

TACOFLOW3 DUO

CIRCULATORS FOR HYDRONIC HEATING & SOLAR APPLICATIONS



R290



A family of products that offers various options to control the output in hydronic heating and solar systems

DESCRIPTION

All TacoFlow3 DUO models are high-efficiency ECM circulation pumps. They are driven by unique hi-tech permanent magnet synchronous motors and comply with the latest ErP EU directives for energy efficiency. Each TacoFlow3 DUO circulator incorporates inverter electronics with the unique two-phase TACO motors to deliver robust designs, with fewer components and lower power losses. These technological benefits result in maintenance-free ECM circulators that can adjust electronically to the needs of the installation while ensuring powerful performance, high efficiency and reliability with a minimal installation footprint.

INSTALLATION POSITION

The pump can be installed both horizontally or vertically. An arrow indicates the flow direction.

OPERATION

The circulators are of a glandless design. The rotating parts of the motor run inside the pumped medium. This provides lubrication for the motor and the rotating parts and eliminates the need for internal seals.

Each circulator is equipped with the unique "auto unblock" function for active protection against rotor jamming.

ADVANTAGES

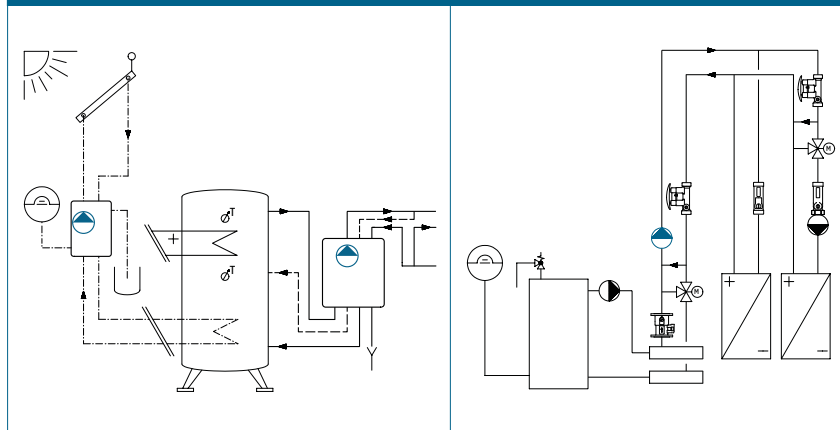
- Suitable for both heating and solar applications
- Easy to install and precise output control through choice of operating modes, performance and connectivity options
- Flexible commissioning with internal ($\Delta p-v$, $\Delta p-c$) and/or external (HYBRID / LIN bus) control schemes
- Highly reliable and robust with superb anti-jamming protection against dry starts and dirt
- Exceptionally compact to fit in tightest spaces
- Reach comfort temperatures faster and save energy with the patented TacoAdapt™ function
- Reduce complexity with HYBRID version (one circulator fits all installations)
- Pin-to-pin connection options to reduce supply chain complexity
- Compliance with flammable refrigerants (e.g., R290, R32)

The "auto unblock" function combines automatic torque boosting/swinging whenever a rotor jam is electronically detected with a unique design to: (a) protect the sensitive rotor chamber from dirt, and (b) reduce the magnetic attraction of any metallic particles contained in the heating water.

APPLICATION CATEGORIES

Standalone and/or system-integrated circulators for hydronic space heating in residential, commercial and industrial buildings with moderate flow and head demands

SYSTEM/BASIC DIAGRAM



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OVERVIEW (AVAILABLE STANDARD PLATFORM OPTIONS)

TacoFlow3 DUO | A family of products that lets you choose the right circulator for each hydronic heating and/or solar applications.

High efficiency circulators with a range of available options regarding operating modes, performance levels, and connectivity (hydraulic and electrical). Further customizations are available upon request.

					TacoFlow3 DUO			
Operating mode: Internal / self control ¹					(Standard)	ADAPT	HYBRID ²	LIN
Proportional pressure (Δp-v)					P1, P2, P3	P1, P2, P3	P2	✗
Constant pressure (Δp-c)					CI, CII, CIII	CI, CII, CIII	CI, CII, CIII	✗
Various constant speeds (Min-Max)					✓	✓	✓	✓
Automatic mode (TacoAdapt™ ³)					✗	✓	✓	✗
Operating mode: External control ⁴								
PWM profile heating / solar (see penultimate page)					✗	✗	✓	✗
LIN bus (VDMA24226)					✗	✗	✗	✓
Performance: Head								
6.0 m (44 W)					✓	✓	✓	✓
8.5 m (63 W)					✓	✓	✓	✓
					Weight ⁵			
Connection	Centre distance	Material	6.0 m	8.5 m				
G 1" (DN15)	130 mm	Composite	1.01 kg	1.12 kg	✓	✓	✓	✓
	130 mm	Cast iron	1.53 kg	1.64 kg	✓	✓	✓	✓
G 1 ½" (DN 25)	130 mm	Cast iron	1.67 kg	1.78 kg	✓	✓	✓	✓
	180 mm	Cast iron	1.79 kg	1.90 kg	✓	✓	✓	✓
G 2" (DN 32)	180 mm	Cast iron	1.94 kg	2.05 kg	✓	✓	✓	✓

¹ No external controller is required for operation.

See curves for more information.

² HYBRID: Circulator incorporates both external control (e.g., external PWM signal) and internal control (e.g., self-controlled) schemes.

³ Granted patent EP 2 910 788 B1

⁴ An external controller is required for operation.

⁵ Without connector and cable

TECHNICAL DATA

Circulator

- Ambient temperature:
+0 °C to +40 °C
- Permissible fluid temperature*:
+2 °C to +110 °C (short term: 130 °C)
- Static pressure:
Max. 1.0 MPa – 10 bar
- Minimum pressure at suction port:
 - 0.005 MPa (0.05 bar) at 75 °C
 - 0.025 MPa (0.25 bar) at 85 °C
 - 0.055 MPa (0.55 bar) at 95 °C
- Max. relative humidity: ≤ 95 %
- Sound pressure level: < 33 dB(A)
- Low Voltage Directive (2014/35/EC): Standards applied: EN 62233, EN 60335-1 and EN 60335-2-51
- EMC Directive (2014/30/EC); Standards applied: EN 61000-3-2, EN 61000-3-3, EN 55014-1 and EN 55014-2
- Ecodesign Directive (2009/125/EC); Standards applied: EN 16297-1 and EN 16297-2
- Approvals and labels: VDE, CE, GS, UKCA

- EN 60335-2-40:2014-01 clause 22.116 and clause 22.117 (all the refrigerants of Annex BB herein, including R290)

Material

- Pump body: Cast iron (CDP-coated (EN-GJL-200))
- Impeller: PA6T/6I GF40 composite plastic
- Rotor shaft: Ceramic
- Rotor bear: Graphite
- Rotor housing: PPS 40GF composite plastic
- Motor: PA66/6 GF30 composite plastic, steel, copper, aluminium

Motor and electronics

- Supply voltage: 1 x 230 V – 240 V (+10 % / -15 %)
- Power plugs: see "Type Key"
- Power rating (P1):
 - 6.0 m: min. 3 W – max. 44 W
 - 8.5 m: min. 3 W – max. 63 W
- Rated current (I1):
 - 6.0 m: min. 0.05 A – max. 0.45 A
 - 8.5 m: min. 0.05 A – max. 0.6 A

- Insulation class: H
- Protection rating: IP44
- Safety category: II
- Starting (inrush) current: < 9 A according to EN 61000-3-3 annex B or VDMA2425 (< 3 A upon request)

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195-1)
- Water and proprietary additives used against corrosion and freezing up to 40 %

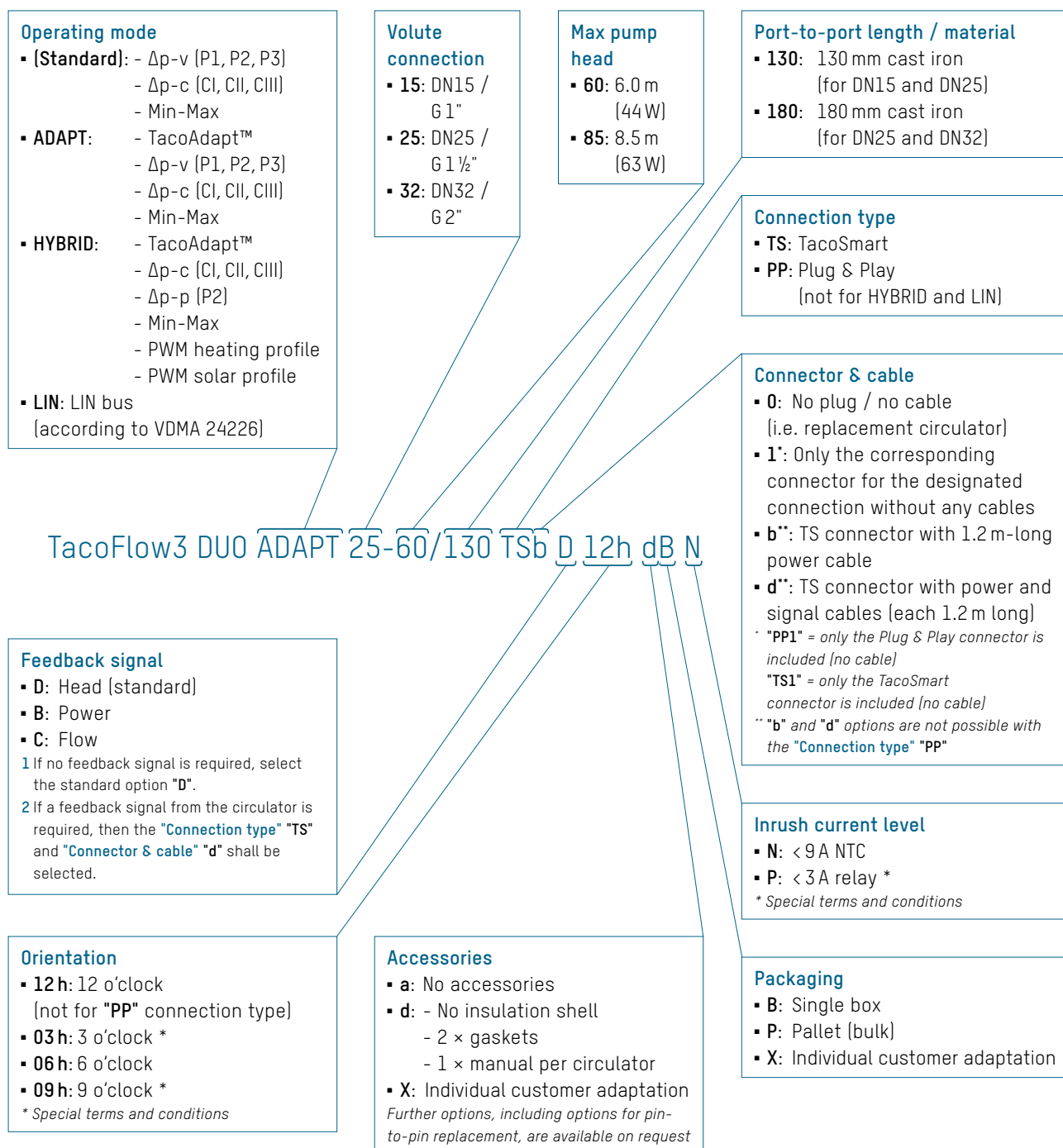
* To prevent condensate in the motor and on the control electronics, the temperature of the pumped medium must always be higher than the ambient temperature.

ENERGY EFFICIENCY INDEX

6.0 m: EEI ≤ 0.19 – Part 2
8.5 m: EEI ≤ 0.20 – Part 2

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TYPE KEY



SELECTING THE RIGHT "OPERATING MODE"

- **[Standard]:** Universal use - standard applications.
- **ADAPT:** With patented TacoAdapt™ intelligence for radiator systems to reach comfort room temperatures faster with lower overall power consumption.
- **HYBRID:** One circulator fits/replaces all. Typical example: one circulator suitable both for systems with and without external controller (minimize complexity, e.g., solar pump groups).
- **LIN:** Digital data exchange to optimize the performance of heating systems.

CONFIGURATION EXAMPLE

TacoFlow3 DUO HYBRID

- To configure a TacoFlow3 DUO circulator which accepts both external control signals (e.g., PWM) and has self-controlled features (e.g., internal control) select "Operating mode" = "HYBRID"

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STANDARD CONFIGURATION (QUICK SELECTION)

- Connection type: "PP": Plug & Play
Connector & cable: "1": No cable
Orientation: "06h": 6 o'clock
Packaging: "B": Single box
Accessories: "d": No Insulation shell, 2 × gaskets, 1 × manual
Inrush current level: "N": < 9 A NTC



Order no.*	Operating Mode	Head	Connection	Port-to-port length	Short product name
33 004 0G 00 036 131	(Standard)	6.0 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO 15-60/130 PP
33 004 0J 00 036 131			G 1 ½" (DN25)		TacoFlow3 DUO 25-60/130 PP
33 004 0L 00 036 131			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO 25-60/180 PP
33 004 0M 00 036 131			G 2" (DN32)		TacoFlow3 DUO 32-60/180 PP
33 00A 0G 0G 036 131		8.5 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO 15-85/130 PP
33 00A 0J 0G 036 131			G 1 ½" (DN25)		TacoFlow3 DUO 25-85/130 PP
33 00A 0L 0G 036 131			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO 25-85/180 PP
33 00A 0M 0G 036 131			G 2" (DN32)		TacoFlow3 DUO 32-85/180 PP
33 004 0G 01 037 131	ADAPT	6.0 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO ADAPT 15-60/130 PP
33 004 0J 01 037 131			G 1 ½" (DN25)		TacoFlow3 DUO ADAPT 25-60/130 PP
33 004 0L 01 037 131			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO ADAPT 25-60/180 PP
33 004 0M 01 037 131			G 2" (DN32)		TacoFlow3 DUO ADAPT 32-60/180 PP
33 00A 0G 0H 037 131		8.5 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO ADAPT 15-85/130 PP
33 00A 0J 0H 037 131			G 1 ½" (DN25)		TacoFlow3 DUO ADAPT 25-85/130 PP
33 00A 0L 0H 037 131			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO ADAPT 25-85/180 PP
33 00A 0M 0H 037 131			G 2" (DN32)		TacoFlow3 DUO ADAPT 32-85/180 PP

* 0 = zero, 1 = one

DIMENSIONAL DRAWING

Version with "Connection type": "PP" (Plug & Play), "Connector & cable": "1", and "Orientation": "06h"
Designed for ease of installation when the distance from the power source location is not known prior to installation.

Volute / pump body: Cast iron

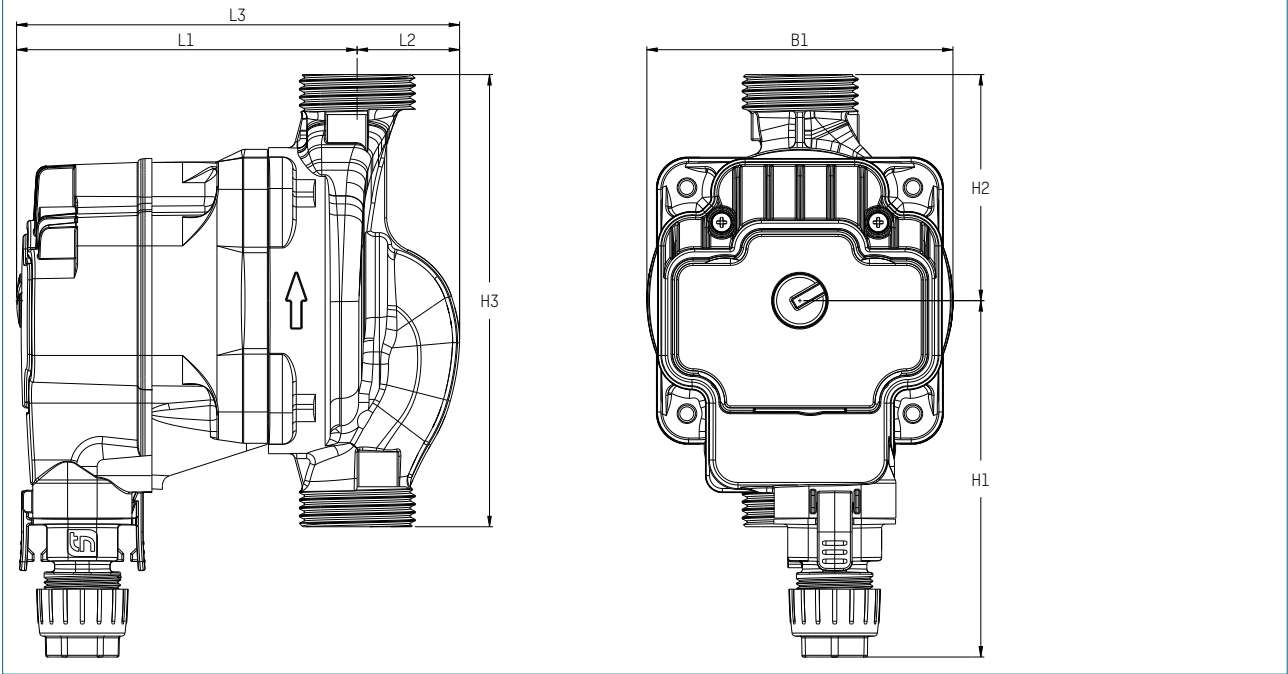


TABLE OF MEASUREMENTS

Product configurations

- 6 o'clock orientation
- 6.0 m / 8.5 m
- Plug & Play connector
- For operating modes:
Standard and ADAPT

Volute connection / height	Measurements (mm)						
	L1	L2	L3	B1	H1	H2	H3
DN15 / 130	98	30	128	88	103	65	130
DN25 / 130	98	30	128	88	103	65	130
DN25 / 180	98	30	128	88	103	90	180
DN32 / 180	98	30	128	88	103	90	180

TACOFLOW3 DUO | CIRCULATORS FOR HYDRONIC HEATING & SOLAR APPLICATIONS

STANDARD CONFIGURATION (QUICK SELECTION)

- Connection type: "TS": TacoSmart
- Connector & cable: "b": 1 × 1.2 m-long power cable (Standard / ADAPT)
"d": 2 × 1.2 m-long power cable (HYBRID)
- Orientation: "12h": 12 o'clock
- Packaging: "B": Single box
- Accessories: "d": No Insulation shell, 2 × gaskets, 1 × manual
- Inrush current level: "N": <9 A NTC



Order no.*	Operating Mode	Head	Connection	Port-to-port length	Short product name
33 000 02 00 02Q 431	(Standard)	6.0 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO 15-60/130 TS
33 000 05 00 02Q 431			G 1 ½" (DN25)		TacoFlow3 DUO 25-60/130 TS
33 000 07 00 02Q 431			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO 25-60/180 TS
33 000 08 00 02Q 431			G 2" (DN32)		TacoFlow3 DUO 32-60/180 TS
33 006 02 06 02Q 431		8.5 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO 15-85/130 TS
33 006 05 06 02Q 431			G 1 ½" (DN25)		TacoFlow3 DUO 25-85/130 TS
33 006 07 06 02Q 431			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO 25-85/180 TS
33 006 08 06 02Q 431			G 2" (DN32)		TacoFlow3 DUO 32-85/180 TS
33 000 02 01 02R 431	ADAPT	6.0 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO ADAPT 15-60/130 TS
33 000 05 01 02R 431			G 1 ½" (DN25)		TacoFlow3 DUO ADAPT 25-60/130 TS
33 000 07 01 02R 431			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO ADAPT 25-60/180 TS
33 000 08 01 02R 431			G 2" (DN32)		TacoFlow3 DUO ADAPT 32-60/180 TS
33 006 02 0H 02R 431		8.5 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO ADAPT 15-85/130 TS
33 006 05 0H 02R 431			G 1 ½" (DN25)		TacoFlow3 DUO ADAPT 25-85/130 TS
33 006 07 0H 02R 431			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO ADAPT 25-85/180 TS
33 006 08 0H 02R 431			G 2" (DN32)		TacoFlow3 DUO ADAPT 32-85/180 TS
33 000 02 02 02S 631	HYBRID	6.0 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO HYBRID 15-60/130 TS
33 000 05 02 02S 631			G 1 ½" (DN25)		TacoFlow3 DUO HYBRID 25-60/130 TS
33 000 07 02 02S 631			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO HYBRID 25-60/180 TS
33 000 08 02 02S 631			G 2" (DN32)		TacoFlow3 DUO HYBRID 32-60/180 TS
33 006 02 0W 02S 631		8.5 m	G 1" (DN15)	130 (mm)	TacoFlow3 DUO HYBRID 15-85/130 TS
33 006 05 0W 02S 631			G 1 ½" (DN25)		TacoFlow3 DUO HYBRID 25-85/130 TS
33 006 07 0W 02S 631			G 1 ½" (DN25)	180 (mm)	TacoFlow3 DUO HYBRID 25-85/180 TS
33 006 08 0W 02S 631			G 2" (DN32)		TacoFlow3 DUO HYBRID 32-85/180 TS

* 0 = zero, 1 = one

DIMENSIONAL DRAWING

Version with "Connection type": "TS" (TacoSmart), "Connector & cable": "a", "b", "c" or "d" and "Orientation": "12h"

Designed for maximum compactness and minimal installation footprint, ideal to fit into the tightest spaces and eliminate the need to change the orientation.

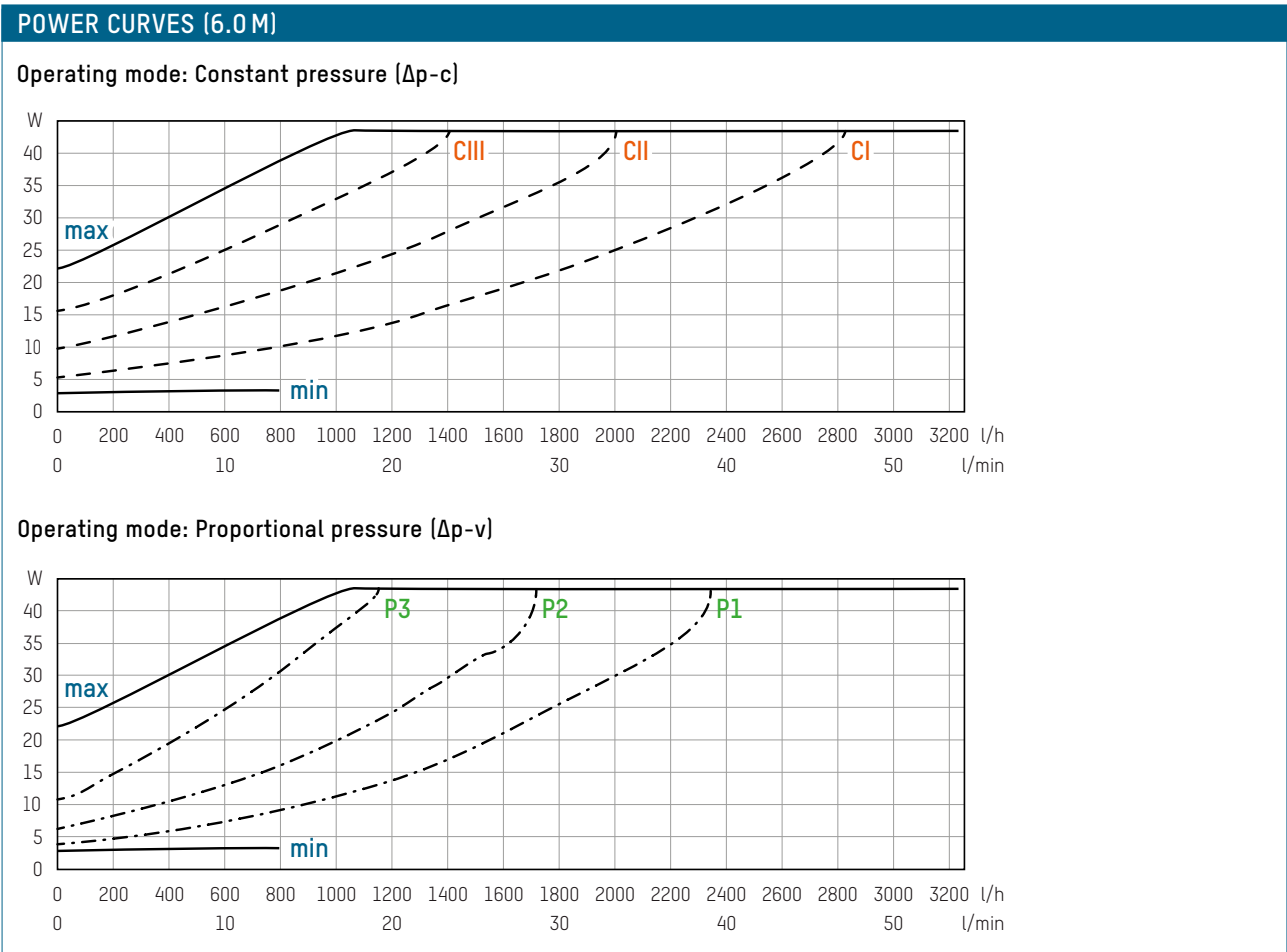
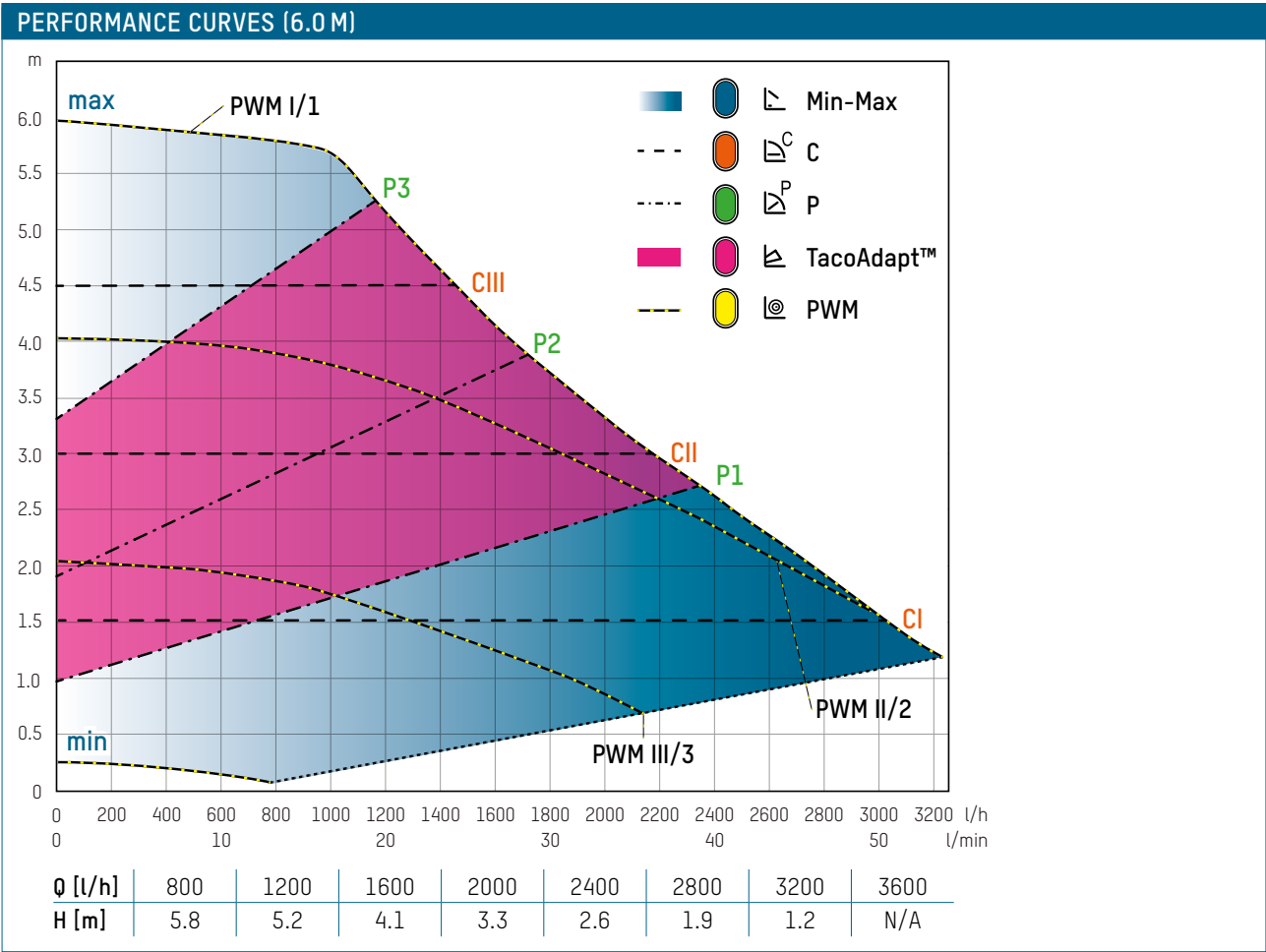
Volute / pump body: Cast iron

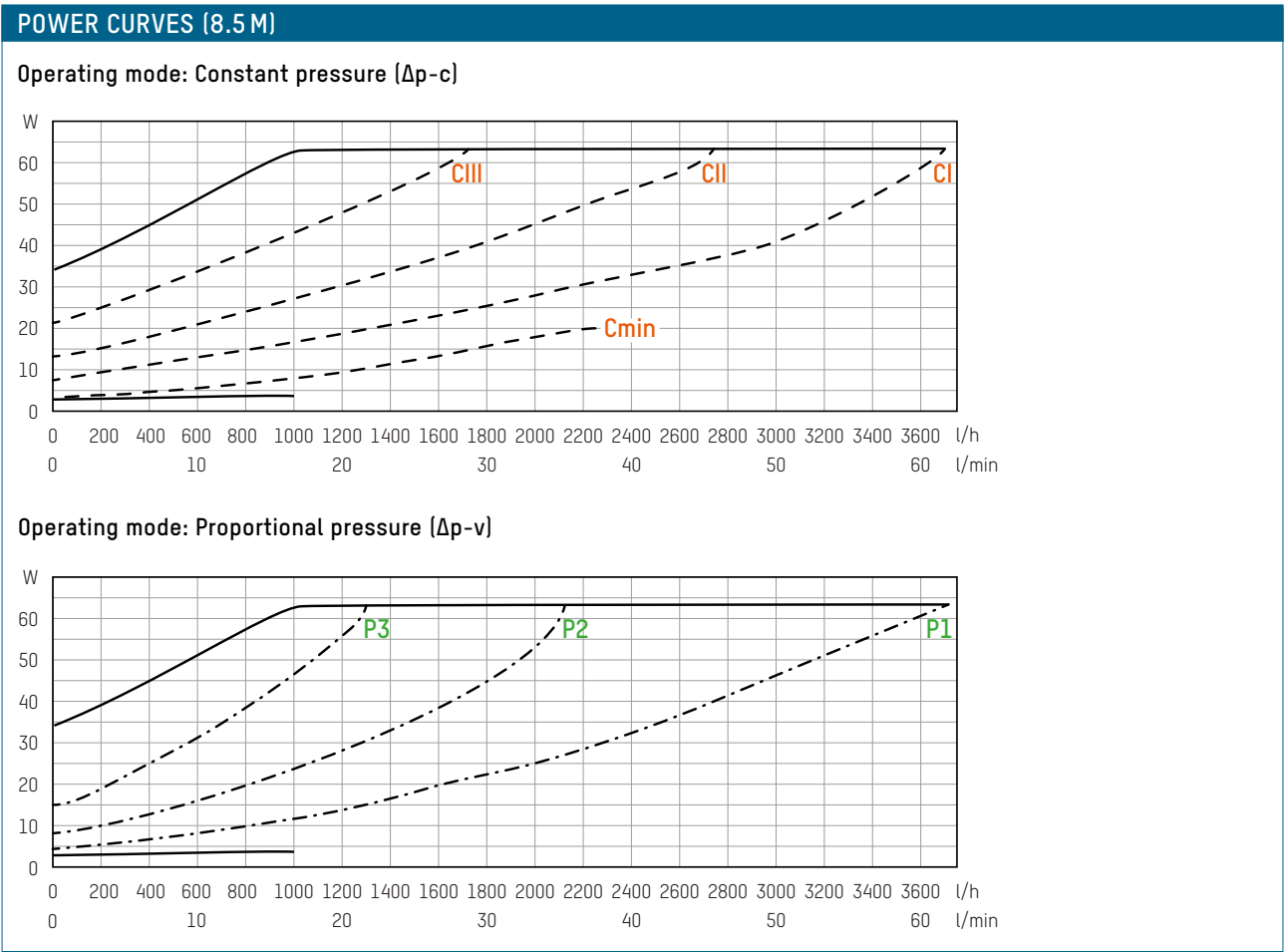
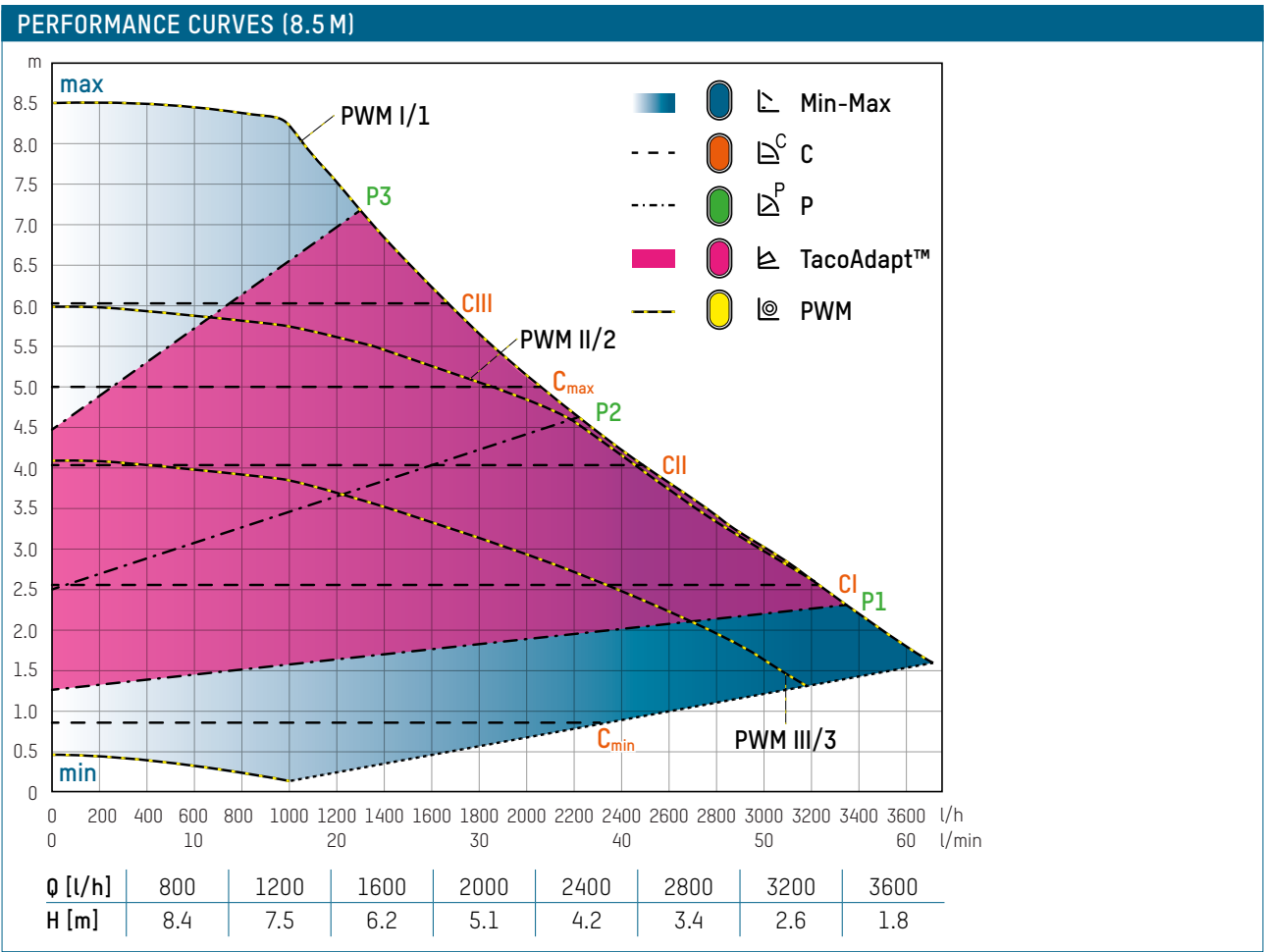
The technical drawing consists of two views of the Tacoflow3 Duo circulator. The left view is a side profile showing the pump body and motor assembly. It includes three horizontal dimension lines: L1 (width of the motor housing), L2 (width of the pump body), and L3 (total width). A vertical dimension line H3 indicates the total height. An upward-pointing arrow is shown on the pump body. The right view is a front-facing view of the pump body, showing the TacoSmart connector. It includes a horizontal dimension line B1 (width) and two vertical dimension lines: H1 (height from the base to the center of the connector) and H2 (height from the center of the connector to the top of the pump body).

TABLE OF MEASUREMENTS

- Product configurations**
- 12 o'clock orientation
 - 6.0m / 8.5m
 - TacoSmart connector
 - For all operating modes:
Standard, ADAPT, HYBRID and LIN

Volute connection / height	Measurements (mm)						
	L1	L2	L3	B1	H1	H2	H3
DN15 / 130	98	30	128	88	65	70	130
DN 25 / 130	98	30	128	88	65	70	130
DN 25 / 180	98	30	128	88	90	70	180
DN 32 / 180	98	30	128	88	90	70	180



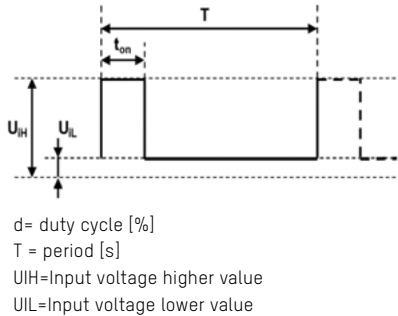


PWM control signal

The TacoFlow3 DUO circulators can be driven by an external controller via a Pulse Width Modulation (PWM) signal. To exchange information with the controller, the circulator needs the two-cable (power and signal) version of the TacoSmart connector.

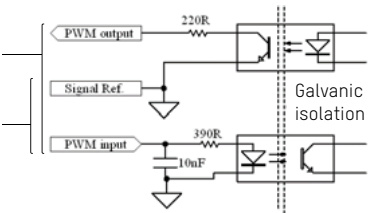
Communication

The PWM communication is standardized in accordance with VDMA 24224 "Wet runner circulating pumps - Specification of PWM control signals". Customer-specific versions are available on request.



PWM input profile

The PWM interface can be 1-way or 2-way and is galvanically isolated to ensure that the user does not come into contact with high voltage.



PWM interface electrical specification

PWM input frequency	100 – 4000 Hz
Input voltage upper value UiH	4 – 24 V
Input voltage lower value UiL	<1 V
Input current at UiH	<15 mA
PWM input operating range	0-100 %
PWM output frequency	75 Hz ±5 %
Accuracy of output signal	±2 %
Output duty cycle	0 – 100 %
Output transistor collector voltage	<70 V
Output transistor collector current	<25 mA
Power dissipation on output resistor	<250 mW
Insulation voltage	3750 V
Sensitive to polarity change	Coded connector

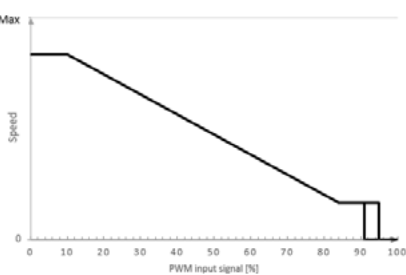
PWM input signal

According to VDMA 24224 the input signal can have a Heating or Solar profile.

Heating profile

In the event of cable breakage in a gas boiler system, the circulator continues to work at maximum speed to guarantee the transfer of heat to the primary exchanger.

PWM Heating profile

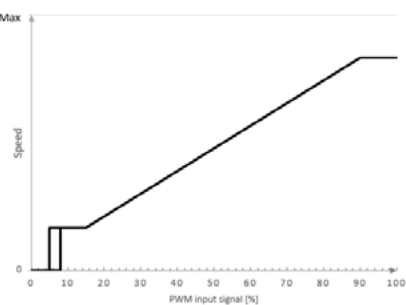


Pump status	PWM input signal
Maximum speed (Max)	≤10 %
Variable speed (Min-Max)	>10 ... ≤84 %
Minimum speed (Min)	>84 ... ≤91 %
Hysteresis range (On/Off)	>91 ... ≤95 %
Standby mode (Off)	>95 ... ≤100 %

Solar profile

In the event of cable breakage, the circulator stops to avoid overheating of the solar thermal system.

PWM Solar profile

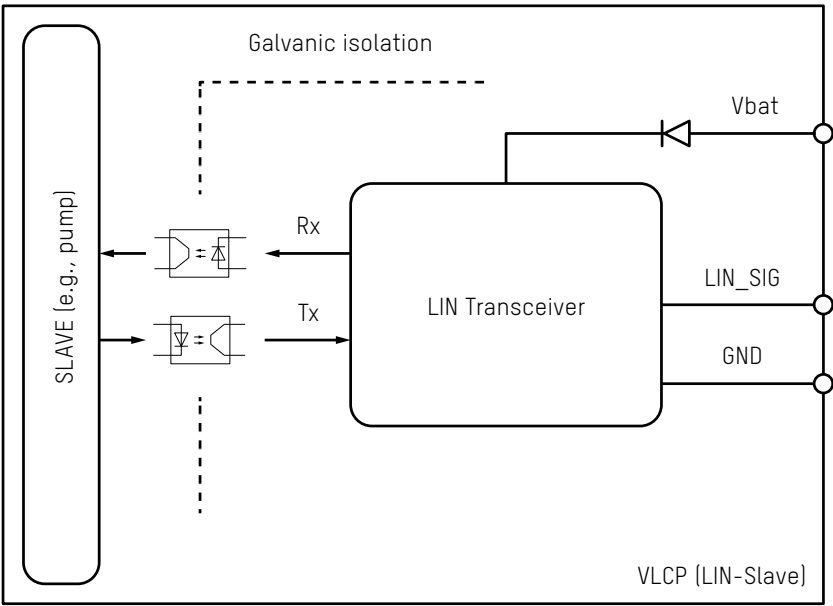


Pump status	PWM input signal
Maximum speed (Max)	>90 ... ≤100 %
Variable speed (Min-Max)	>15 ... ≤90 %
Minimum speed (Min)	>8 ... ≤15 %
Hysteresis range (On/Off)	>5 ... ≤8 %
Standby mode (Off)	≤5 %

LIN bus: Explanation

The TacoFlow3 DU0 circulators can be driven by an external controller with the LIN bus technology. The LIN bus interface used is based on the VDMA LIN Circulator Profile (VLCP) as described in VDMA 24226. Herein, the VLCP pump is defined as Slave.

The VLCP interface is galvanically insulated to guarantee the SELV level (IEC 60335 “safety extra low voltage”). For the circulator to exchange information with the controller, the circulator needs the two-cable (power and signal) version of the TacoSmart connector.



VLCP LIN BUS ELECTRICAL SPECIFICATION

VLCP power supply	Provided externally (e.g., master)
Power for LIN bus (Vbat)	8 – 27 V
Max current consumption of VLCP	25 mA
LIN speed slave	19.2 Kbps