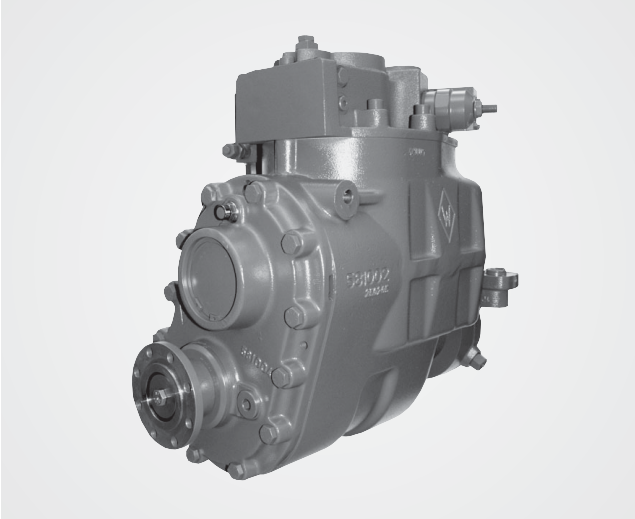
ZEUS HYDRATECH LTD

Global Suppliers of Premium Hydraulic Components

Official UK Distributor for Sauer Bibus GmbH

T: +44(0)1172 130042. E: sales@zeushydratech.com. W: zeushydratech.com



Characteristics

- Design: axial piston variable displacement motor in bent axis design for hydrostatic drives in open and closed loop circuits
- Unique large angle motor
- IVCD® is a stepless hydrostatic drive transmission consisting of a mechanical gearbox, a hydraulic motor and controller
- The 45 degree wide angle technology offers a large speed range
- The entire speed range can be driven without loss of torque. No torque interruption over the whole speed range.
- Automatic adaption to power requirements as well as a simple change in direction of travel and torque reversal
- Optimal efficiency through integrated variable displacement large angle motor
- Low noise level
- Reduced fuel consumption
- High power cube ratio

Contents

Type Description and Ordering Code

	A				Q	B			C				D				E	F		G	H				I			J		K	
ICVD													/				N								N			N	N

Unit 1

A **Design**

MO-S0	Hydraulic motor
PU-S0	Hydraulic pump
GT-S1	Hydraulic motor with 1 mechanical gear ratio
GT-S2	Hydraulic motor with 2 mechanical gear ratios and mounting flange for additional motor
GT-T2	Double hydraulic motor with 2 mechanical gear ratios
GT-T3	Double hydraulic motor with 3 mechanical gear ratios

Q **Mounting Flange for Additional Motor**

N	Without mounting flange for additional motor
A	With mounting flange for additional motor

B **Displacement-gross, code for possible max. displacement (3 digits in cm3/rev.) range 233-466**

Example	
233	233cm³ / 45°
278	Total 278cm³/rpm standard hyd. motor, flange ZD 125mm, LK 160mm 4xM12, shaft W30x14x98 DIN 5480
313	Total 313cm³/rpm standard hyd. motor, flange 140 B4 HL ISO 3019/2, shaft W40x2x30x18x9g DIN 5480
340	Total 340cm³/rpm standard hyd. motor, flange ZD 160mm, LK 200 4xM16, key N45x2x30x21-9H DIN 5480

C **Rotary group Configuration**

V	Variable
K	Fixed
Z	Motor 1 and motor 2 variable displacement
E	Motor 1 variable displacement and motor 2 fixed

D **Gear Ratios**

NNN	Without
094	0,94
124	1,24
164	1,64
183	1,833
220	2,2
118	1,176

E **Controls**

N	None
H	Pressure related control
E	Electric control
O	Hydraulic control for open circuit
P	Electro-proportional control

F **Positioning Pressure Supply and Constant Pressure Override [1])**

G **Begin of Regulation [1])**

H **Ramp [1])**

I **Orifice Set [1])**

J **StrokeLlimitation [1])**

K **Open**

NN	without

Stepless hydrostatic drive with 45° large angle technique **ICVD®**

L	M	N	O

L **Min. Displacement in Full cm³/rpm Motor at 35 bar Δp [1])**

	233: 40 - 100 cm³/U

M **Flushing Pressure Setting Motor [1])**

N **Shaft**

NN	Without
1 F	Flange DIN ISO 7646 - 120x8xM10 hole circle 101.5 mm
2 F	Flange DIN ISO 7646 - 150x8x12 hole circle 130 mm
2W	Splined shaft DIN 5480 W50X2X30X24X8F, flange SAE D 4 hole

O **Shaft**

NN	Without
2 F	Flange DIN ISO 7646 - 150x8x12 hole circle 130 mm
1W	Splined shaft 21T 16/32 P DIN ANSI B92. 1
1 F	Flange DIN ISO 7646 - 120x8x10 hole circle 101.5mm

[1]) to be determined at time of projecting

Further variations upon request.

Stepless hydrostatic drive with 45° large angle technique **ICVD®**

Type Description and Ordering Code

E2	F2	G2	H2	I2	J2	K2	L2	M2	Y	Z
N					N	N N				

Unit 2

E2 **Controls 2**

NN	Without
H	Pressure dependent control
E	Electric control
O	Hydraulic control for open circuit
P	Electro-proportional control
W	Factory setting standard hyd. motor (F2 - M2 omitted)

F2 **Positioning Pressure Supply and Constant Pressure Override 2 [1])**

G2 **Begin of Regulation 2 [1])**

H2 **Ramp 2 [1])**

I2 **Orifice Set 2 [1])**

J2 **Stroke Limiter 2 [1])**

K2 **Open**

NN	Without

L2 **Min. displacement in full cm^3/rpm motor 2 [1])**

	233: 40 - 100 cm^3/U

M2 **Flushing pressure setting 2 [1])**

Y **Options [1])**

NNN	Without
AAA	4-Wheel valve / speed sensor 4.5 - 32V DC 20mA / carraro mounting flange
AAB	Speed sensor 8 - 16V DC 20mA / carraro mounting flange
AAC	Speed sensor 8 - 16V DC 20mA
AAD	Speed sensor 8 - 16V DC 20mA / turning angle indicator

Z **Options**

NNN	Without

[1]) to be determined at time of projecting **Further variations upon request.**

Technical Data

Hydraulic Fluids

Ratings and data are based on operating with hydraulic fluids containing oxidation, rust and foam inhibitors.These fluids must possess good thermal and hydrolytic stability to prevent wear, erosion and corrosion of the internal components.

Operation of the ICVD® using fire resistant fluids is also permitted under modified operating conditions.

It is not permissible to mix hydraulic fluids. For more information, contact your Sauer Bibus Service Representative.

Suitable Hydraulic Fluids:

– Hydraulic fluids per DIN 51 524, part 2 (HLP)
– Hydraulic fluids per DIN 51 524, part 3 (HVLP)
– API CD, CE and CF engine fluids per SAE J183
– M2C33F or G automatic transmission fluids (ATF)
– Agricultural multi purpose oil (STOU)

Temperature

The temperature and viscosity requirements must both be met.

Temperatures must lie within established limits (see table). The minimum temperature does not effect the motor/ components; however, can influence the power transfer. The maximum temperature is dependent upon the material properties of the motor. The indicated temperatures must not be exceeded and are normally measured on the case draining port.

Temperature Range[1])

υ minimum	=	–20°C	intermittent, cold start
υ rated	=	104°C	
υ maximum	=	115°C	intermittent

[1]) Measured at the hottest point, normally at the case drain port.

Viscosity

For maximum unit efficiency and bearing life, the oil viscosity should remain within the recommended operating range (see table). The minimum viscosity level should only occur during brief occasions of maximum ambient temperature. Minimum viscosity should only occur during cold start-up at appropriate reduced speed until the system has warmed up.

Viscosity range

ν minimum	=	7	mm^2/s	intermittent
ν rated	=	12-80	mm^2/s	recommended
ν maximum	=	1600	mm^2/s	intermittent at cold

Fluids and Filtration

In order to prevent premature wear, it is imperative that only clean fluid be used to fill and operate the hydrostatic drive system. The fluids must be considered as a part of the complete machine. The selected filter system must, under normal operating conditions, comply with the cleanliness class 20/17/12 or better in-accordance-with ISO 4406.

The selection of a filter depends on a number of factors including the contaminant ingression rate, the generation of contaminants in the system, the required fluid cleanliness, and the desired maintenance interval. Filter are selected to meet the above requirements using rating parameters of efficiency and capacity.

Since each system is unique, the filtration requirement for that system will be unique and must be determined by test in each case. It is essential that monitoring of prototypes and evaluation of components and performance throughout the test program be the final criteria for judging the adequacy of the filtration system.

Independent Braking System

Attention!

The loss of hydrostatic drive line **power in any mode of operation** (e.g., forward, reverse, or „neutral“ mode) may cause the loss of hydrostatic braking capacity. A braking system, redundant to the hydrostatic transmission must, therefore, be provided which is adequate to stop and hold the system should the condition develop.

Reservoir

In the reservoir, the air contained in the pressure fluid is deaerated during dwelling time. In addition, volumne variations associated with fluid expansion or contraction and in conjunction with the operation of differential cylinders are compensated.

The reservoir must be designed to accommodate maximum volume changes during all system operating modes. The minimum capacity of the reservoir in liter must be 5 to 8 times the maximum flow of the chargel pump.

A minimum reservoir volume equal to ½ times charge pump flow in l/min is recommended. This allows 30 seconds dwell time for the trapped air in the fluid in the reservior to rise to the surface of the fluid. If the reservior meets this creteria, then an adequate compensation volume will exist for most system application with closed reservoirs (i.e. no breather). The reservoir outlet to the charge pump inlet should be above the bottom of the reservoir inorder to take advantage of gravity separation and to prevent large foreign particles from entering the charge inlet line. The return line inlet port on the reservoir should be positioned below the surface of the fluid and as far away from the suction port as possible.

Deaeration will be inhanced through the slanted mounting of the baffle-plate between the return and inlet ports.

Technical Data

Rotary Group:

Design: variable displacement axial piston motor in bent axis design for both closed and open circuit operation.

Direction of rotation:
clockwise (CW) and counter-clockwise (CCW)

With no control pressure (initial position), the rotary group is at maximum swivel angle (closed circuit).

Geometric displacements:
max. 233 cm^3/rpm, min. 40 cm^3/rpm, optional 0 cm^3/rpm

Continouous speeds:
at max. swivel angle 1800 rpm,
at min. swivel angle 4000 rpm

maximum speed (intermittent):
at max. swivel angle 2200 rpm,
at min. swivel angle 4200 rpm

Control pressure: high pressure control

Swivel angle: max. 45°, min. 7°, optional 0°

Theor. specific torque 3,7 Nm/bar

Hydraulic Specifications:

Operating Pressure Range

Input p_1:

Working pressure (max.) Δp 480 bar,

Working pressure (min.) 10 bar,

max. intermittent pressure Δp 510 bar

Case Pressure

max. continuous pressure 2 bar, intermittent 5 bar

Charge pressure 32 bar

Filtration

Required Cleanliness Class per ISO 4406 20/17/12 or better:

Table of Values (theoretical values without considering η_{mh} und η_v: values rounded-off)

Sizes				
Displacement	V_g	233	cm^3	
max. speed	n_{max}	2200	min^{-1}	at max. displacement / angle
	n_n	1800	min^{-1}	continuous speed max. displacement / angle
	$n_{max\ intermit.}$	4200	min^{-1}	at min. displacement / angle
	n_n	4000	min^{-1}	continuous speed at min. displacement / angle
max. displacement	$Q_{v\,max}$	400	L/min	

Controls

Options	**Electric**	**Speed dependent**
Pressure compensator function	●	●
Travel direction valve	●	●
Hi/Lo speed valve	-	●
Speed sensor	●	●
Flushing valve	●	●
Hydr. stroke limiter with valve	-	●
alternative: Hi/Lo speed valve and elect. stroke limiter	-	●

Ports for Torque Transfer

Options

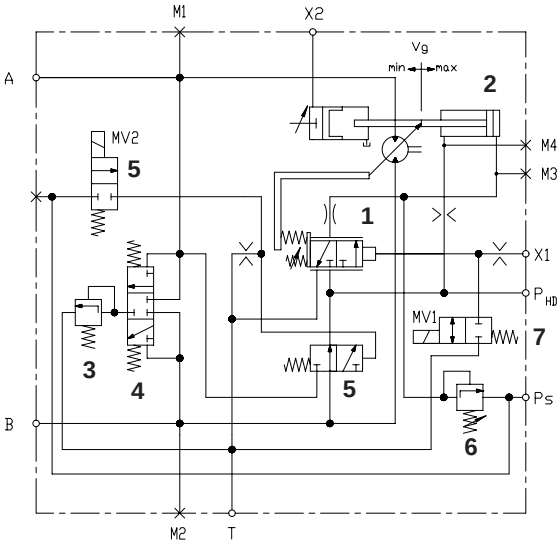
Profile sleeve	ANSI [1])
Universal joint flange	DIN [1])

[1]) Additional variations upon request

Control Options, Circuit Symbol

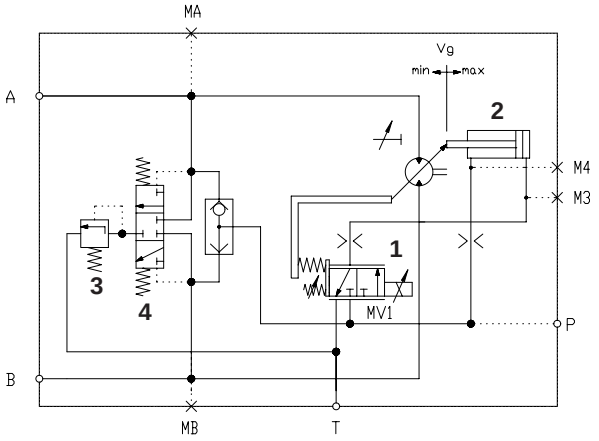
1. Control Pressure Dependent Control

Closed circuit



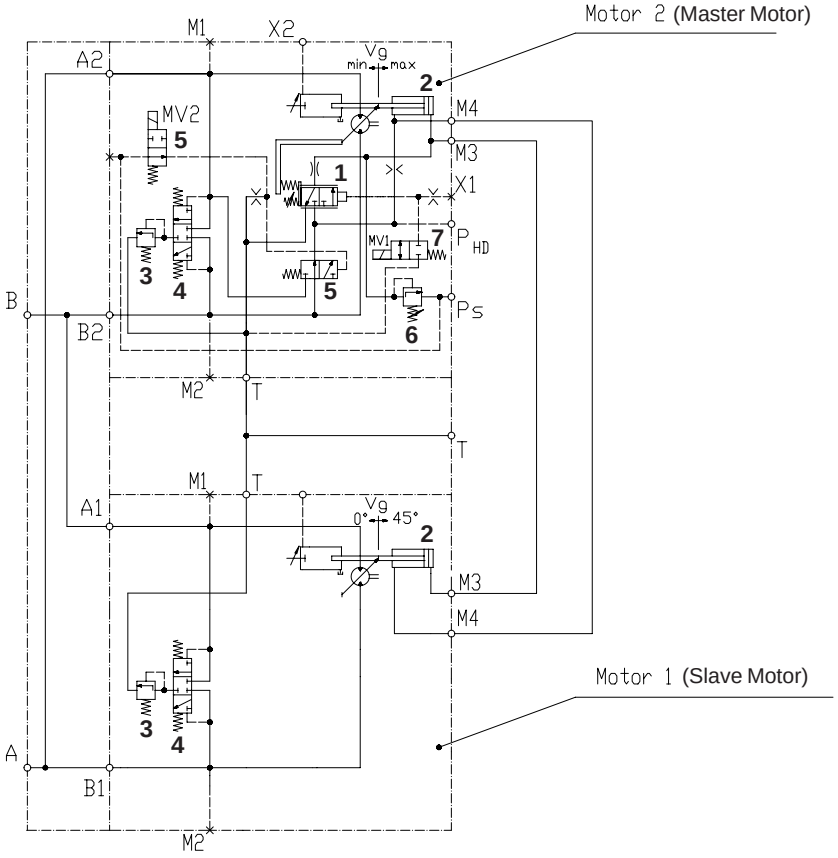
2. Electric Control

Closed circuit



3. Control with 2 Hydraulic Motors

Master Slave operation, control pressure
closed circuit

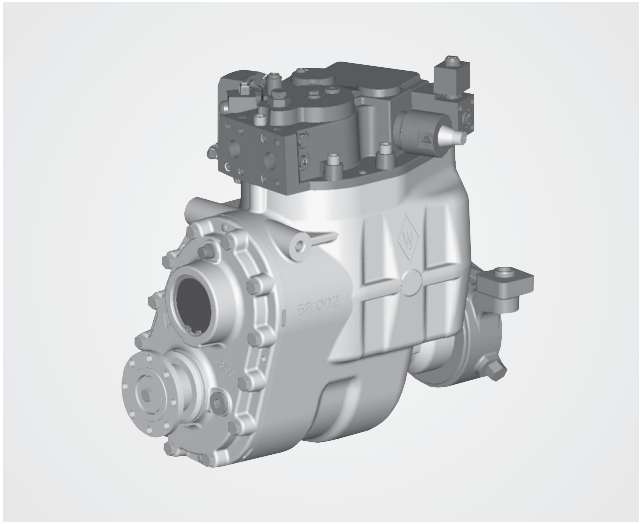


Further possibilities upon request, e.g. 2 motors as Master or electric.

1 controller hydraulic
2 stroke
3 loop flushing relief valve
4 direction valve
5 set pressure shift
6 pressure relief valve
7 directional valve

Coordinate the possible control options at the time of projecting with the application technique

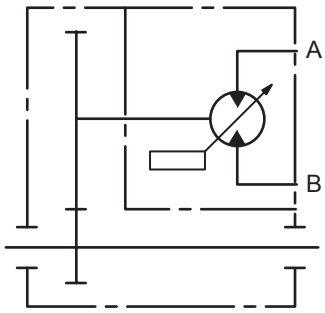
ICVD® GT-S1 N 233V



Technical Data:

Gear ratio range	i	0.8 - 1.6
max. torque on the rotary group shaft	Md	1600 Nm
Torque on the output shaft	Md	1280-2560 Nm
Max. universal shaft - sloping angle [1])		<3° und Z slope
Universal shaft flange Outside diameter [1])		DIN ISO 7646 120 x 8 x 10
max. operating pressure		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 140 kg
Transmission oil capacity		approx. 4 L
Oil specification		SAE 90 API-GL-5
Filling quantity (hydraulic)		approx. 15 L

[1]) additional variations upon request



Kinematic diagram

Direction of Flow:

direction of rotation	port „A“	port „B“
clockwise	outlet	inlet
counter-clockwise	inlet	outlet

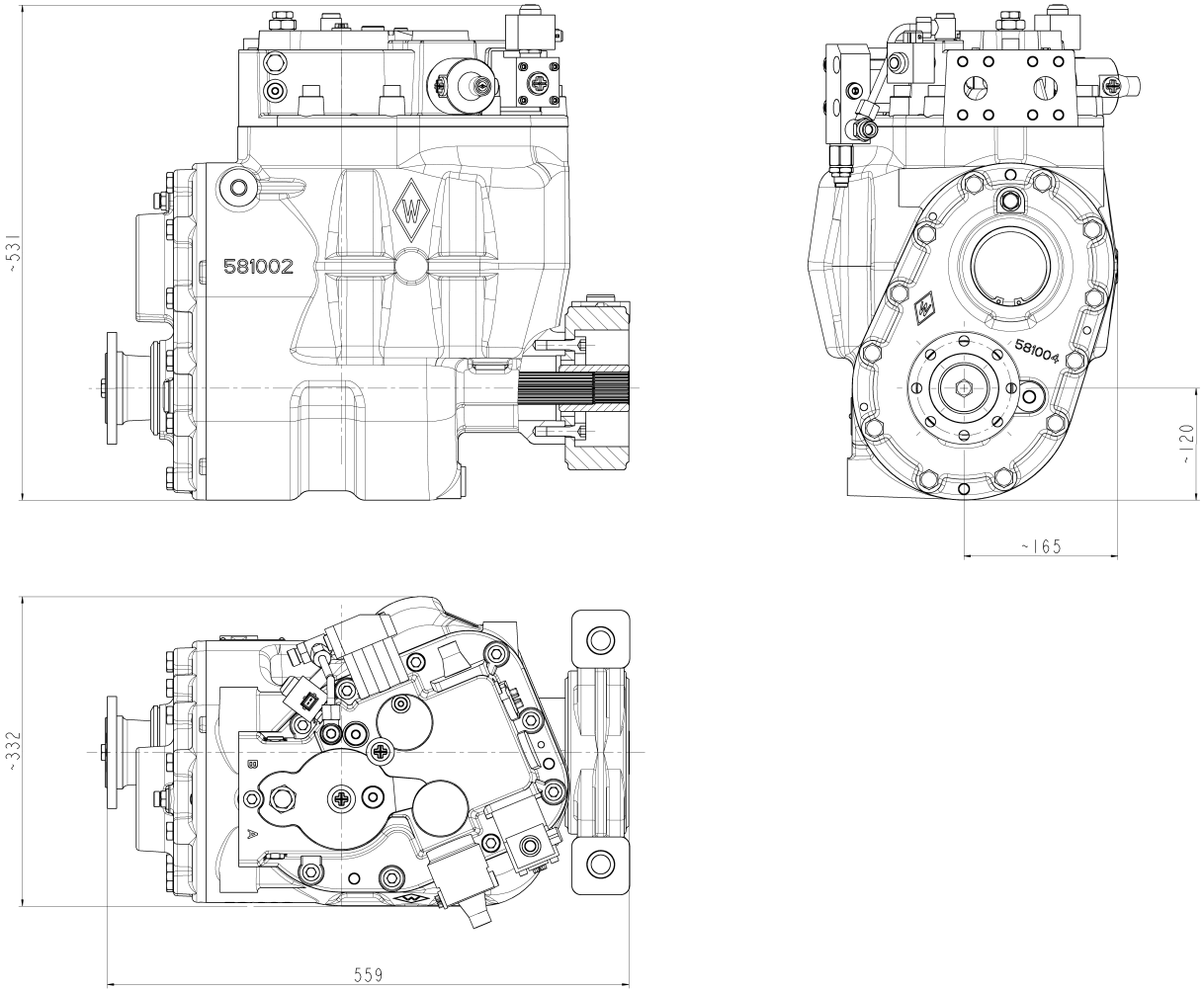
Definition of direction of rotation: as seen looking onto the high pressure connection of the control cover.

Maintenance and Oil Change:

Oil inspection after 100 operating hours

Oil change after 1,500 operating hours or once a year whatever comes first

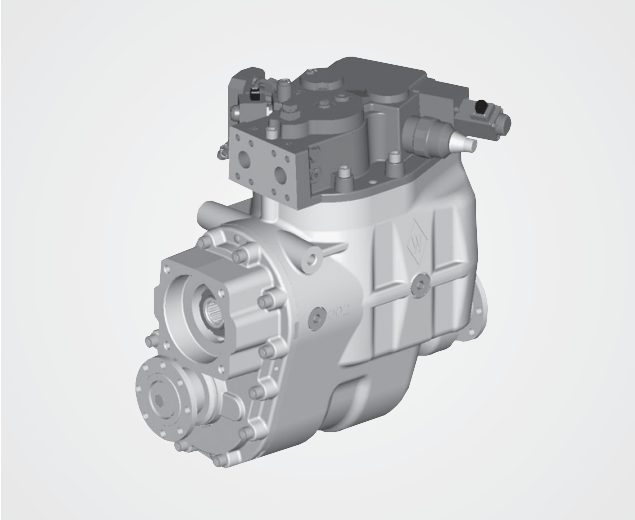
Unit Dimensions ICVD® GT-S1 N 233V



- High pressure ports A + B: SAE 1“ (6000 psi), useable thread depth 18 mm
- Leakage oil port T: M 22x1,5
- Control pressure port X1: M 14x1,5
- Charge pressure port Ps: M 14x1,5
- Measuring ports MA, MB, M3: M 12x1,5
- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

ICVD®GT-S1 A 233V



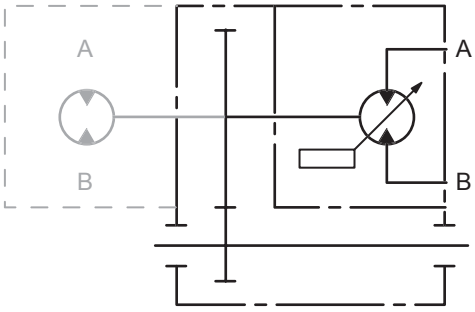
Technical Data:

Gear ratio range	i	0,8 - 1,6
max. torque on the rotary group shaft	Md	2000 Nm
Torque on the output shaft	Md	1600-3200 Nm
Max. universal shaft - sloping angle [1])		<3° und Z slope
Universal shaft flange Outside diameter front side rear side [1])		DIN ISO 7646 120 x 8 x 10 120 x 8 x 10
max. operating pressure		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 150 kg
Transmission oil capacity		approx. 3,7 L
Oil specification		SAE 90 API-GL-5
Filling quantity (hydraulic)		approx. 15 L

Single Adaption (mounting illustration per ISO) [1])

Displacement	23-45 cm^3

[1]) additional variations upon request



Kinematic diagram

Direction of Flow:

direction of rotation	port „A“	port „B“
clockwise	outlet	inlet
counter-clockwise	inlet	outlet

Definition of direction of rotation: as seen looking onto the high pressure connection of the control cover.

Maintenance and Oil Change:

Oil inspection after 100 operating hours

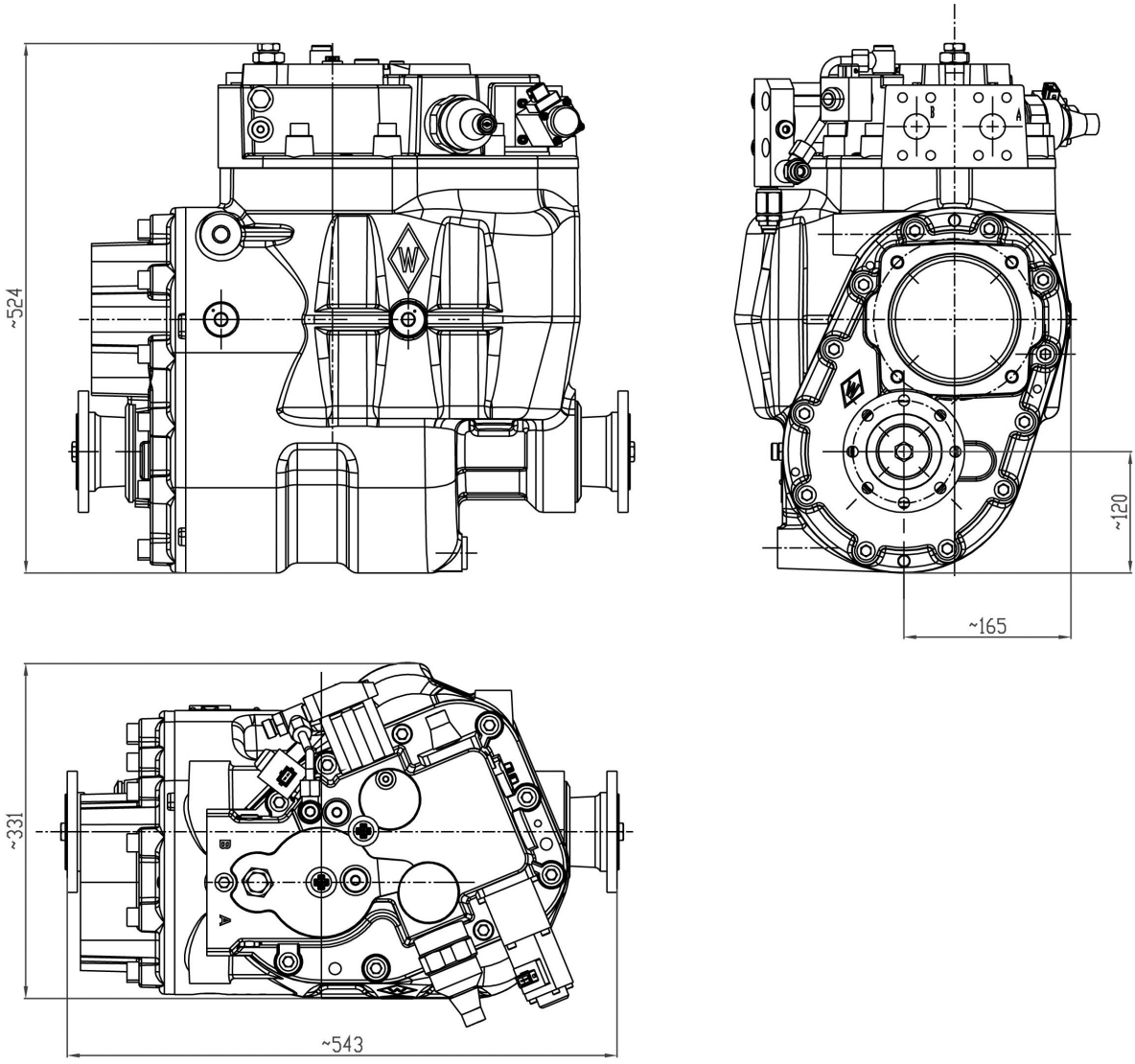
Oil change after 1,500 operating hours or once a year whatever comes first

Mounting Possibilities:

Flange: ISO 3019-2

Internal profile max: DIN 5480-N30x2x30x14x9H

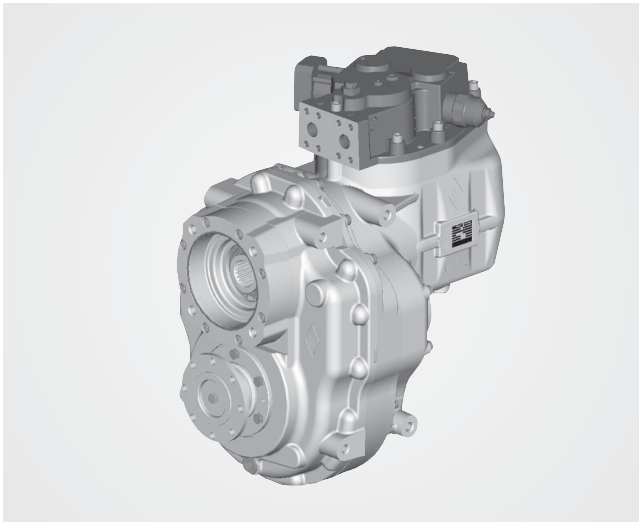
Unit Dimensions ICVD®GT-S1 A 233V



- High pressure ports A + B: SAE 1“ (6000 psi), useable thread depth 18 mm
- Leakage oil port T: M 22x1,5
- Control pressure port X1: M 14x1,5
- Charge pressure port Ps: M 14x1,5
- Measuring ports MA, MB, M3: M 12x1,5
- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

ICVD® GT-S2 A 233V



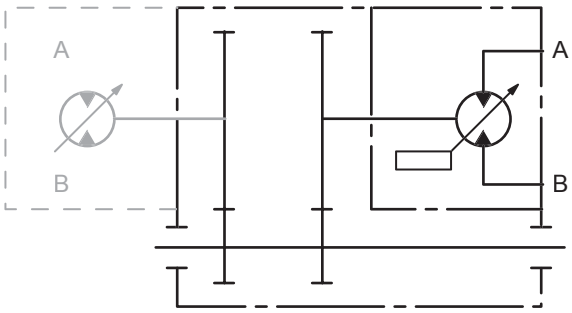
Technical Data:

Gear ratio range	i	1,7 - 2,2
max. torque on the rotary group shaft	Md	2400 Nm
Torque on the output shaft	Md	4080-5280 Nm
Max. universal shaft - sloping angle [1])		<3° und Z slope
Universal shaft flange Outside diameter [1])		DIN ISO 7646 120 x 8 x 10
max. operating pressure		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 185 kg
Filling quantity (hydraulic)		approx. 15 L
Transmission oil capacity		approx. 6,5 L
Oil specification		SAE 90 API-GL-5

Single Adaption (mounting illustration per ISO) [1])

Displacement	80-140 cm^3

[1]) additional variations upon request



Kinematic diagram

Direction of Flow:

direction of rotation	port „A“	port „B“
clockwise	outlet	inlet
counter-clockwise	inlet	outlet

Definition of direction of rotation: as seen looking onto the high pressure connection of the control cover.

Maintenance and Oil Change:

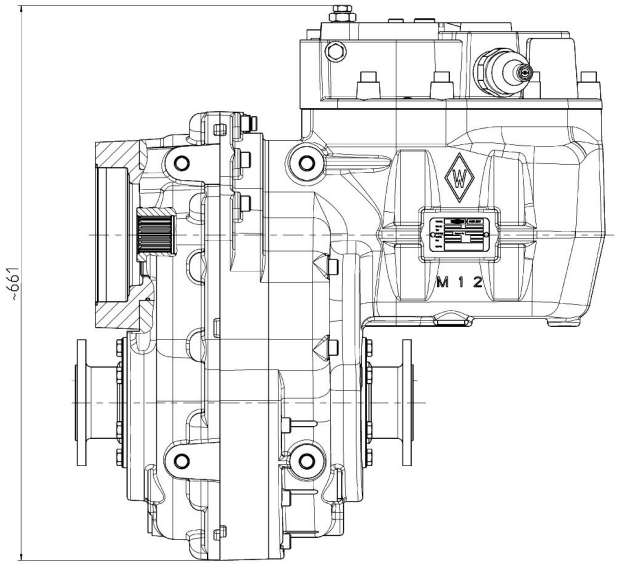
Oil inspection after 100 operating hours

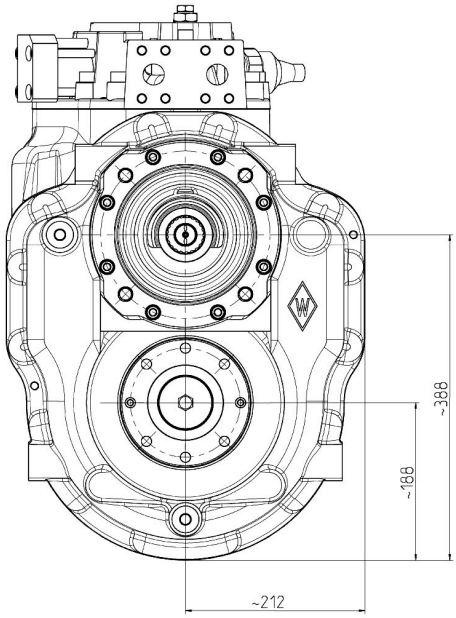
Oil change after 1,500 operating hours or once a year whatever comes first

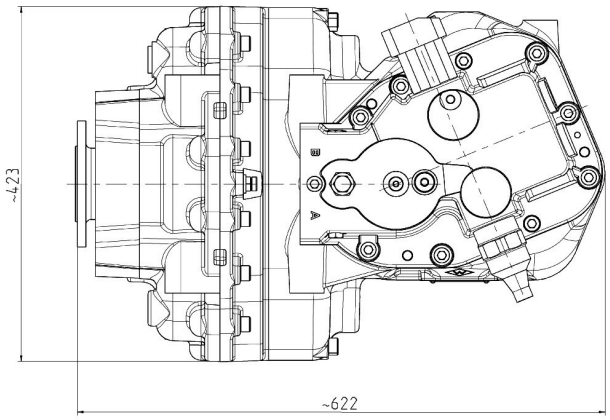
Mounting Possibilities:

Flange:	ISO 3019-2
Internal profile max:	DIN 5480

Unit Dimensions ICVD®GT-S2 A 233V



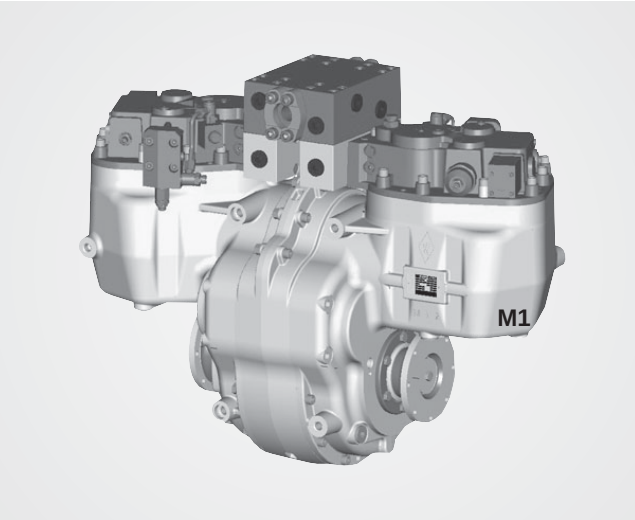




- High pressure ports A + B: SAE 1“ (6000 psi), useable thread depth 18 mm
- Leakage oil port T: M 22x1,5
- Control pressure port X1: M 14x1,5
- Charge pressure port Ps: M 14x1,5
- Measuring ports MA, MB, M3: M 12x1,5
- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

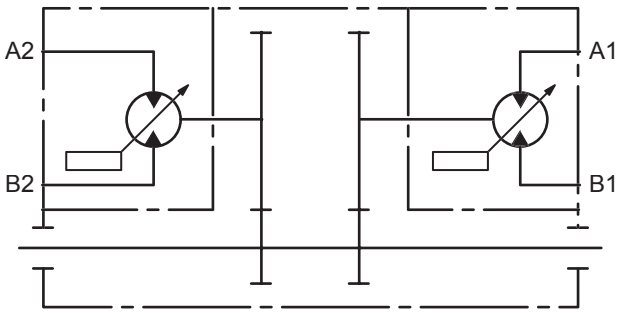
ICVD® GT-T2 N 233V/233V



Technical Data:

Gear ratio range	i	1,7 - 2,2
max. torque on the rotary group shaft	Md	3200 Nm
Torque on the output shaft	Md	5440-7040 Nm
Max. universal shaft - sloping angle [1])		<3° und Z slope
Universal shaft flange Outside diameter [1])		DIN ISO 7646 120 x 8 x 10
max. operating pressure		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 270 kg
Transmission oil capacity		approx. 6,5 L
Oil specification		SAE 90 API-GL-5
Filling quantity (hydraulic)		approx. 15 L per motor

[1]) additional variations upon request



Kinematic diagram

Direction of Flow:

direction of rotation		port „A“	port „B“
Master motor	Slave motor		
clockwise	counter-clockwise	outlet	inlet
counter-clockwise	clockwise	inlet	outlet

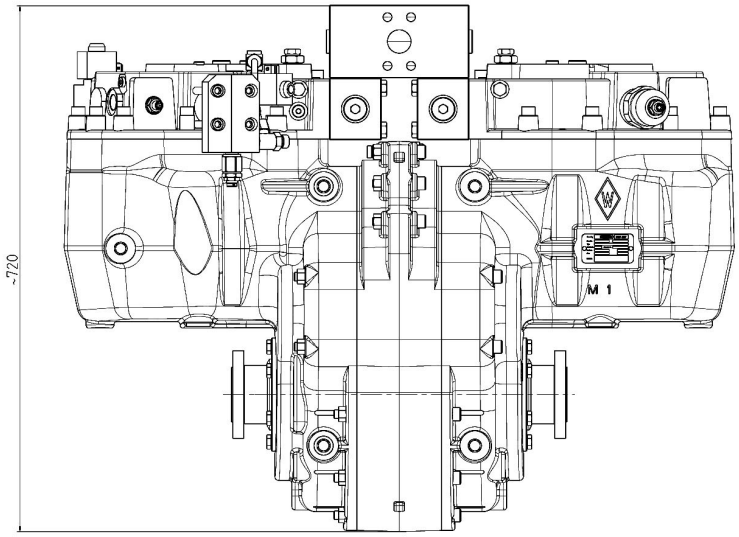
Definition of direction of rotation: as seen looking onto the output shaft of the motor M1.

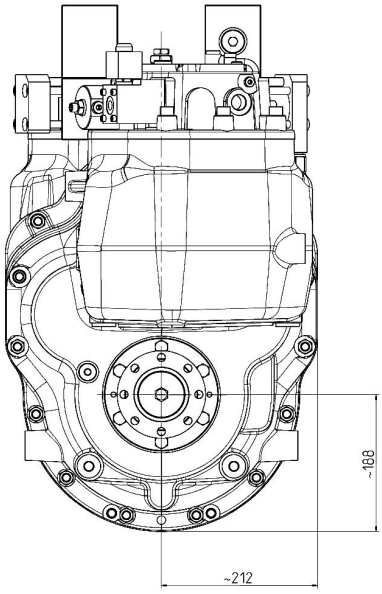
Maintenance and Oil Change:

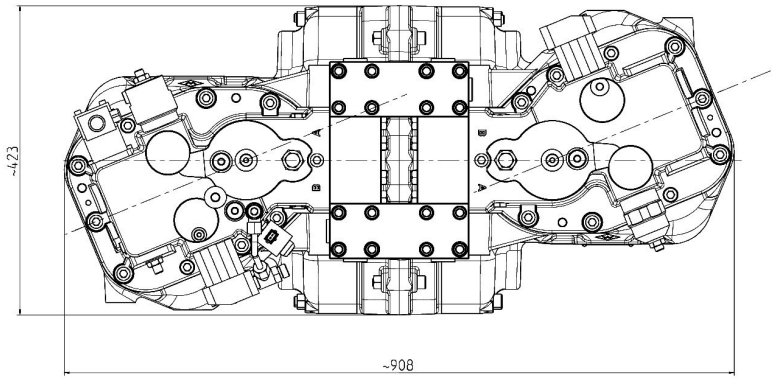
Oil inspection after 100 operating hours

Oil change after 1,500 operating hours or once a year whatever comes first

Unit Dimensions ICVD®GT-T2 N 233V/233V



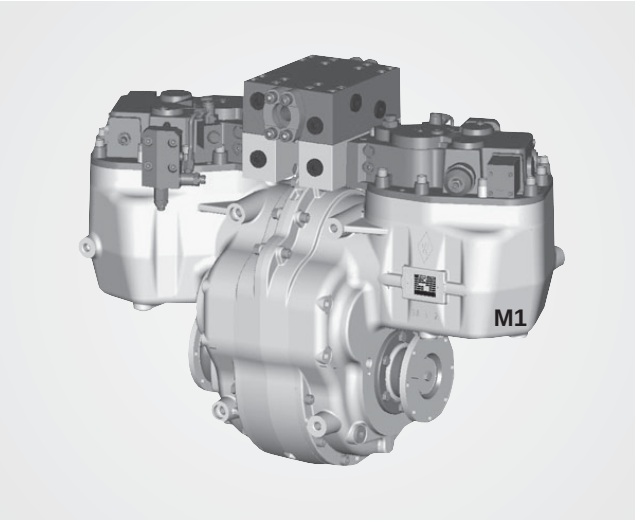


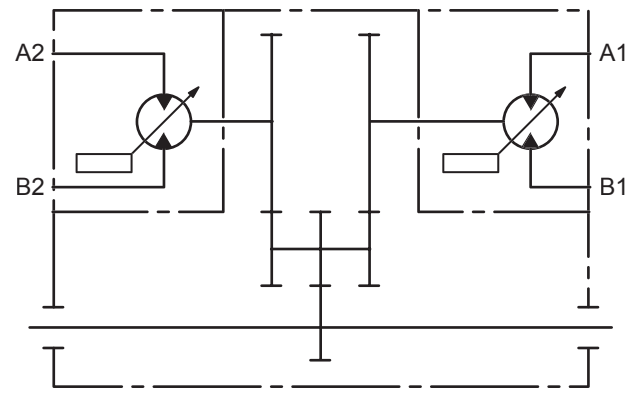


- High pressure ports A + B: SAE 1“ (6000 psi), useable thread depth 18 mm
- Leakage oil port T: M 22x1,5
- Control pressure port X1: M 14x1,5
- Charge pressure port Ps: M 14x1,5
- Measuring ports MA, MB, M3: M 12x1,5
- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

ICVD®GT-T3 N 233V/233V





Kinematic diagram

Technical Data:

Gear ratio range	i	0,8 - 1,6
max. torque on the rotary group shaft	Md	3200 Nm
Torque on the output shaft	Md	2560-5120 Nm
Max. universal shaft - sloping angle [1])		<3° und Z slope
Universal shaft flange Outside diameter [1])		DIN ISO 7646 120 x 8 x 10
max. operating pressure		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 290 kg
Transmission oil capacity		approx. 6,5 L
Oil specification		SAE 90 API-GL-5
Filling quantity (hydraulic)		approx.15 L per motor

[1]) additional variations upon request

Direction of Flow:

direction of rotation		port „A“	port „B“
Master motor	Slave motor		
counter-clockwise	clockwise	outlet	inlet
clockwise	counter-clockwise	inlet	outlet

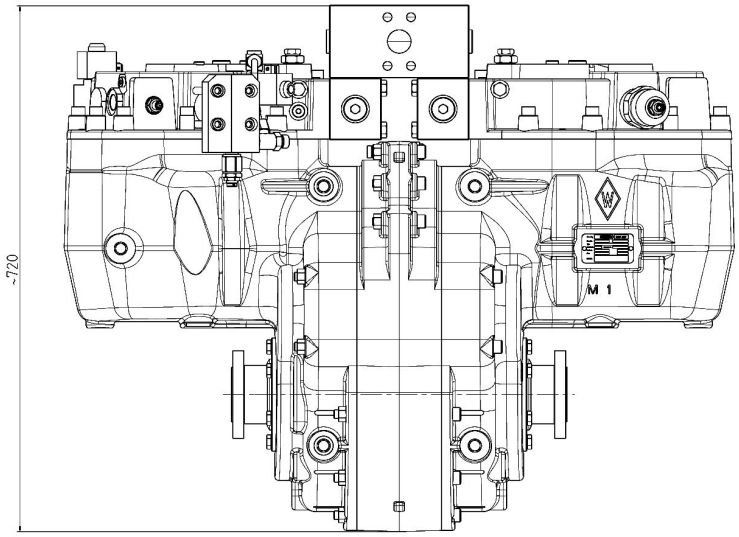
Definition of direction of rotation: as seen looking onto the output shaft of the motor M1.

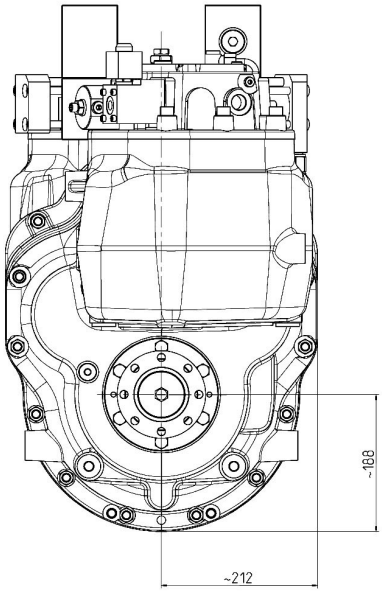
Maintenance and Oil Change:

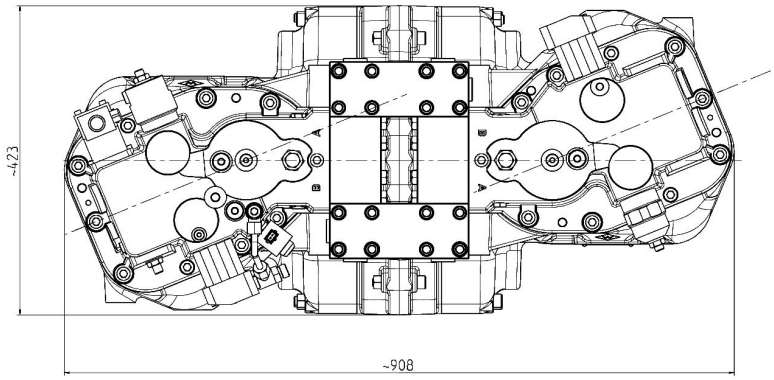
Oil inspection after 100 operating hours

Oil change after 1,500 operating hours or once a year whatever comes first

Unit Dimensions ICVD®GT-T3 N 233V/233V



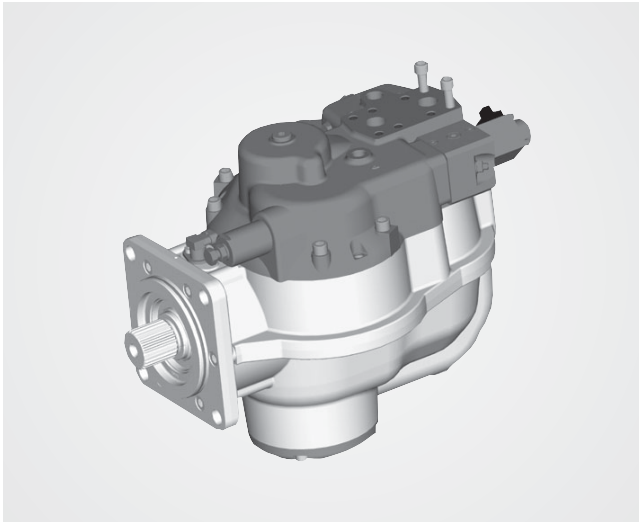




- High pressure ports A + B: SAE 1“ (6000 psi), useable thread depth 18 mm
- Leakage oil port T: M 22x1,5
- Control pressure port X1: M 14x1,5
- Charge pressure port Ps: M 14x1,5
- Measuring ports MA, MB, M3: M 12x1,5
- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

ICVD®MO-S0 N 233V



Technical Data:

max. torque on the rotary group shaft	Md	1600 Nm
Flange connection	ISO3019+2	160B4HW
Shaft profile	DIN 5480	W50x2x30x24x8f
Operating pressure - max.		480 bar
Mounting position		verticle [1])
Weight (w/o oil)	m	approx. 95 kg
Filling quantity (hydraulic)		approx.15 L per motor

[1]) additional variations upon request

Direction of Flow:

direction of rotation	port „A“	port „B“
clockwise	outlet	inlet
counter-clockwise	inlet	outlet

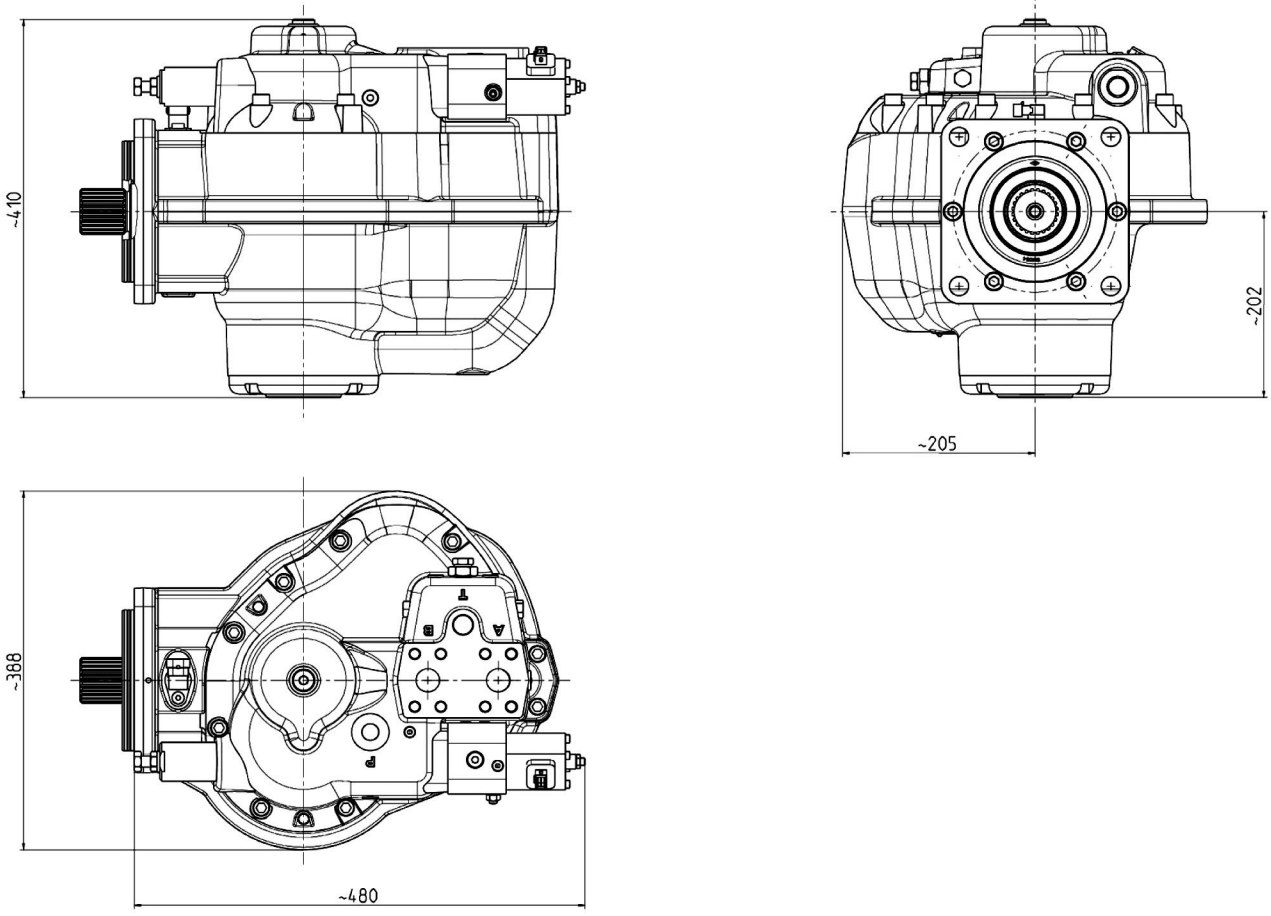
Definition of direction of rotation: as seen looking onto the output shaft of the motor from the front.

Maintenance and Oil Change:

Oil inspection after 100 operating hours

Oil change after 1,500 operating hours or once a year whatever comes first

Unit Dimensions ICVD® MO-S0 N 233V



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- Measuring port M4: M 10x1

Please request certified drawings prior to finalizing your construction.

Safety Instructions

Requirements for a Safe and Trouble-Free Operation

Safety

ICVD® units are designed and manufactured in-accordance-with up-to-date technical standards. It is, however, dangerous if the ICVD® units are improperly or unprofessionally applied, e.g. used by unqualified personnel which could result in:

– Personal injury to body and possible loss of life
– Danger to machines and other valuables of the user
– Risks for the efficient operation of the application

Every individual involved in the set-up, comissioning, operation and maintenance of a ICVD® unit must read and understand this handbook. SAUER BIBUS offers training seminars to meet this requirement.

The ICVD® units are designed for use in both open and closed circuit operation. Those responsible for the safety of the system must insure that:

– only qualified personnel are allowed to work with ICVD® units
– Operating instructions and other production documents are available to the individuals working with ICVD® units and that these documents are complied with.
– Working on or being close to ICVD® units by unqualified individuals is strickly verbidden.

Qualified personnel are individuals who, based on their education, experience, training as well as their knowledge of revelant standards, stipulations, safety instructions and operational conditions, are authorized by those responsible to carry out their job and thereby are capable of recognizing and preventing dangerous situations to occur. These individuals are also trainined in first aid procedures and are aware of the location and use of emergency equipment.

WARNING:

It is mandatory that the basic planning of the complete system as well as all work involved in the transport, assembly, installation, initial start-up, maintenance and repair in the various areas is carried out by qualified personnel respect. supervised by them.

In doing so, special attention must be give to the following:

– the technical data and information covering the permissible application (assembly, operational requirements and surroundings) covered in the documentation accompanying the order acknowledgement, catalogue, operating instructions, instructions on the nomenclature plate and any other revelant documents.
– the general set-up and safety instructions
– the local system specifications and stipulations
– the professional use of tools, lifting equipment and transport aids
– the use of personal protective equipment

In the event of doubt, especially if specific product documentation is not available, then the required clarification must be obtained from SAUER BIBUS GmbH. In this case, please indicate the type description and identification number of the unit involved.

In order to prevent malfunctions from occuring, the stipulated maintenance, inspection and change instructions must be complied with. Any changes in normal operation such as increased power consumption, higher temperature, vibrations, un-normal noise or smell and/or activation of the monitoring system indicates that something is not operating correctly. In order to prevent malfunctions which could cause direct or indirect damage to personnel and equipment, responsible maintenance personnel must be contacted immediately.

WHEN IN DOUBT, SHUT-DOWN THE ICVD UNIT IMMEDIATELY

Sauer Bibus GmbH
Lise-Meitner-Ring 13
89231 Neu-Ulm / Germany
Tel.: +49 (0) 731 1896-0
Fax: +49 (0) 731 1896-199
info@sauerbibus.de
www.sauerbibus.de

GKN Walterscheid GmbH
Hauptstraße 150
53797 Lohmar / Germany
Tel.: +49 (0) 2246 12-0
Fax: +49 (0) 2246 12-3501
info@walterscheid.gknplc.com
www.walterscheid.com

ICVD 02/06 · 100116e

Our international sales network covers every jurisdiction. Our global shipping partners mean you can be sure we're on hand whenever you need us.

Zeus Hydratech Ltd

Unit 35
Old Mills Industrial Estate
Paulton
Bristol, BS39 7SU
United Kingdom

T. +44 (0) 1172 130042
E: info@zeushydratech.com
W. www.zeushydratech.com