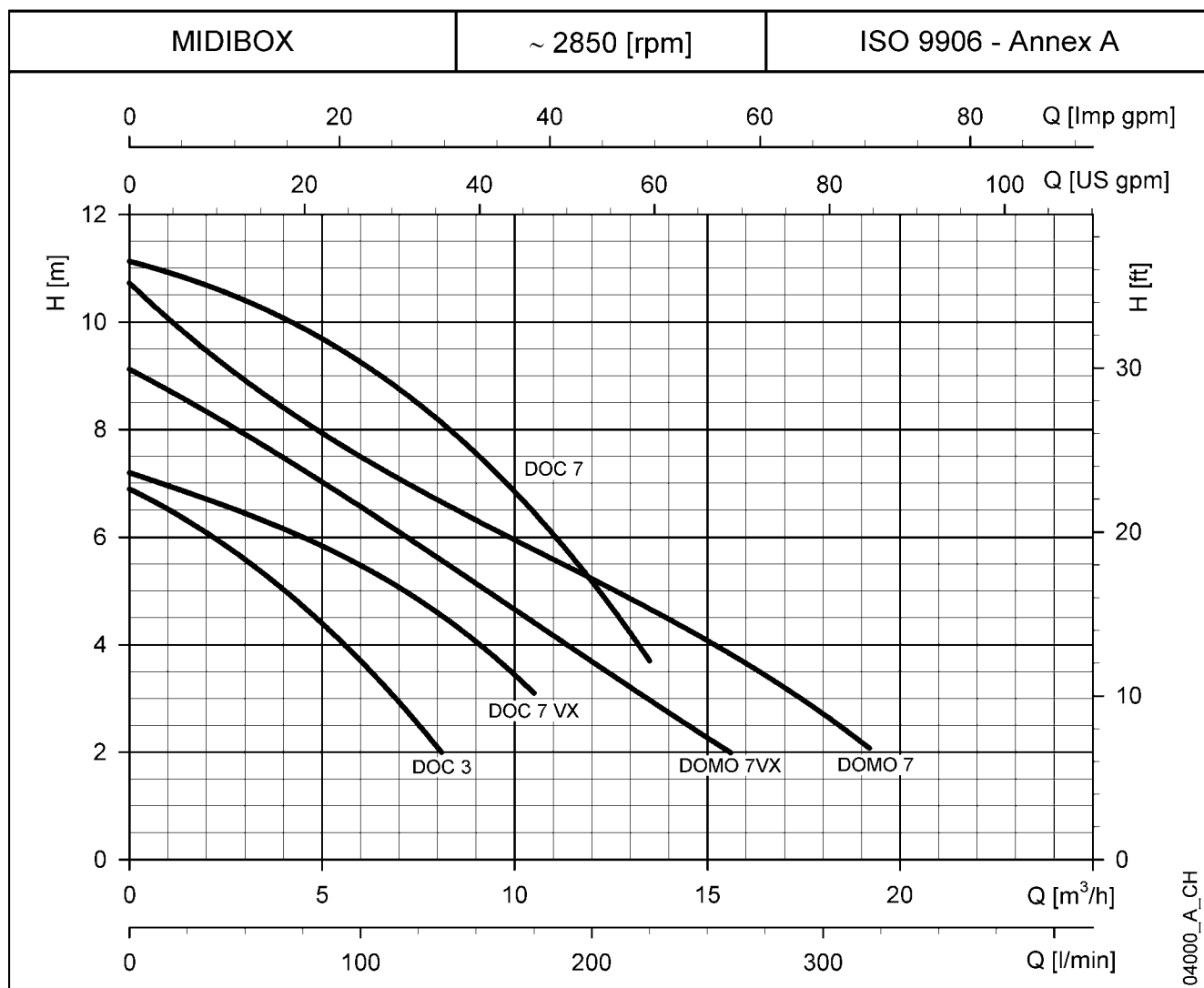
EXAMPLE : MIDIBOX DOMO 7VX
Lifting station MIDIBOX series with DOMO 7VX submersible electric pump.



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MIDIBOX SERIES OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

PUMP TYPE	RATED POWER		Q = DELIVERY									
			l/min	0	30	60	90	135	175	225	260	320
	m³/h	0	1,8	3,6	5,4	8,1	10,5	13,5	15,6	19,2		
	H = TOTAL HEAD METRES COLUMN OF WATER											
DOC 3	0,25	0,33	6,9	6,2	5,3	4,1	2,0					
DOC 7(T)	0,55	0,75	11,1	10,7	10,2	9,5	8,1	6,5	3,7			
DOC 7VX(T)	0,55	0,75	7,2	6,8	6,3	5,7	4,5	3,1				
DOMO 7(T)	0,55	0,75	10,7	9,6	8,6	7,8	6,7	5,8	4,7	3,8	2,1	
DOMO 7VX(T)	0,55	0,75	9,1	8,4	7,7	6,8	5,6	4,4	3,0	2,0		

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

midibox-2p50-en_a_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE		220-240 V	
	kW	A	$\mu\text{F} / 450 \text{ V}$
DOC 3	0,31	1,43	6,3
DOC 7	0,78	3,47	16
DOC 7VX	0,66	2,96	16
DOMO 7	0,8	3,94	16
DOMO 7VX	0,79	3,91	16

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE		220-240 V	380-415 V
	kW	A	A
-	-	-	-
DOC 7T	0,79	2,82	1,63
DOC 7VXT	0,66	2,68	1,55
DOMO 7T	0,73	2,58	1,49
DOMO 7VXT	0,71	2,56	1,48

*Maximum values within operating range

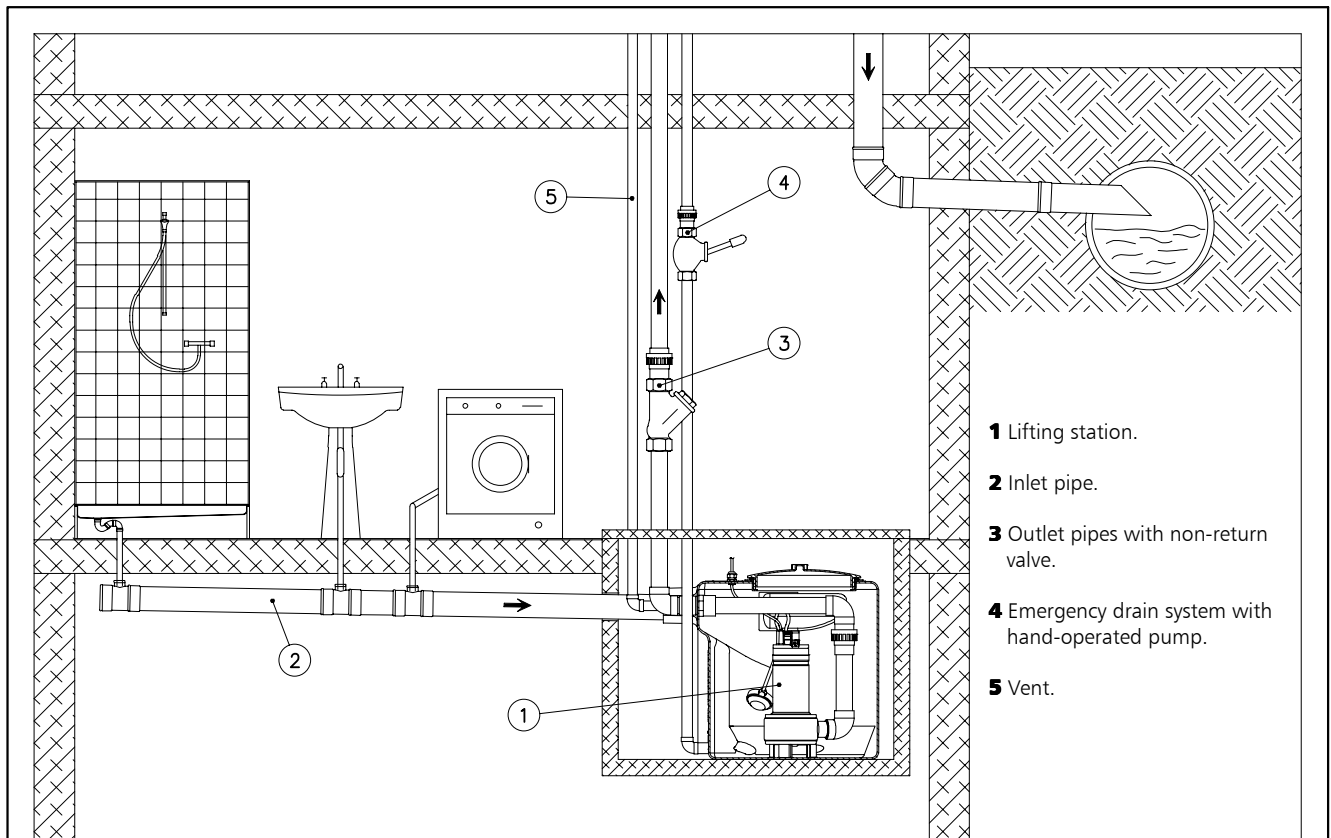
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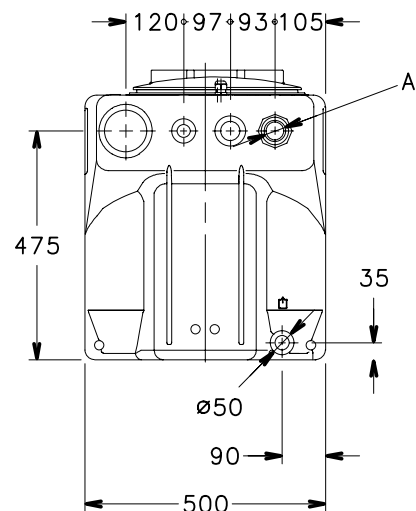
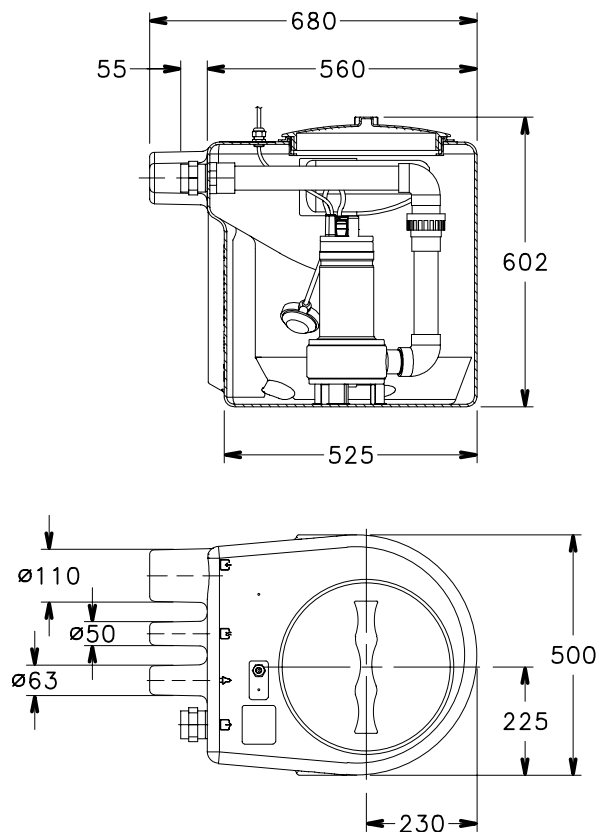
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MIDIBOX SERIES



DIMENSIONS AND WEIGHTS



MODEL	DIMENSIONS (mm)	WEIGHT kg
	A	
MIDIBOX DOC3	Rp 1" 1/4	13
MIDIBOX DOC7(T)	Rp 1" 1/4	16
MIDIBOX DOC7VX(T)	Rp 1" 1/4	16
MIDIBOX DOMO7(T)	Rp 1" 1/2	20
MIDIBOX DOMO7VX(T)	Rp 1" 1/2	20

midibox-en_a_td

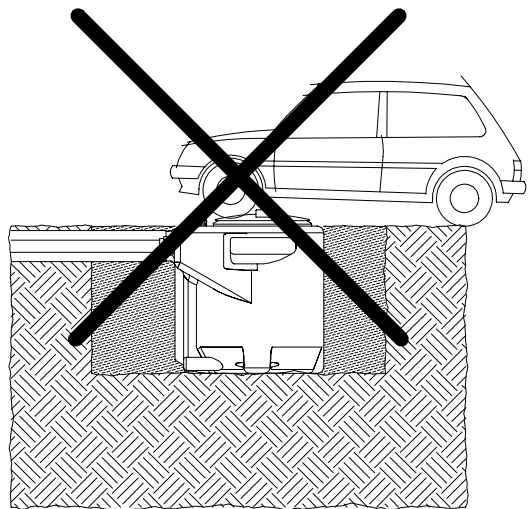
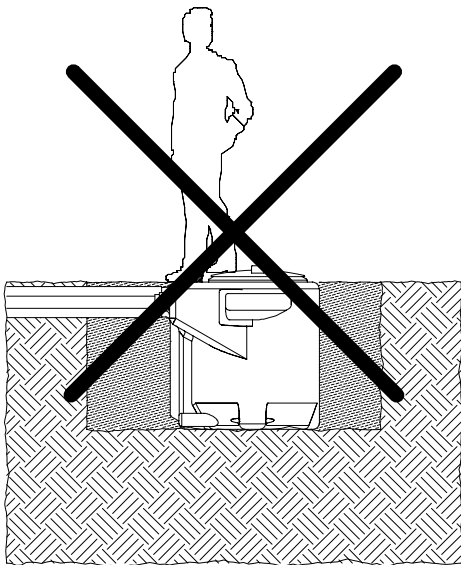
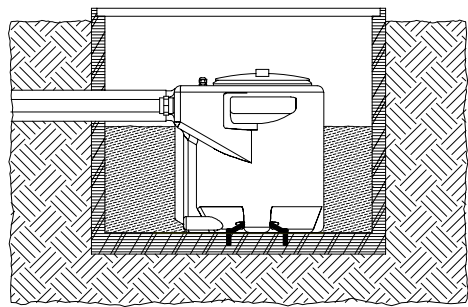
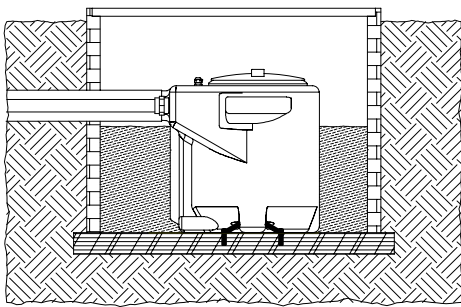
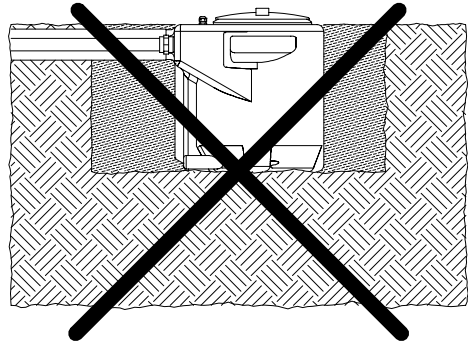
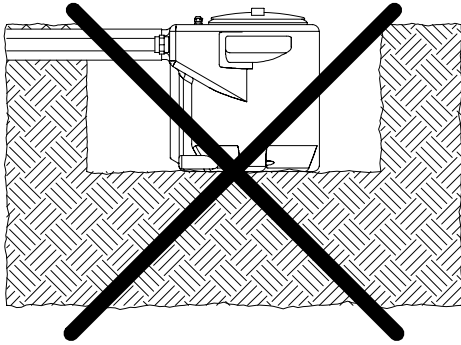
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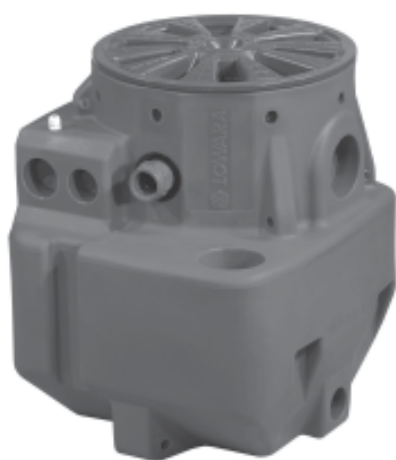
MIDIBOX SERIES APPLICATION EXAMPLES



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Prefabricated lifting station for wastewater in compliance with EN 12050-1&2 standard

SINGLEBOX PLUS Series



MARKET SECTORS

DOMESTIC.

APPLICATIONS

- Suitable for delivering gray water and wastewater to main sewer lines located at a higher level, or where gravity drainage is not possible.

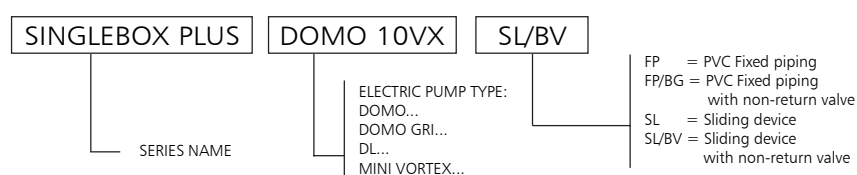
SPECIFICATIONS

- The standard station is equipped with:
 - polyethylene **basin** with a capacity of 270 litres, equipped with a threaded pedestrian cover (100 kg max).
 - **Cable glands** for power supply cables (and floats).
 - Rp 1"1/2 or 2" **delivery pipes** with fast connection and ring nut for easy disassembly of the pump or with sliding device.
 - **4 fast connections**:
2 x DN110 for inlet,
1 x DN50 for ventilation and
1 x DN65 for cable connection.
 - **1 x DN50** fast connection for the manual pump.
 - **DOMO** or **DL submersible pump**, vortex, channel impeller type or with grinder device.
 - **QDR control panel** for three-phase versions.
 - **3 rubber seal**:
1 x DN110, 1 x DN50 and
1 x DN65 mm.
 - Versions with **vortex impeller** or with **grinder device** suitable for:
 - clean water, effluent, sewage containing suspended solids and fibres.
 - Versions with **single or twin channel impeller** suitable for:
 - clean water, effluent, sewage containing suspended solids but not containing fibres.
 - Special versions equipped with delivery pipes, ball check valve and gate valve.
 - Special versions equipped with sliding device and non-return ball valve.
- **Singlebox plus** can be installed on the floor or buried in a suitable structure following instructions in the "Instructions and Operative Manual".
 - **Easy installation**:
 - installation is quick and easy: for the single-phase versions you just connect the pipes and the electrical cables; for the three-phase versions you also need to connect the control panel.
 - The new **Singlebox plus** is provided side handles for ease of handling.
 - Pre-installed delivery pump and unions.
 - **Ecological solution**:
 - tank made from 100% recyclable polyethylene.
 - Airtight anti-pollution tank, pursuant to European standard EN 12050.
 - **Easy maintenance and repair**.
 - Tried and tested pump technology.
 - Pump quick and easy to remove thanks to the ring nut located near the cover.

ACCESSORIES

- Available accessories:
 - Ball check valves.
 - Alarm kit.
 - Manual pump + seal.
 - Seals kit.

IDENTIFICATION CODE



EXAMPLE : SINGLEBOX PLUS DOMO 10VX SL/BV

Lifting station SINGLEBOX PLUS series with DOMO 10VX submersible electric pump with sliding device and non-return valve.

SINGLEBOX PLUS

sboxplus modelli-en a sc

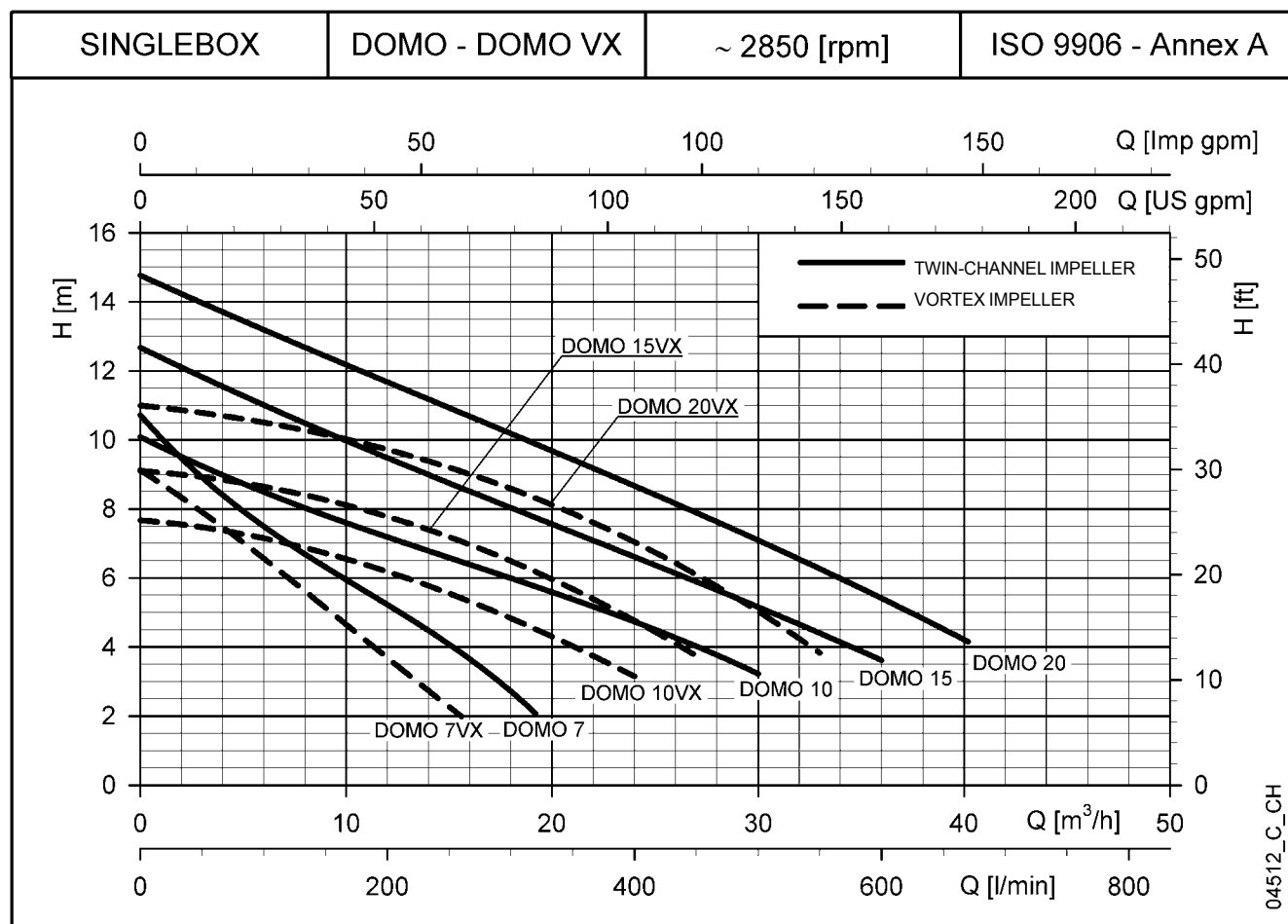
Single-phase pumps come with start capacitor, overload protection and float switch. Versions with control panel and accessories are available on request.



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SINGLEBOX PLUS SERIES DOMO-DOMO VX OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DOMO	PUMP TYPE	RATED POWER		Q = DELIVERY													
				l/min	0	50	100	150	200	250	300	320	400	500	600	670	
				m³/h	0	3	6	9	12	15	18	19,2	24	30	36	40,2	
				H = TOTAL HEAD METRES COLUMN OF WATER													
	DOMO 7(T)	0,55	0,75		10,7	8,9	7,5	6,3	5,2	4,1	2,7	2,1					
	DOMO 10(T)	0,75	1		10,1	9,2	8,5	7,8	7,2	6,6	6,0	5,8	4,7	3,2			
	DOMO 15(T)	1,1	1,5		12,7	11,8	11,0	10,2	9,5	8,8	8,0	7,8	6,6	5,2	3,6		
	DOMO 20T	1,5	2		14,8	14,0	13,2	12,4	11,7	10,9	10,2	9,9	8,7	7,1	5,4	4,2	

DOMO VX	PUMP TYPE	RATED POWER		Q = DELIVERY													
				l/min	0	80	100	150	175	200	225	260	300	400	450	550	
				m³/h	0	4,8	6	9	10,5	12	13,5	15,6	18	24	27	33	
				H = TOTAL HEAD METRES COLUMN OF WATER													
	DOMO 7VX(T)	0,55	0,75		9,1	7,1	6,6	5,1	4,4	3,7	3,0	2,0					
	DOMO 10VX(T)	0,75	1		7,7	7,3	7,1	6,7	6,5	6,2	5,9	5,4	4,8	3,1			
	DOMO 15VX(T)	1,1	1,5		9,1	8,8	8,6	8,3	8,0	7,8	7,5	7,1	6,5	4,8	3,7		
	DOMO 20VXT	1,5	2		11,0	10,6	10,5	10,2	9,9	9,7	9,5	9,1	8,6	7,0	6,1	3,8	

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

sbox_domo-domovx-2p50-en_a_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE		220-240 V	
	kW	A	$\mu\text{F} / 450 \text{ V}$
DOMO 7	0,8	3,94	16
DOMO 10	1,14	5,84	22
DOMO 15	1,58	7,02	30
-	-	-	-
DOMO 7VX	0,79	3,91	16
DOMO 10VX	1,15	5,88	22
DOMO 15VX	1,36	6,11	30
-	-	-	-

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE		220-240 V	380-415 V
	kW	A	A
DOMO 7T	0,73	2,58	1,49
DOMO 10T	1,09	4,09	2,36
DOMO 15T	1,49	4,73	2,73
DOMO 20T	1,96	6,6	3,81
DOMO 7VXT	0,71	2,56	1,48
DOMO 10VXT	1,1	4,09	2,36
DOMO 15VXT	1,26	4,31	2,49
DOMO 20VXT	1,74	6,22	3,59

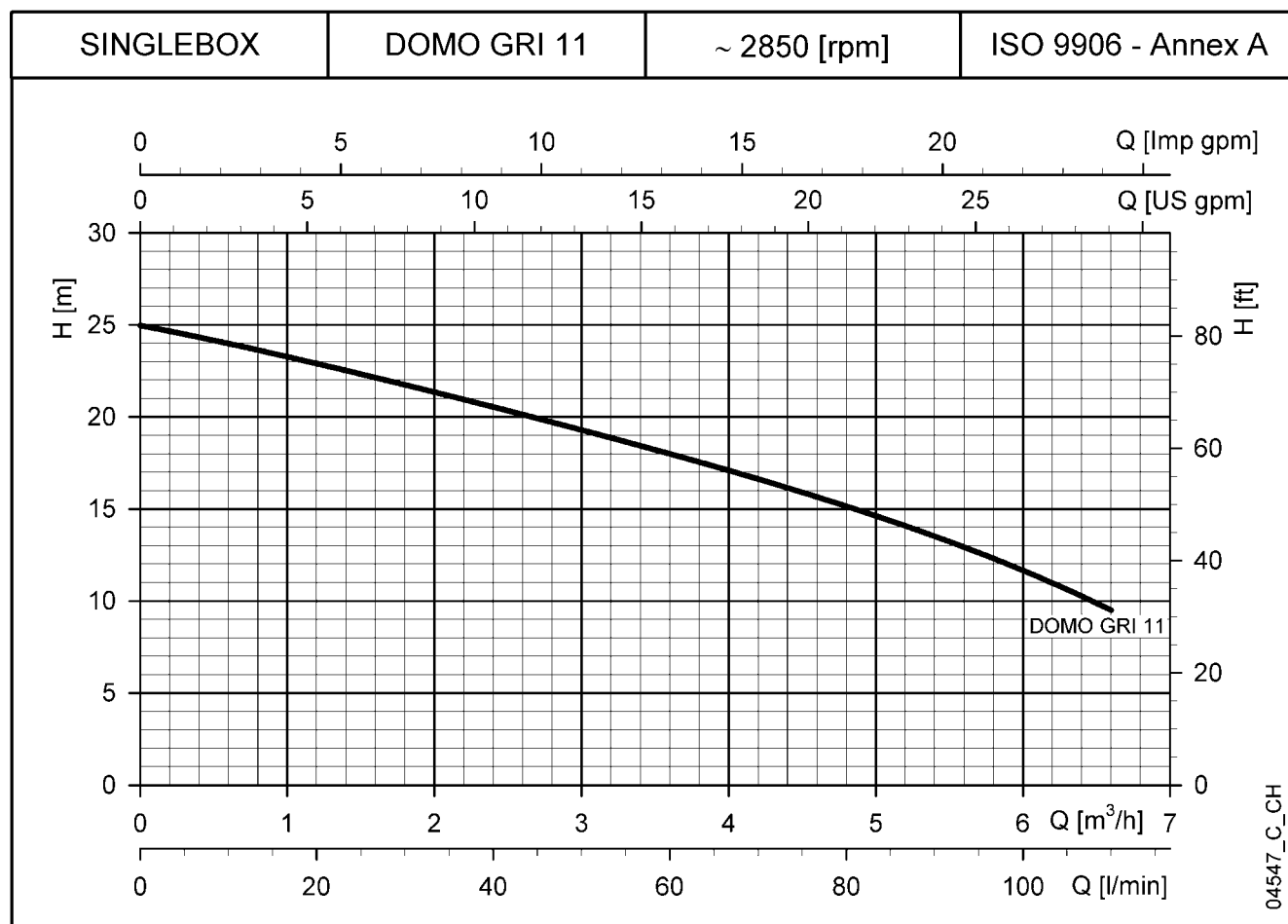
sbox_domo-domovx-2p50-en_a_te



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SINGLEBOX PLUS SERIES DOMO GRI OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DOMO GRI	PUMP TYPE	RATED POWER		Q = DELIVERY											
				l/min	0	15	30	40	50	60	70	80	90	100	110
		m3/h	0	0,9	1,8	2,4	3	3,6	4,2	4,8	5,4	6	6,6		
	kW		HP	H = TOTAL HEAD METRES COLUMN OF WATER											
	DOMO GRI 11	1,1	1,5	25,0	23,5	21,7	20,5	19,3	18,0	16,6	15,2	13,5	11,7	9,5	
DOMO GRI 11(T)															

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

sbox_domo-gri-2p50-en_a_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE		220-240 V	
	kW	A	$\mu\text{F} / 450 \text{ V}$
DOMO GRI 11	1,5	6,84	30

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE		220-240 V	380-415 V
	kW	A	A
DOMO GRI 11T	1,39	4,55	2,63

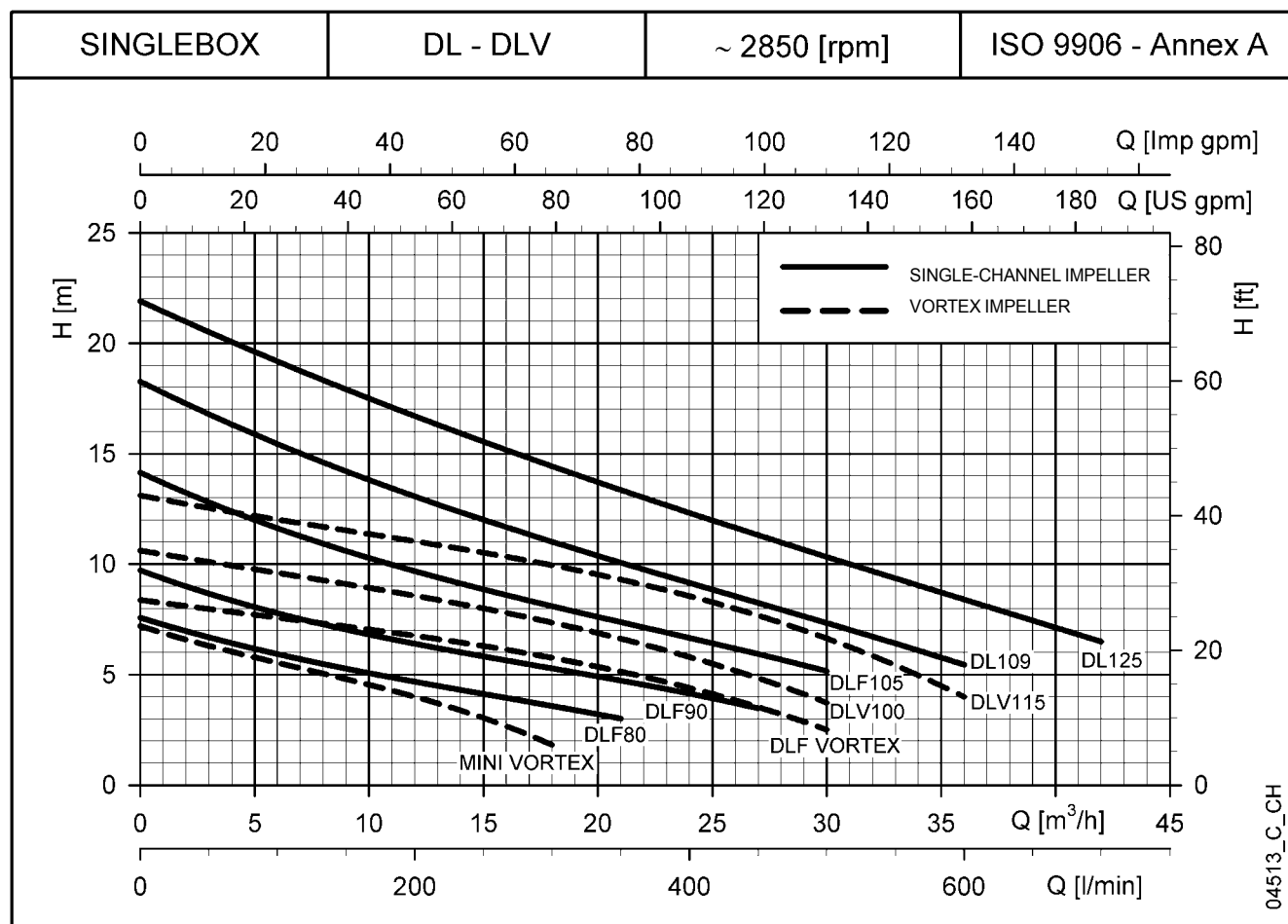
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SINGLEBOX PLUS SERIES DL-DLV OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DL	PUMP TYPE	RATED POWER		Q = DELIVERY													
				l/min	0	100	150	200	250	300	350	400	450	500	600	700	
				m³/h	0	6	9	12	15	18	21	24	27	30	36	42	
				H = TOTAL HEAD METRES COLUMN OF WATER													
	DLF(M) 80	0,6	0,8		7,6	5,9	5,3	4,7	4,1	3,6	3,0						
	DLF(M) 90	0,6	0,8		9,7	7,8	7,0	6,4	5,8	5,3	4,7	4,1	3,5				
	DLF 105	1,1	1,5		14,1	11,6	10,6	9,7	8,9	8,1	7,4	6,7	5,9	5,2			
	DL(M) 109	1,1	1,5		18,3	15,4	14,2	13,1	12,0	11,0	10,1	9,2	8,2	7,3	5,4		
	DL 125	1,5	2		21,9	19,2	17,9	16,7	15,5	14,4	13,4	12,3	11,3	10,3	8,4	6,5	

DLV	PUMP TYPE	RATED POWER		Q = DELIVERY												
				l/min	0	50	100	150	200	250	300	350	400	450	500	600
				m³/h	0	3	6	9	12	15	18	21	24	27	30	36
				H = TOTAL HEAD METRES COLUMN OF WATER												
	MINI VORTEX(M)	0,6	0,8		7,2	6,3	5,5	4,8	4,0	3,0	1,8					
	DLF VORTEX	1,1	1,5		8,4	8,0	7,6	7,2	6,8	6,3	5,8	5,1	4,4	3,5	2,5	
	DLV(M) 100	1,1	1,5		10,6	10,1	9,6	9,1	8,6	8,0	7,4	6,6	5,8	4,8	3,7	
	DLV 115	1,5	2		13,1	12,5	12,0	11,5	11,0	10,5	9,9	9,3	8,5	7,7	6,6	4,0

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

sbox_dl-dlv-2p50-en_b_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE		220-240 V	
	kW	A	$\mu\text{F} / 450 \text{ V}$
DLFM 80	0,79	3,91	25
DLFM 90	0,89	4,27	25
-	-	-	-
DLM109	1,55	6,87	35
-	-	-	-
MINI VORTEX M	1,05	4,82	25
-	-	-	-
DLVM100	1,64	7,3	35
-	-	-	-

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE		220-240 V	380-415 V
	kW	A	A
DLF 80	0,80	-	2,09
DLF 90	0,92	3,81	2,20
DLF 105	1,43	4,66	2,69
DL 109	1,54	5,44	3,14
DL 125	2,14	6,58	3,80
MINI VORTEX	1,10	-	2,36
DLF VORTEX	1,66	5,11	2,95
DLV 100	1,65	5,63	3,25
DLV 115	2,25	6,81	3,93

sbox_dl-dlv-2p50-en_b_te



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Prefabricated lifting station for wastewater in compliance with EN 12050-1&2 standard

DOUBLEBOX PLUS Series



MARKET SECTORS

DOMESTIC.

APPLICATIONS

- Suitable for delivering gray water and wastewater to main sewer lines located at a higher level, or where gravity drainage is not possible.

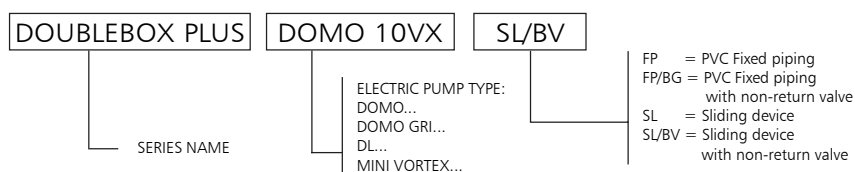
SPECIFICATIONS

- The standard station is equipped with:
 - polyethylene **basin** with a capacity of 550 litres, equipped with two threaded pedestrian covers (100 kg max).
 - **Cable glands** for power supply cables (and floats).
 - 2x Rp 1" 1/2 or 2" **delivery pipes** with fast connections and ring nuts for easy disassembly of the pumps or with sliding device.
 - **8 fast connections:**
 - 4 x DN110 for inlet,
 - 2 x DN50 for ventilation and
 - 2 x DN65 for cable connection.
 - **1 x DN50** fast connection for the manual pump.
 - 2x **DOMO** or **DL** **submersible pumps**, vortex, channel impeller type or with grinder device.
 - QXR2 **control panel** for three-phase versions.
 - **3 rubber seal:**
 - 1 x DN110, 1 x DN50 and
 - 1 x DN65 mm.
- Versions with **vortex impeller** or with **grinder device** suitable for:
 - clean water, effluent, sewage containing suspended solids and fibres.
- Versions with **single or twin channel impeller** suitable for:
 - clean water, effluent, sewage containing suspended solids but not containing fibres.
- Special versions equipped with delivery pipes, ball check valve and gate valve.
- Special versions equipped with sliding device and non-return ball valve.
- **Doublebox plus** can be installed on the floor or buried in a suitable structure following instructions in the "Instructions and Operative Manual".
- **Easy installation:**
 - installation is quick and easy: for the single-phase versions you just connect the pipes and the electrical cables; for the three-phase versions you also need to connect the control panel.
 - The new **Doublebox plus** is provided side handles for ease of handling.
 - Pre-installed delivery pump and unions.
- **Ecological solution:**
 - tank made from 100% recyclable polyethylene.
 - Airtight anti-pollution tank, pursuant to European standard EN 12050.
- **Easy maintenance and repair.**
 - Tried and tested pump technology.
 - Pump quick and easy to remove thanks to the ring nut located near the cover.

ACCESSORIES

- Available accessories:
 - Ball check valves.
 - Alarm kit.
 - Manual pump + seal.
 - Seals kit.

IDENTIFICATION CODE



EXAMPLE : DOUBLEBOX PLUS DOMO 10VX SL/BV
Lifting station DOUBLEBOX PLUS series with DOMO 10VX submersible electric pump with sliding device and non-return valve.



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DOUBLEBOX PLUS SERIES CHART

DOUBLEBOX PLUS		CHARACTERISTICS					FEATURED COMPONENTS			VERSIONS				
		kW	HP	Q max (l/min)	H max (m)	Impeller type	Control panel	Float pre-assembled on pump	Float (10 m cable)	Standard with ring nut	Ring nut, non-return valve and gate valve	Standard	With non-return valve	
DATA REFERS TO 2 PUMPS RUNNING SIMULTANEOUSLY														
DOUBLEBOX PLUS DOMO 7	FIXED PVC PIPE FITTINGS	SINGLE_PHASE	2x0.55	2x0.75	640	10,7	TWIN CHANNEL		X		X	X		
DOUBLEBOX PLUS DOMO 7VX			2x0.55	2x0.75	520	9,1	VORTEX		X		X	X		
DOUBLEBOX PLUS DOMO 10			2x0.75	2x1	1000	10,1	TWIN CHANNEL		X		X	X		
DOUBLEBOX PLUS DOMO 10VX			2x0.75	2x1	800	7,7	VORTEX		X		X	X		
DOUBLEBOX PLUS DOMO 15			2x1.1	2x1.5	1200	12,7	TWIN CHANNEL		X		X	X		
DOUBLEBOX PLUS DOMO 15VX			2x1.1	2x1.5	900	9,1	VORTEX		X		X	X		
DOUBLEBOX PLUS DOMO GRI 11			2x1.1	2x1.5	220	25	GRINDER		X		X	X		
DOUBLEBOX PLUS DOMO 7T		THREE-PHASE	2x0.55	2x0.75	640	10,7	TWIN CHANNEL	X		X	X	X		
DOUBLEBOX PLUS DOMO 7VXT			2x0.55	2x0.75	520	9,1	VORTEX	X		X	X	X		
DOUBLEBOX PLUS DOMO 10T			2x0.75	2x1	1000	10,1	TWIN CHANNEL	X		X	X	X		
DOUBLEBOX PLUS DOMO 10VXT			2x0.75	2x1	800	7,7	VORTEX	X		X	X	X		
DOUBLEBOX PLUS DOMO 15T			2x1.1	2x1.5	1200	12,7	TWIN CHANNEL	X		X	X	X		
DOUBLEBOX PLUS DOMO 15VXT			2x1.1	2x1.5	900	9,1	VORTEX	X		X	X	X		
DOUBLEBOX PLUS DOMO 20T			2x1.5	2x2	1340	14,8	TWIN CHANNEL	X		X	X	X		
DOUBLEBOX PLUS DOMO 20VXT			2x1.5	2x2	1100	11	VORTEX	X		X	X	X		
DOUBLEBOX PLUS DOMO GRI 11T			2x1.1	2x1.5	220	25	GRINDER	X		X	X	X		
DOUBLEBOX PLUS DOMO 10	LOWERING DEVICE	SINGLE_PHASE	2x0.75	2x1	1000	10,1	TWIN CHANNEL		X				X	X
DOUBLEBOX PLUS DOMO 10VX			2x0.75	2x1	800	7,7	VORTEX		X				X	X
DOUBLEBOX PLUS DOMO 15			2x1.1	2x1.5	1200	12,7	TWIN CHANNEL		X				X	X
DOUBLEBOX PLUS DOMO 15VX			2x1.1	2x1.5	900	9,1	VORTEX		X				X	X
DOUBLEBOX PLUS DOMO GRI 11			2x1.1	2x1.5	220	25	GRINDER		X				X	X
DOUBLEBOX PLUS DOMO 10T		THREE-PHASE	2x0.75	2x1	1000	10,1	TWIN CHANNEL	X		X			X	X
DOUBLEBOX PLUS DOMO 10VXT			2x0.75	2x1	800	7,7	VORTEX	X		X			X	X
DOUBLEBOX PLUS DOMO 15T			2x1.1	2x1.5	1200	12,7	TWIN CHANNEL	X		X			X	X
DOUBLEBOX PLUS DOMO 15VXT			2x1.1	2x1.5	900	9,1	VORTEX	X		X			X	X
DOUBLEBOX PLUS DOMO 20T			2x1.5	2x2	1340	14,8	TWIN CHANNEL	X		X			X	X
DOUBLEBOX PLUS DOMO 20VXT			2x1.5	2x2	1100	11	VORTEX	X		X			X	X
DOUBLEBOX PLUS DOMO GRI 11T			2x1.1	2x1.5	220	25	GRINDER	X		X			X	X
DOUBLEBOX PLUS DLFM 80		SINGLE_PHASE	2x0.6	2x0.8	700	7,6	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DLFM 90			2x0.6	2x0.8	900	9,7	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS MINI VORTEX M			2x0.6	2x0.8	600	7,2	VORTEX	X		X			X	X
DOUBLEBOX PLUS DLM 109			2x1.1	2x1.5	1200	18,3	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DLVM 100			2x1.1	2x1.5	1000	10,6	VORTEX	X		X			X	X
DOUBLEBOX PLUS DLF 80		THREE-PHASE	2x0.6	2x0.8	700	7,6	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DLF 90			2x0.6	2x0.8	900	9,7	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS MINI VORTEX			2x0.6	2x0.8	600	7,2	VORTEX	X		X			X	X
DOUBLEBOX PLUS DLF 105			2x1.1	2x1.5	1000	14,1	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DL 109			2x1.1	2x1.5	1200	18,3	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DLV 100			2x1.1	2x1.5	1000	10,6	VORTEX	X		X			X	X
DOUBLEBOX PLUS DLF VORTEX			2x1.1	2x1.5	1000	8,4	VORTEX	X		X			X	X
DOUBLEBOX PLUS DL 125			2x1.5	2x2	1400	21,9	SINGLE CHANNEL	X		X			X	X
DOUBLEBOX PLUS DLV 115			2x1.5	2x2	1200	13,1	VORTEX	X		X			X	X

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Notes

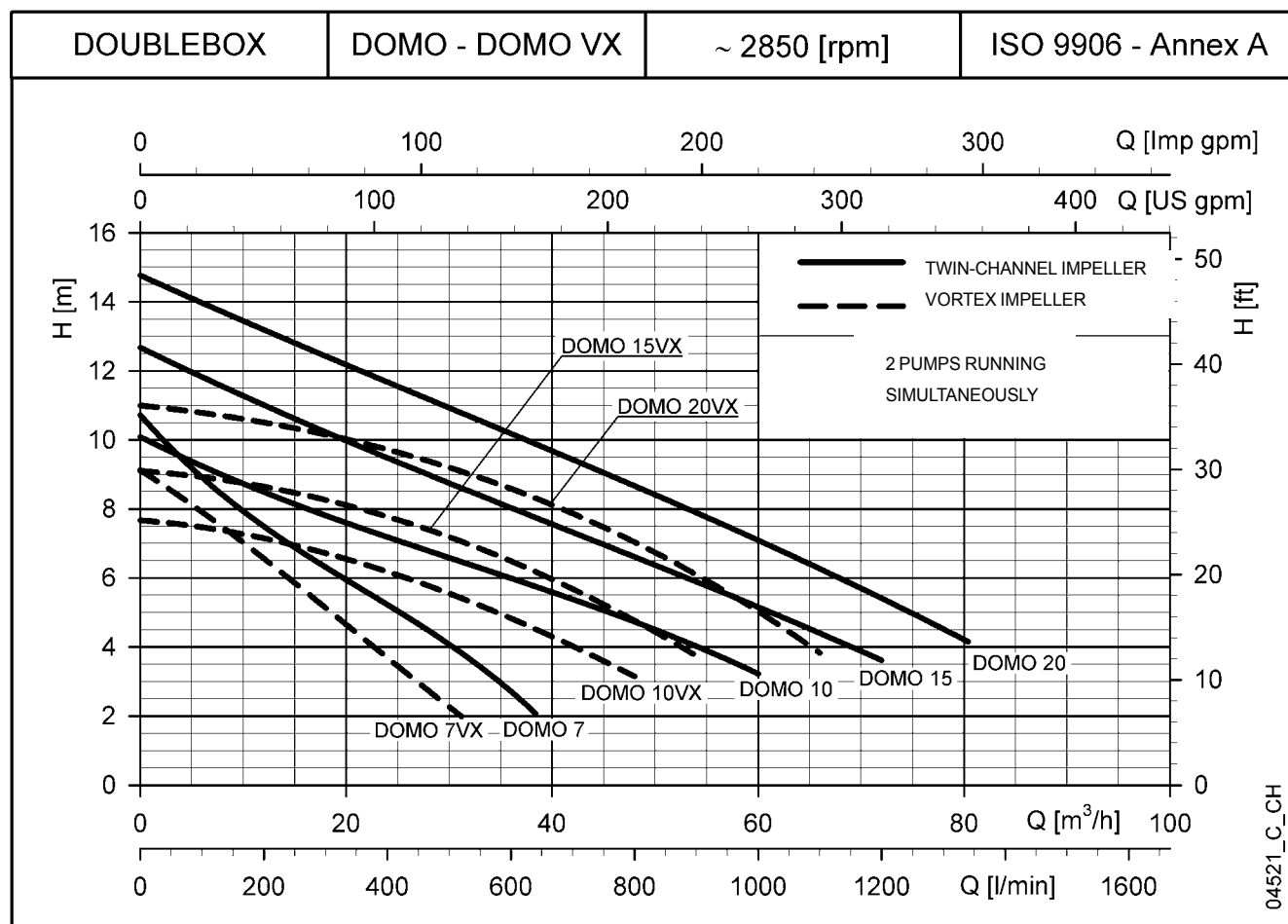
Single-phase pumps come with start capacitor, overload protection and float switch.
Versions with control panel and accessories are available on request.



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DOUBLEBOX PLUS SERIES DOMO-DOMO VX OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DOMO	PUMP TYPE	RATED POWER		Q = DELIVERY												
				l/min	0	100	200	300	400	500	600	640	800	1000	1200	1340
		m³/h	0	6	12	18	24	30	36	38,4	48	60	72	80,4		
	kW	HP	H = TOTAL HEAD METRES COLUMN OF WATER													
	DOMO 7(T)	2x0.55	2x0.75	10,7	8,9	7,5	6,3	5,2	4,1	2,7	2,1					
DOMO 10(T)	2x0.75	2x1	10,1	9,2	8,5	7,8	7,2	6,6	6,0	5,8	4,7	3,2				
DOMO 15(T)	2x1.1	2x1.5	12,7	11,8	11,0	10,2	9,5	8,8	8,0	7,8	6,6	5,2	3,6			
DOMO 20T	2x1.5	2 x 2	14.8	14.0	13.2	12.4	11.7	10.9	10.2	9.9	8.7	7.1	5.4	4.2		

DOMO VX	PUMP TYPE	RATED POWER		Q = DELIVERY												
				l/min	0	160	200	300	350	400	450	520	600	800	900	1100
	m3/h	0	9,6	12	18	21	24	27	31,2	36	48	54	66			
	H = TOTAL HEAD METRES COLUMN OF WATER															
	kW	HP														
DOMO 7VX(T)	2x0.55	2x0.75	9,1	7,1	6,6	5,1	4,4	3,7	3,0	2,0						
DOMO 10VX(T)	2x0.75	2x1	7,7	7,3	7,1	6,7	6,5	6,2	5,9	5,4	4,8	3,1				
DOMO 15VX(T)	2x1.1	2x1.5	9,1	8,8	8,6	8,3	8,0	7,8	7,5	7,1	6,5	4,8	3,7			
DOMO 20VXT	2x1.5	2 x 2	11.0	10.6	10.5	10.2	9.9	9.7	9.5	9.1	8.6	7.0	6.1	3.8		

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

dbbox_domo-domovx-2p50-en_a_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE	kW	220-240 V A	$\mu\text{F} / 450 \text{ V}$
DOMO 7	2x0.8	2x3.94	2x16
DOMO 10	2x1.14	2x5.84	2x22
DOMO 15	2x1.58	2x7.02	2x30
-	-	-	-
DOMO 7VX	2x0.79	2x3.91	2x16
DOMO 10VX	2x1.15	2x5.88	2x22
DOMO 15VX	2x1.36	2x6.11	2x30
-	-	-	-

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE	kW	220-240 V A	380-415 V A
DOMO 7T	2x0.73	2x2.58	2x1.49
DOMO 10T	2x1.09	2x4.09	2x2.36
DOMO 15T	2x1.49	2x4.73	2x2.73
DOMO 20T	2x1.96	2x6.6	2x3.81
DOMO 7VXT	2x0.71	2x2.56	2x1.48
DOMO 10VXT	2x1.1	2x4.09	2x2.36
DOMO 15VXT	2x1.26	2x4.31	2x2.49
DOMO 20VXT	2x1.74	2x6.22	2x3.59

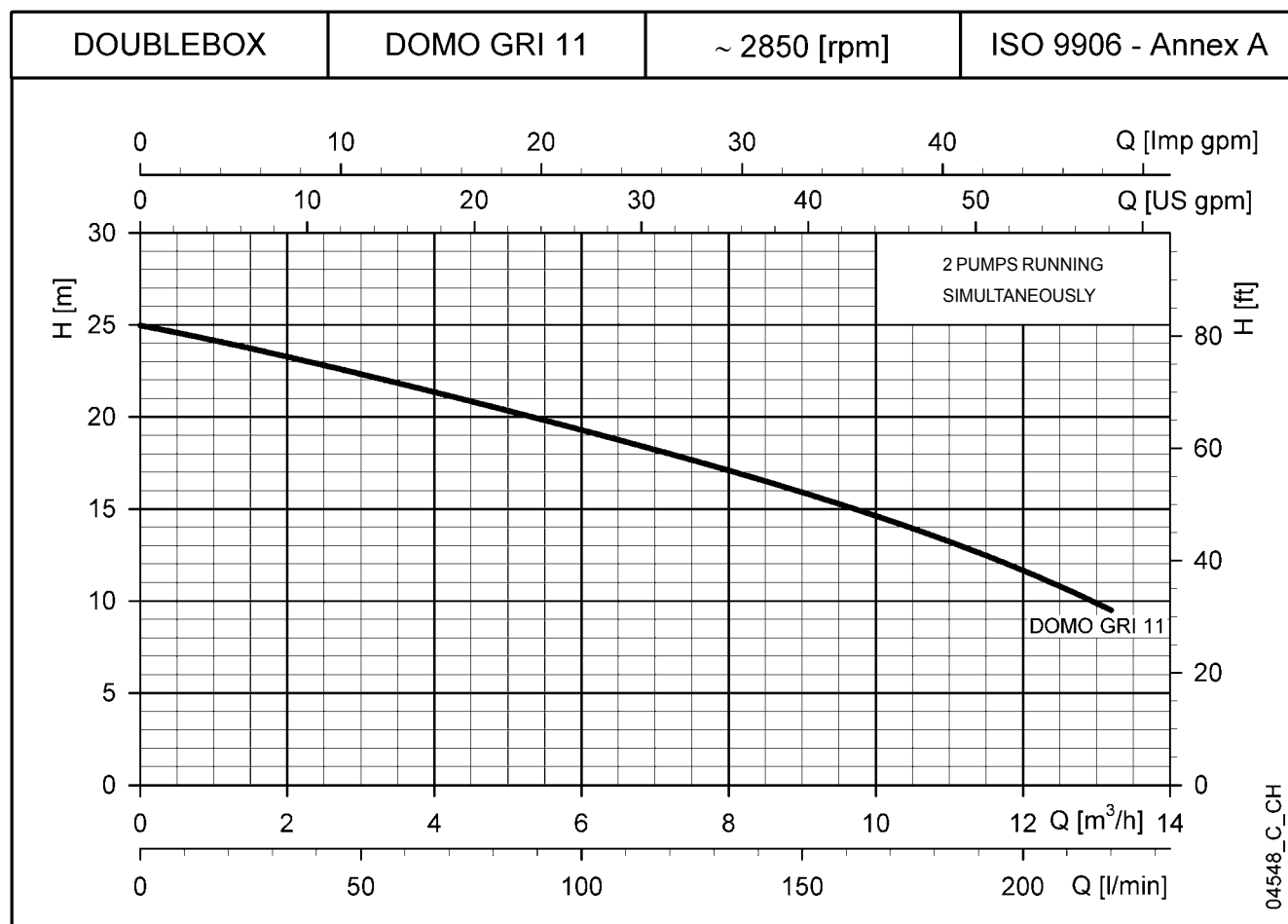
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DOUBLEBOX PLUS SERIES DOMO GRI OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DOMO GRI	PUMP TYPE	RATED POWER		Q = DELIVERY									
				l/min	0	30	60	80	100	120	140	160	180
				m³/h	0	1,8	3,6	4,8	6	7,2	8,4	9,6	10,8
				H = TOTAL HEAD METRES COLUMN OF WATER									
	DOMO GRI11	kW	HP	25,0	23,5	21,7	20,5	19,3	18,0	16,6	15,2	13,5	11,7
	DOMO GRI11(T)												9,5

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

dbox_domo-gri-2p50-en_a_th

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE	kW	220-240 V A	$\mu\text{F} / 450 \text{ V}$
DOMO GRI11	2x1.5	2x6.84	2x30

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE_PHASE	kW	220-240 V A	380-415 V A
DOMO GRI11T	2x1.39	2x4.55	2x2.63

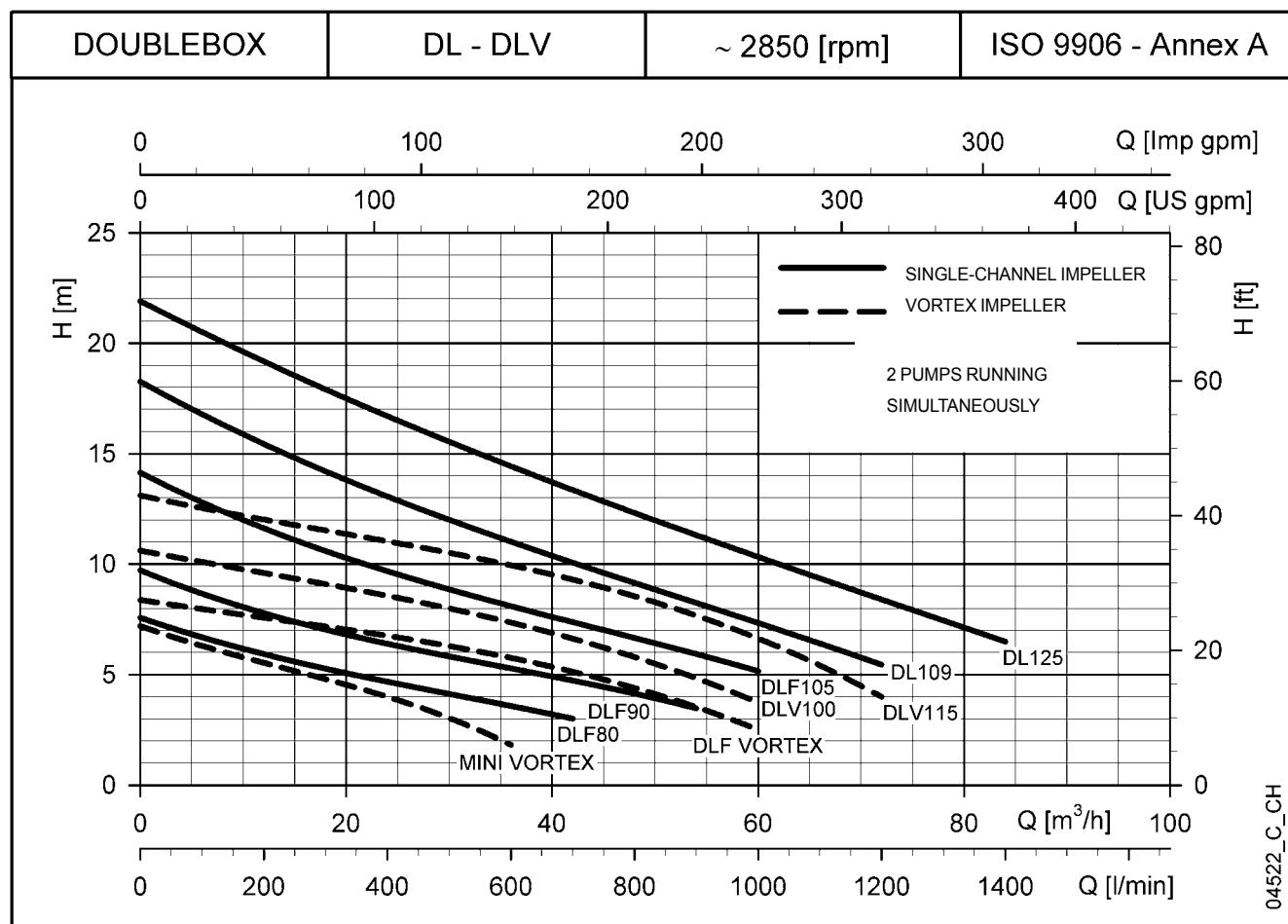
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DOUBLEBOX PLUS SERIES DL-DLV OPERATING CHARACTERISTICS AT 50 Hz



HYDRAULIC PERFORMANCE TABLE

DL	PUMP TYPE	RATED POWER		Q = DELIVERY													
				l/min	0	200	300	400	500	600	700	800	900	1000	1200	1400	
				m³/h	0	12	18	24	30	36	42	48	54	60	72	84	
	H = TOTAL HEAD METRES COLUMN OF WATER																
	kW	HP															
DLF(M) 80	2x0.6	2x0.8	7,6	5,9	5,3	4,7	4,1	3,6	3,0								
DLF(M) 90	2x0.6	2x0.8	9,7	7,8	7,0	6,4	5,8	5,3	4,7	4,1	3,5						
DLF 105	2x1.1	2x1.5	14,1	11,6	10,6	9,7	8,9	8,1	7,4	6,7	5,9	5,2					
DL(M) 109	2x1.1	2x1.5	18,3	15,4	14,2	13,1	12,0	11,0	10,1	9,2	8,2	7,3	5,4				
DL 125	2x1.5	2x2	21,9	19,2	17,9	16,7	15,5	14,4	13,4	12,3	11,3	10,3	8,4	6,5			

DLV	PUMP TYPE	RATED POWER		Q = DELIVERY									
				l/min	0	100	200	300	400	500	600	700	800
				m³/h	0	6	12	18	24	30	36	42	48
				H = TOTAL HEAD METRES COLUMN OF WATER									
	MINI VORTEX(M)	2x0.6	2x0.8		7,2	6,3	5,5	4,8	4,0	3,0	1,8		
	DLF VORTEX	2x1.1	2x1.5		8,4	8,0	7,6	7,2	6,8	6,3	5,8	5,1	4,4
	DLV(M) 100	2x1.1	2x1.5		10,6	10,1	9,6	9,1	8,6	8,0	7,4	6,6	5,8
	DLV 115	2x1.5	2x2		13,1	12,5	12,0	11,5	11,0	10,5	9,9	9,3	8,5

These performances (referred to the single pump) are valid for liquids with density $\rho = 1,0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

dbox_dl-dlv-2p50-en_b_te

ELECTRICAL DATA TABLE

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	CAPACITOR
SINGLE-PHASE	kW	220-240 V A	$\mu\text{F} / 450 \text{ V}$
DLFM 80	2x0.79	2x3.91	2x25
DLFM 90	2x0.89	2x4.27	2x25
-	-	-	-
DLM109	2x1.55	2x6.87	2x35
-	-	-	-
MINI VORTEX M	2x1.05	2x4.82	2x25
-	-	-	-
DLVM100	2x1.64	2x7.3	2x35
-	-	-	-

*Maximum values within operating range.

PUMP TYPE	ABSORBED POWER*	ABSORBED CURRENT*	ABSORBED CURRENT*
THREE-PHASE	kW	220-240 V A	380-415 V A
DLF 80	2x0.8	-	2x2.09
DLF 90	2x0.92	2x3.81	2x2.2
DLF 105	2x1.43	2x4.66	2x2.69
DL 109	2x1.54	2x5.44	2x3.14
DL 125	2x2.14	2x6.58	2x3.8
MINI VORTEX	2x1.1	-	2x2.36
DLF VORTEX	2x1.66	2x5.11	2x2.95
DLV 100	2x1.65	2x5.63	2x3.25
DLV 115	2x2.25	2x6.81	2x3.93

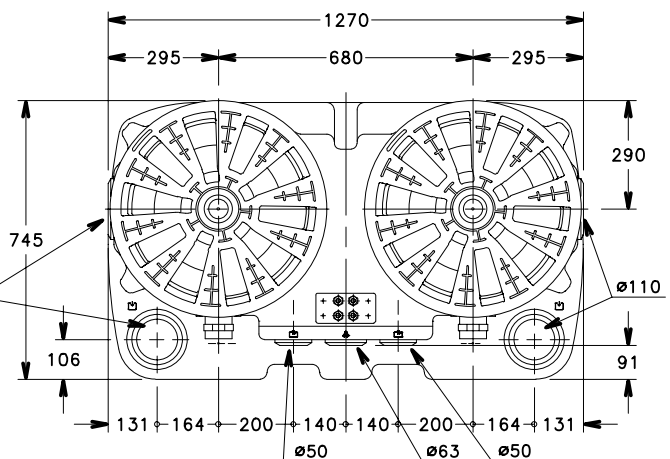
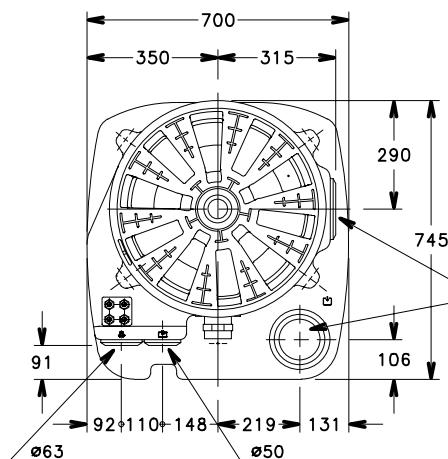
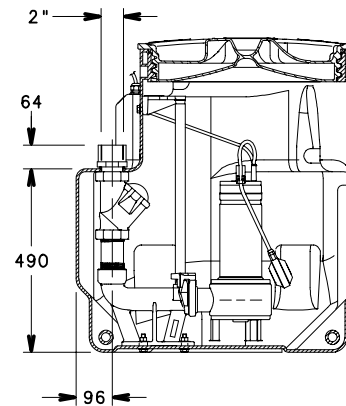
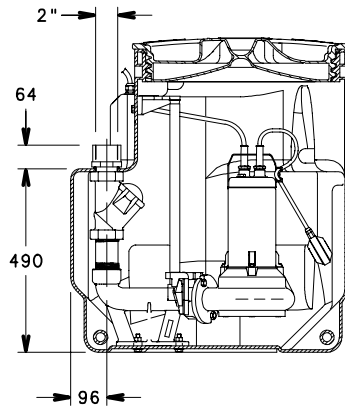
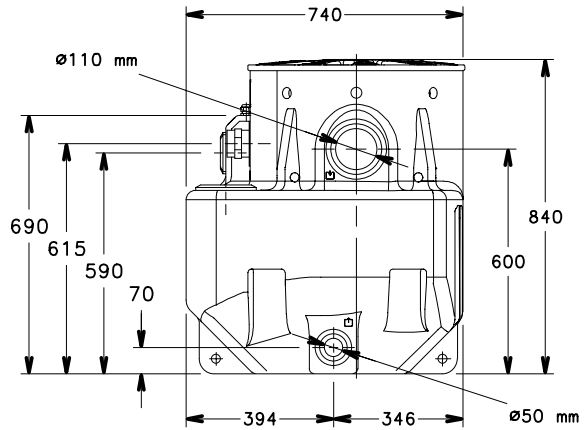
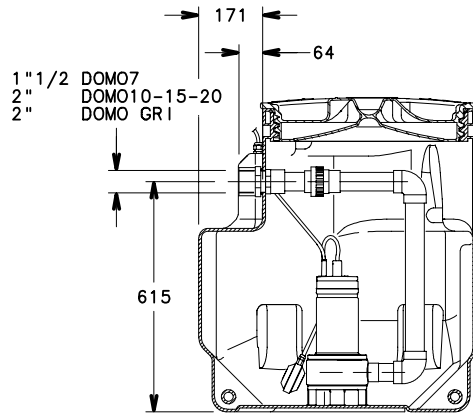
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SINGLEBOX PLUS - DOUBLEBOX PLUS SERIES DIMENSIONS AND WEIGHTS



MODEL	WEIGHT (kg)			
	PVC	PVC BV	SL	SL BV
SINGLEBOX PLUS	23	27	32	36
DOUBLEBOX PLUS	44	51	62	69

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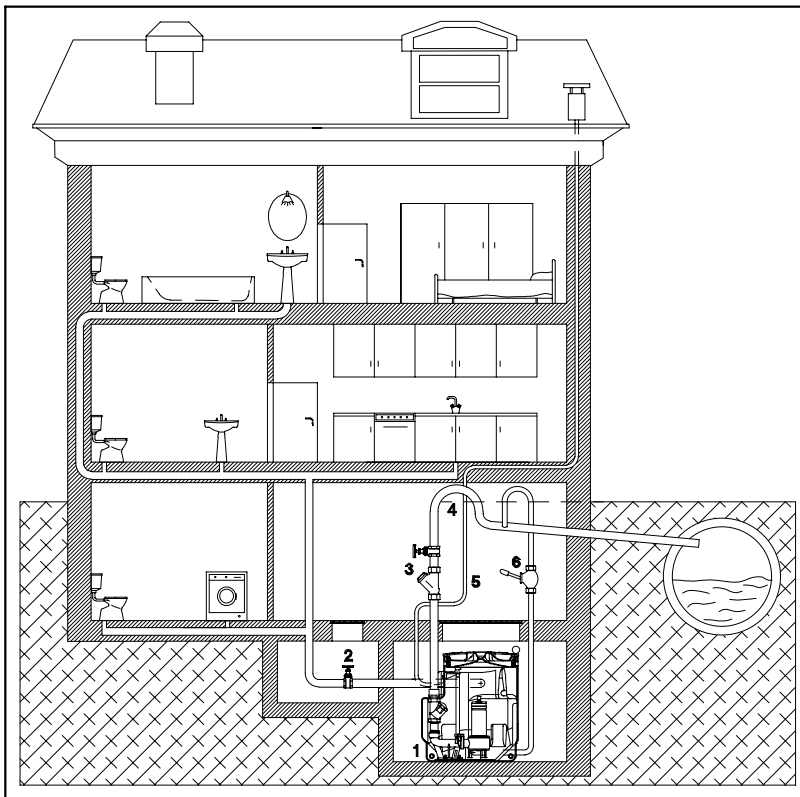
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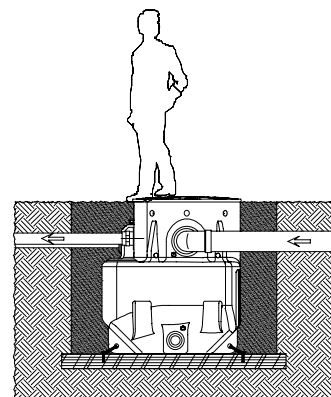
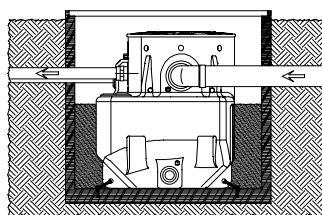
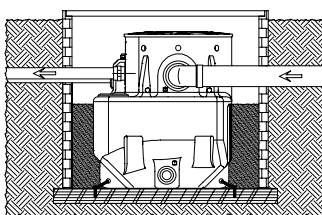
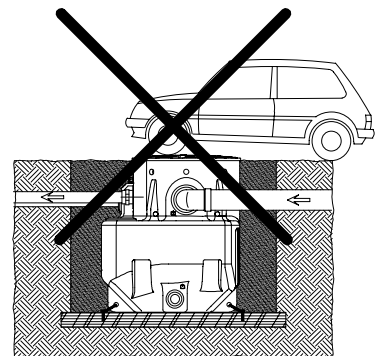
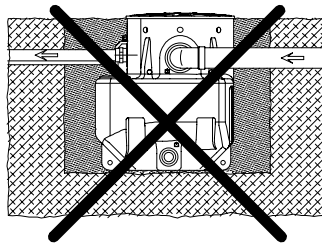
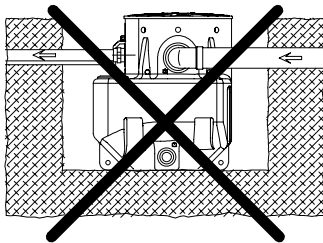
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SINGLEBOX PLUS - DOUBLEBOX PLUS SERIES APPLICATION EXAMPLES



- 1** Lifting station.
- 2** Inlet pipe with gate valve.
- 3** Outlet pipes with non-return valve.
- 4** Drain-trap.
- 5** Vent.
- 6** Emergency drain system with hand-operated pump.



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SINGLEBOX PLUS - DOUBLEBOX PLUS SERIES CERTIFICATION

MINIBOX MIDIBOX SINGLEBOX PLUS DOUBLEBOX PLUS

Station	Use
MINIBOX DOC3	Clean water
MINIBOX DOC7	Clean water
MINIBOX DOC7VX	Clean water
MIDIBOX DOC3	Clean water
MIDIBOX DOC7	Clean water
MIDIBOX DOC7T	Clean water
MIDIBOX DOC7VX	EN 12050 - 2
MIDIBOX DOC7VXT	EN 12050 - 2
MIDIBOX DOMO7	EN 12050 - 2
MIDIBOX DOMO7T	EN 12050 - 2
MIDIBOX DOMO7VX	EN 12050 - 2
MIDIBOX DOMO7VXT	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 7	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 7T	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 7VX	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 7VXT	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 10	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 10T	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 10VX	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 10VXT	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 15	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 15T	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 15VX	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 15VXT	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 20T	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO 20VXT	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO GRI 11	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DOMO GRI 11T	EN 12050 - 1
SINGLEBOX PLUS / DOUBLEBOX PLUS DLFM 80	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLF 80	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLFM 90	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLF 90	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS MINI VORTEX M	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS MINI VORTEX	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLF 105	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLM 109	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DL 109	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLVM 100	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLV 100	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLF VORTEX	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DL 125	EN 12050 - 2
SINGLEBOX PLUS / DOUBLEBOX PLUS DLV 115	EN 12050 - 2

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TECHNICAL APPENDIX

WATER REQUIREMENTS IN CIVIL USERS

Determination of the water requirement depends on the type of users and contemporaneity factor. The calculation may be subject to regulations, standards or customs that may vary from country to country. The calculation method shown below is an example based on practical experience, designed to provide a reference value and not a substitute for detailed analytical calculation.

Water requirements in condominiums.

The **consumption table** shows the maximum values for each delivery point, depending on the plumbing amenities.

MAXIMUM CONSUMPTION FOR EACH DELIVERY POINT

TYPE	CONSUMPTION (l/min)
Sink	9
Dishwasher	10
Washing machine	12
Shower	12
Bathtub	15
Washbasin	6
Bidet	6
Flush tank WC	6
Controlled flushing system WC	90

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The **sum of the water consumption values** of each delivery point determines the maximum theoretical requirement, which must be reduced according to the **contemporaneity coefficient**, because in actual fact the delivery points are never used all together.

$f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$	Coefficient for apartments with one bathroom and flush tank WC
$f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$	Coefficient for apartments with one bathroom and controlled flushing system WC
$f = \frac{1,03}{\sqrt{(0,545 \times Nr \times Na)}}$	Coefficient for apartments with two bathrooms and flush tank WC
$f = \frac{0,8}{\sqrt{(0,727 \times Nr \times Na)}}$	Coefficient for apartments with two bathrooms and controlled flushing system WC
f = coefficient; Nr = number of delivery points; Na = number of apartments	

The **table of water requirements in civil users** shows the maximum contemporaneity flow-rate values based on the **number of apartments** and the type of WC for apartments with one bathroom and two bathrooms.

As regards apartments with one bathroom, 7 drawing points have been taken into consideration, while 11 points have been considered for apartments with two bathrooms. If the number of drawing points or apartments is different, use the formulas to **calculate** the requirement.

TABLE OF WATER REQUIREMENTS IN CIVIL USERS

NUMBER OF APARTMENTS	WITH FLUSH TANK WC		WITH CONTROLLED FLUSHING SYSTEM WC	
	1	2	1	2
	FLOW RATE (l/min)			
1	32	40	60	79
2	45	56	85	111
3	55	68	105	136
4	63	79	121	157
5	71	88	135	176
6	78	97	148	193
7	84	105	160	208
8	90	112	171	223
9	95	119	181	236
10	100	125	191	249
11	105	131	200	261
12	110	137	209	273
13	114	143	218	284
14	119	148	226	295
15	123	153	234	305
16	127	158	242	315
17	131	163	249	325
18	134	168	256	334
19	138	172	263	343
20	142	177	270	352
21	145	181	277	361
22	149	185	283	369
23	152	190	290	378
24	155	194	296	386
25	158	198	302	394
26	162	202	308	401
27	165	205	314	409
28	168	209	320	417
29	171	213	325	424
30	174	217	331	431
35	187	234	357	466
40	200	250	382	498
45	213	265	405	528
50	224	280	427	557
55	235	293	448	584
60	245	306	468	610
65	255	319	487	635
70	265	331	506	659
75	274	342	523	682
80	283	354	540	704
85	292	364	557	726
90	301	375	573	747
95	309	385	589	767
100	317	395	604	787
120	347	433	662	863
140	375	468	715	932
160	401	500	764	996
180	425	530	811	1056
200	448	559	854	1114

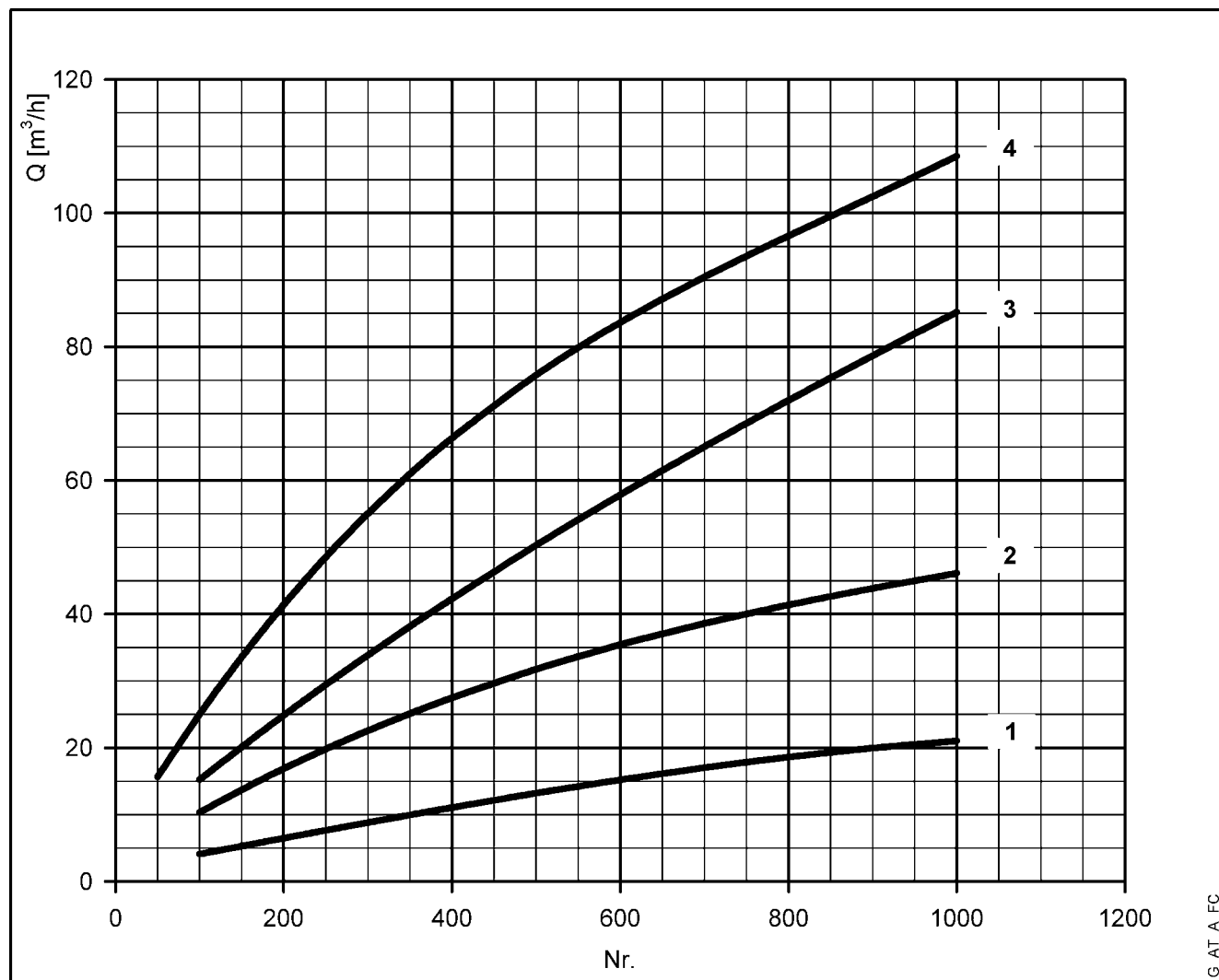
For seaside resorts, a flow rate increased by at least 20% must be considered.

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WATER REQUIREMENTS FOR COMMUNITY BUILDINGS

The requirements of buildings intended for specific uses, such as **offices, residential units, hotels, department stores, nursing homes** and so on, are different from those of condominium, and both their global daily water consumption and the maximum contemporaneity flow rate usually greater. The **diagram of water requirements for community buildings** shows the maximum contemporaneity flow rate of some types of communities, for guidance.

These requirements must be determined case by case with the utmost accuracy, using analytical calculation methods according to particular needs and local provisions.



For seaside resorts, the flow rate must be increased by at least 20%.

- 1 = Offices (Nr. of people)
- 2 = Department stores (Nr. of people)
- 3 = Nursing homes (Nr. of beds)
- 4 = Hotels, residences (Nr. of beds)

NPSH

The minimum operating values that can be reached at the pump suction end are limited by the onset of cavitation.

Cavitation is the formation of vapour-filled cavities within liquids where the pressure is locally reduced to a critical value, or where the local pressure is equal to, or just below the vapour pressure of the liquid.

The vapour-filled cavities flow with the current and when they reach a higher pressure area the vapour contained in the cavities condenses. The cavities collide, generating pressure waves that are transmitted to the walls. These, being subjected to stress cycles, gradually become deformed and yield due to fatigue. This phenomenon, characterized by a metallic noise produced by the hammering on the pipe walls, is called incipient cavitation.

The damage caused by cavitation may be magnified by electrochemical corrosion and a local rise in temperature due to the plastic deformation of the walls. The materials that offer the highest resistance to heat and corrosion are alloy steels, especially austenitic steel. The conditions that trigger cavitation may be assessed by calculating the total net suction head, referred to in technical literature with the acronym NPSH (Net Positive Suction Head).

The NPSH represents the total energy (expressed in m.) of the liquid measured at suction under conditions of incipient cavitation, excluding the vapour pressure (expressed in m.) that the liquid has at the pump inlet.

To find the static height h_z at which to install the machine under safe conditions, the following formula must be verified:

$$h_p + h_z \geq (\text{NPSH}_r + 0.5) + h_f + h_{pv} \quad ①$$

where:

- h_p** is the absolute pressure applied to the free liquid surface in the suction tank, expressed in m. of liquid; h_p is the quotient between the barometric pressure and the specific weight of the liquid.
- h_z** is the suction lift between the pump axis and the free liquid surface in the suction tank, expressed in m.; h_z is negative when the liquid level is lower than the pump axis.
- h_f** is the flow resistance in the suction line and its accessories, such as: fittings, foot valve, gate valve, elbows, etc.
- h_{pv}** is the vapour pressure of the liquid at the operating temperature, expressed in m. of liquid. h_{pv} is the quotient between the P_v vapour pressure and the liquid's specific weight.
- 0,5** is the safety factor.

The maximum possible suction head for installation depends on the value of the atmospheric pressure (i.e. the elevation above sea level at which the pump is installed) and the temperature of the liquid.

To help the user, with reference to water temperature (4° C) and to the elevation above sea level, the following tables show the drop in hydraulic pressure head in relation to the elevation above sea level, and the suction loss in relation to temperature.

Water temperature (°C)	20	40	60	80	90	110	120
Suction loss (m)	0,2	0,7	2,0	5,0	7,4	15,4	21,5

Elevation above sea level (m)	500	1000	1500	2000	2500	3000
Suction loss (m)	0,55	1,1	1,65	2,2	2,75	3,3

Friction loss is shown in the tables at pages 33-34 of this catalogue. To reduce it to a minimum, especially in cases of high suction head (over 4-5 m.) or within the operating limits with high flow rates, we recommend using a suction line having a larger diameter than that of the pump's suction port. It is always a good idea to position the pump as close as possible to the liquid to be pumped.

Make the following calculation:

Liquid: water at ~15°C $\gamma = 1 \text{ kg/dm}^3$

Flow rate required: 30 m³/h

Head for required delivery: 43 m.

Suction lift: 3,5 m.

The selection is an FHE 40-200/75 pump whose NPSH required value is, at 30 m³/h, di 2,5 m.

For water at 15 °C

$$h_p = P_a / \gamma = 10,33\text{m}, h_{pv} = P_v / \gamma = 0,174\text{m} (0,01701 \text{ bar})$$

The H_f flow resistance in the suction line with foot valves is ~ 1,2 m.

By substituting the parameters in formula ① with the numeric values above, we have:

$$10,33 + (-3,5) \geq (2,5 + 0,5) + 1,2 + 0,17$$

from which we have: 6,8 > 4,4

The relation is therefore verified.



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VAPOUR PRESSURE

VAPOUR PRESSURE p_s AND ρ DENSITY OF WATER TABLE

t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s bar	ρ kg/dm ³	t °C	T K	p_s bar	ρ kg/dm ³
0	273,15	0,00611	0,9998	55	328,15	0,15741	0,9857	120	393,15	1,9854	0,9429
1	274,15	0,00657	0,9999	56	329,15	0,16511	0,9852	122	395,15	2,1145	0,9412
2	275,15	0,00706	0,9999	57	330,15	0,17313	0,9846	124	397,15	2,2504	0,9396
3	276,15	0,00758	0,9999	58	331,15	0,18147	0,9842	126	399,15	2,3933	0,9379
4	277,15	0,00813	1,0000	59	332,15	0,19016	0,9837	128	401,15	2,5435	0,9362
5	278,15	0,00872	1,0000	60	333,15	0,1992	0,9832	130	403,15	2,7013	0,9346
6	279,15	0,00935	1,0000	61	334,15	0,2086	0,9826	132	405,15	2,867	0,9328
7	280,15	0,01001	0,9999	62	335,15	0,2184	0,9821	134	407,15	3,041	0,9311
8	281,15	0,01072	0,9999	63	336,15	0,2286	0,9816	136	409,15	3,223	0,9294
9	282,15	0,01147	0,9998	64	337,15	0,2391	0,9811	138	411,15	3,414	0,9276
10	283,15	0,01227	0,9997	65	338,15	0,2501	0,9805	140	413,15	3,614	0,9258
11	284,15	0,01312	0,9997	66	339,15	0,2615	0,9799	145	418,15	4,155	0,9214
12	285,15	0,01401	0,9996	67	340,15	0,2733	0,9793	155	428,15	5,433	0,9121
13	286,15	0,01497	0,9994	68	341,15	0,2856	0,9788	160	433,15	6,181	0,9073
14	287,15	0,01597	0,9993	69	342,15	0,2984	0,9782	165	438,15	7,008	0,9024
15	288,15	0,01704	0,9992	70	343,15	0,3116	0,9777	170	433,15	7,920	0,8973
16	289,15	0,01817	0,9990	71	344,15	0,3253	0,9770	175	448,15	8,924	0,8921
17	290,15	0,01936	0,9988	72	345,15	0,3396	0,9765	180	453,15	10,027	0,8869
18	291,15	0,02062	0,9987	73	346,15	0,3543	0,9760	185	458,15	11,233	0,8815
19	292,15	0,02196	0,9985	74	347,15	0,3696	0,9753	190	463,15	12,551	0,8760
20	293,15	0,02337	0,9983	75	348,15	0,3855	0,9748	195	468,15	13,987	0,8704
21	294,15	0,24850	0,9981	76	349,15	0,4019	0,9741	200	473,15	15,550	0,8647
22	295,15	0,02642	0,9978	77	350,15	0,4189	0,9735	205	478,15	17,243	0,8588
23	296,15	0,02808	0,9976	78	351,15	0,4365	0,9729	210	483,15	19,077	0,8528
24	297,15	0,02982	0,9974	79	352,15	0,4547	0,9723	215	488,15	21,060	0,8467
25	298,15	0,03166	0,9971	80	353,15	0,4736	0,9716	220	493,15	23,198	0,8403
26	299,15	0,03360	0,9968	81	354,15	0,4931	0,9710	225	498,15	25,501	0,8339
27	300,15	0,03564	0,9966	82	355,15	0,5133	0,9704	230	503,15	27,976	0,8273
28	301,15	0,03778	0,9963	83	356,15	0,5342	0,9697	235	508,15	30,632	0,8205
29	302,15	0,04004	0,9960	84	357,15	0,5557	0,9691	240	513,15	33,478	0,8136
30	303,15	0,04241	0,9957	85	358,15	0,5780	0,9684	245	518,15	36,523	0,8065
31	304,15	0,04491	0,9954	86	359,15	0,6011	0,9678	250	523,15	39,776	0,7992
32	305,15	0,04753	0,9951	87	360,15	0,6249	0,9671	255	528,15	43,246	0,7916
33	306,15	0,05029	0,9947	88	361,15	0,6495	0,9665	260	533,15	46,943	0,7839
34	307,15	0,05318	0,9944	89	362,15	0,6749	0,9658	265	538,15	50,877	0,7759
35	308,15	0,05622	0,9940	90	363,15	0,7011	0,9652	270	543,15	55,058	0,7678
36	309,15	0,05940	0,9937	91	364,15	0,7281	0,9644	275	548,15	59,496	0,7593
37	310,15	0,06274	0,9933	92	365,15	0,7561	0,9638	280	553,15	64,202	0,7505
38	311,15	0,06624	0,9930	93	366,15	0,7849	0,9630	285	558,15	69,186	0,7415
39	312,15	0,06991	0,9927	94	367,15	0,8146	0,9624	290	563,15	74,461	0,7321
40	313,15	0,07375	0,9923	95	368,15	0,8453	0,9616	295	568,15	80,037	0,7223
41	314,15	0,07777	0,9919	96	369,15	0,8769	0,9610	300	573,15	85,927	0,7122
42	315,15	0,08198	0,9915	97	370,15	0,9094	0,9602	305	578,15	92,144	0,7017
43	316,15	0,09639	0,9911	98	371,15	0,9430	0,9596	310	583,15	98,70	0,6906
44	317,15	0,09100	0,9907	99	372,15	0,9776	0,9586	315	588,15	105,61	0,6791
45	318,15	0,09582	0,9902	100	373,15	1,0133	0,9581	320	593,15	112,89	0,6669
46	319,15	0,10086	0,9898	102	375,15	1,0878	0,9567	325	598,15	120,56	0,6541
47	320,15	0,10612	0,9894	104	377,15	1,1668	0,9552	330	603,15	128,63	0,6404
48	321,15	0,11162	0,9889	106	379,15	1,2504	0,9537	340	613,15	146,05	0,6102
49	322,15	0,11736	0,9884	108	381,15	1,3390	0,9522	350	623,15	165,35	0,5743
50	323,15	0,12335	0,9880	110	383,15	1,4327	0,9507	360	633,15	186,75	0,5275
51	324,15	0,12961	0,9876	112	385,15	1,5316	0,9491	370	643,15	210,54	0,4518
52	325,15	0,13613	0,9871	114	387,15	1,6362	0,9476	374,15	647,30	221,20	0,3154
53	326,15	0,14293	0,9862	116	389,15	1,7465	0,9460				
54	327,15	0,15002	0,9862	118	391,15	1,8628	0,9445				

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TABLE OF FLOW RESISTANCE IN 100 m OF STRAIGHT CAST IRON PIPELINE (HAZEN-WILLIAMS FORMULA C=100)

FLOW RATE		NOMINAL DIAMETER in mm and inches																	
m³/h	l/min		15 1/2"	20 3/4"	25 1"	32 1 1/4"	40 1 1/2"	50 2	65 2 1/2"	80 3"	100 4"	125 5"	150 6"	175 7"	200 8"	250 10"	300 12"	350 14"	400 16"
0,6	10	v	0,94	0,53	0,34	0,21	0,13		The hr values must be multiplier by: 0,71 for galvanized or painted steel pipes 0,54 for stainless steel or copper pipes 0,47 for PVC or PE pipes										
		hr	16	3,94	1,33	0,40	0,13												
0,9	15	v	1,42	0,80	0,51	0,31	0,20												
		hr	33,9	8,35	2,82	0,85	0,29												
1,2	20	v	1,89	1,06	0,68	0,41	0,27	0,17											
		hr	57,7	14,21	4,79	1,44	0,49	0,16											
1,5	25	v	2,36	1,33	0,85	0,52	0,33	0,21											
		hr	87,2	21,5	7,24	2,18	0,73	0,25											
1,8	30	v	2,83	1,59	1,02	0,62	0,40	0,25											
		hr	122	30,1	10,1	3,05	1,03	0,35											
2,1	35	v	3,30	1,86	1,19	0,73	0,46	0,30											
		hr	162	40,0	13,5	4,06	1,37	0,46											
2,4	40	v		2,12	1,36	0,83	0,53	0,34	0,20										
		hr		51,2	17,3	5,19	1,75	0,59	0,16										
3	50	v		2,65	1,70	1,04	0,66	0,42	0,25										
		hr		77,4	26,1	7,85	2,65	0,89	0,25										
3,6	60	v		3,18	2,04	1,24	0,80	0,51	0,30										
		hr		108	36,6	11,0	3,71	1,25	0,35										
4,2	70	v		3,72	2,38	1,45	0,93	0,59	0,35										
		hr		144	48,7	14,6	4,93	1,66	0,46										
4,8	80	v		4,25	2,72	1,66	1,06	0,68	0,40										
		hr		185	62,3	18,7	6,32	2,13	0,59										
5,4	90	v			3,06	1,87	1,19	0,76	0,45	0,30									
		hr			77,5	23,3	7,85	2,65	0,74	0,27									
6	100	v			3,40	2,07	1,33	0,85	0,50	0,33									
		hr			94,1	28,3	9,54	3,22	0,90	0,33									
7,5	125	v			4,25	2,59	1,66	1,06	0,63	0,41									
		hr			142	42,8	14,4	4,86	1,36	0,49									
9	150	v				3,11	1,99	1,27	0,75	0,50	0,32								
		hr				59,9	20,2	6,82	1,90	0,69	0,23								
10,5	175	v				3,63	2,32	1,49	0,88	0,58	0,37								
		hr				79,7	26,9	9,07	2,53	0,92	0,31								
12	200	v				4,15	2,65	1,70	1,01	0,66	0,42								
		hr				102	34,4	11,6	3,23	1,18	0,40								
15	250	v				5,18	3,32	2,12	1,26	0,83	0,53	0,34							
		hr				154	52,0	17,5	4,89	1,78	0,60	0,20							
18	300	v					3,98	2,55	1,51	1,00	0,64	0,41							
		hr					72,8	24,6	6,85	2,49	0,84	0,28							
24	400	v					5,31	3,40	2,01	1,33	0,85	0,54	0,38						
		hr					124	41,8	11,66	4,24	1,43	0,48	0,20						
30	500	v					6,63	4,25	2,51	1,66	1,06	0,68	0,47						
		hr					187	63,2	17,6	6,41	2,16	0,73	0,30						
36	600	v						5,10	3,02	1,99	1,27	0,82	0,57	0,42					
		hr						88,6	24,7	8,98	3,03	1,02	0,42	0,20					
42	700	v						5,94	3,52	2,32	1,49	0,95	0,66	0,49					
		hr						118	32,8	11,9	4,03	1,36	0,56	0,26					
48	800	v						6,79	4,02	2,65	1,70	1,09	0,75	0,55					
		hr						151	42,0	15,3	5,16	1,74	0,72	0,34					
54	900	v						7,64	4,52	2,99	1,91	1,22	0,85	0,62					
		hr						188	52,3	19,0	6,41	2,16	0,89	0,42					
60	1000	v							5,03	3,32	2,12	1,36	0,94	0,69	0,53				
		hr							63,5	23,1	7,79	2,63	1,08	0,51	0,27				
75	1250	v							6,28	4,15	2,65	1,70	1,18	0,87	0,66				
		hr							96,0	34,9	11,8	3,97	1,63	0,77	0,40				
90	1500	v							7,54	4,98	3,18	2,04	1,42	1,04	0,80				
		hr							134	48,9	16,5	5,57	2,29	1,08	0,56				
105	1750	v							8,79	5,81	3,72	2,38	1,65	1,21	0,93				
		hr							179	65,1	21,9	7,40	3,05	1,44	0,75				
120	2000	v								6,63	4,25	2,72	1,89	1,39	1,06	0,68			
		hr								83,3	28,1	9,48	3,90	1,84	0,96	0,32			
150	2500	v								8,29	5,31	3,40	2,36	1,73	1,33	0,85			
		hr								126	42,5	14,3	5,89	2,78	1,45	0,49			
180	3000	v									6,37	4,08	2,83	2,08	1,59	1,02	0,71		
		hr									59,5	20,1	8,26	3,90	2,03	0,69	0,28		
210	3500	v									7,43	4,76	3,30	2,43	1,86	1,19	0,83		
		hr									79,1	26,7	11,0	5,18	2,71	0,91	0,38		
240	4000	v									8,49	5,44	3,77	2,77	2,12	1,36	0,94		
		hr									101	34,2	14,1	6,64	3,46	1,17	0,48		
300	5000	v										6,79	4,72	3,47	2,65	1,70	1,18		
		hr										51,6	21,2	10,0	5,23	1,77	0,73		
360	6000	v										8,15	5,66	4,16	3,18	2,04	1,42		
		hr										72,3	29,8	14,1	7,33	2,47	1,02		
420	7000	v											6,61	4,85	3,72	2,38	1,65	1,21	
		hr											39,6	18,7	9,75	3,29	1,35	0,64	
480	8000	v											7,55	5,55	4,25	2,72	1,89	1,39	
		hr											50,7	23,9	12,49	4,21	1,73	0,82	
540	9000	v											8,49	6,24	4,78	3,06	2,12	1,56	1,19
		hr											63,0	29,8	15,5	5,24	2,16	1,02	0,53
600	10000	v												6,93	5,31	3,40	2,36	1,73	1,33
		hr												36,2	18,9	6,36	2,62	1,24	0,63

FLOW RESISTANCE

TABLE OF FLOW RESISTANCE IN BENDS, VALVES AND GATES

The flow resistance is calculated using the equivalent pipeline length method according to the table below:

ACCESSORY TYPE	DN											
	25	32	40	50	65	80	100	125	150	200	250	300
	Equivalent pipeline length (m)											
45° bend	0,2	0,2	0,4	0,4	0,6	0,6	0,9	1,1	1,5	1,9	2,4	2,8
90° bend	0,4	0,6	0,9	1,1	1,3	1,5	2,1	2,6	3,0	3,9	4,7	5,8
90° smooth bend	0,4	0,4	0,4	0,6	0,9	1,1	1,3	1,7	1,9	2,8	3,4	3,9
Union tee or cross	1,1	1,3	1,7	2,1	2,6	3,2	4,3	5,3	6,4	7,5	10,7	12,8
Gate	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
Non return valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9

G-a-pcv-en_a_th

The table is valid for the Hazen Williams coefficient $C=100$ (cast iron pipework);

for steel pipework, multiply the values by 1,41;

for stainless steel, copper and coated cast iron pipework, multiply the values by 1,85;

When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table of flow resistance.

The values given are guideline values which are bound to vary slightly according to the model, especially for gate valves and non-return valves, for which it is a good idea to check the values supplied by manufacturers.

VOLUMETRIC CAPACITY

Litres per minute l/min	Cubic metres per hour m ³ /h	Cubic feet per hour ft ³ /h	Cubic feet per minute ft ³ /min	Imp. gal. per minute Imp. gal./min	US gal. per minute Us gal./min
1,0000	0,0600	2,1189	0,0353	0,2200	0,2642
16,6667	1,0000	35,3147	0,5886	3,6662	4,4029
0,4719	0,0283	1,0000	0,0167	0,1038	0,1247
28,3168	1,6990	60,0000	1,0000	6,2288	7,4805
4,5461	0,2728	9,6326	0,1605	1,0000	1,2009
3,7854	0,2271	8,0208	0,1337	0,8327	1,0000

PRESSURE AND HEAD

Newton per square metre N/m ²	kilo Pascal kPa	bar bar	Pound force per square inch psi	metre of water m H ₂ O	millimetre of mercury mm Hg
1,0000	0,0010	1 x 10 ⁻⁵	1.45 x 10 ⁻⁴	1.02 x 10 ⁻⁴	0,0075
1000,0000	1,0000	0,0100	0,1450	0,1020	7,5006
1 x 10 ⁵	100,0000	1,0000	14,5038	10,1972	750,0638
6894,7570	6,8948	0,0689	1,0000	0,7031	51,7151
9806,6500	9,8067	0,0981	1,4223	1,0000	73,5561
133,3220	0,1333	0,0013	0,0193	0,0136	1,0000

LENGTH

millimetre mm	centimetre cm	metre m	inch in	foot ft	yard yd
1,0000	0,1000	0,0010	0,0394	0,0033	0,0011
10,0000	1,0000	0,0100	0,3937	0,0328	0,0109
1000,0000	100,0000	1,0000	39,3701	3,2808	1,0936
25,4000	2,5400	0,0254	1,0000	0,0833	0,0278
304,8000	30,4800	0,3048	12,0000	1,0000	0,3333
914,4000	91,4400	0,9144	36,0000	3,0000	1,0000

VOLUME

cubic metre m ³	litre litro	millilitre ml	imp. Gallon imp. gal.	US gallon US gal.	cubic foot ft ³
1,0000	1000,0000	1 x 10 ⁶	219,9694	264,1720	35,3147
0,0010	1,0000	1000,0000	0,2200	0,2642	0,0353
1 x 10 ⁻⁶	0,0010	1,0000	2.2 x 10 ⁻⁴	2.642 x 10 ⁻⁴	3.53 x 10 ⁻⁵
0,0045	4,5461	4546,0870	1,0000	1,2009	0,1605
0,0038	3,7854	3785,4120	0,8327	1,0000	0,1337
0,0283	28,3168	28316,8466	6,2288	7,4805	1,0000

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ITT-Lowara (www.lowara.com), headquarters of "Residential and Commercial Water - EMEA" part of the ITT Corporation and located in Montecchio Maggiore, Vicenza - Italy, is a leading manufacturer of hydraulic pumps and water handling and control systems. It has 1.819 employees in Europe, 675 operating in Italy. In 2009 its consolidated sales totalled about 286 million €, or over 396 million \$. ITT Corporation is a high-technology engineering and manufacturing company operating on all seven continents in three vital markets: water and fluids management, global defense and security, and motion and flow control. With a heritage of innovation, ITT partners with its customers to deliver extraordinary solutions that create more livable environments, provide protection and safety and connect our world. Headquartered in White Plains, N.Y., the company generated 2009 revenue of \$10.9 billion.

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