Bevel Buddybox 4

Gear and Gearmotor

Operating Manual



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Table of Contents

Important Notes
General Notes
Spare parts2
Important Notes
Safety notes
Intended use
Safety instructions for use in an ATEX area 4
Notes on transport
Notes on care for the environment
ATEX marking according to Directive 2014/34/EU
and EN ISO 80079-36
Inspection Upon Delivery
Nameplate Inspection
Lubrication Inspection 7
Important Notes
Nomenclature
Nomenclature 8
Nomenclature continued 9
Storing and Transporting
Storage Location 10
Storage Period 10
Operation After Storage 10
Installation Precautions 10
Installation Location 11
Conditions for installing in an ATEV area 11
Other special provisions for areas with explosive
atmospheros:
Installation Angle
Severe Loading Conditions
Severe Loduling Conditions
Installation Notes
Taper-Grip Busning Introduction
Components of Taper-Grip Bushing
laper-Grip Bushing
Keyed Hollow Bore Installation
Bore and Shaft Iolerance Specifications
Keyed Hollow Bore Installation
onto Driven Shaft
Shrink Disc Type Mounting Introduction
Bore and Shaft Tolerance Specifications
Shrink Disc Type Hollow Bore Installation onto Shaft . 18
Torque Arm Installation
Turnbuckle Type Torque Arm Parts 20
Removal from Driven Shaft
Removal of BBB4 with Taper-Grip Bushing 24
Lubrication

Lubricatio	n Introduction
Lub	rication Nomenclature
Lub	rication Method
Bev	el Gear Portion and Cyclo Portion Lubricants 31
Rec	ommended Oils
Сус	lo Portion Approved Greases
Oil	Quantities
Oil	Supply Procedure
Oil	change Intervals
Oil	Discharge Procedure
Gre	ase Quantities
Gre	ase Replenishment and Draining Procedure 37
Y2 Oil Fill 8	Drain Procedures
Affe	ected Unit Sizes
Oil	Fill Process
Oil	Drain Process
Motor inst	allation
Elec	trical installation41
Bra	ke motors
Che	cking for brake wear
Bra	ke with manual hand release
Cor	verter operation
Mo	tor protection
Exte	ernal fans
Cor	nmissioning the input drive
Parts	
Bea	rings and Oil Seals
Bevel Gear	ing Parts and Tooth Count
Bev	el Gearing Parts and Tooth Count
Cyclo Porti	on Disassembly/Assembly
Disa	assembly/Assembly
Сус	lo Portion – General Disassembly
Сус	lo Portion – General Reassembly
Red	ucer Troubleshooting
Red	ucer Troubleshooting
EC I	machinery directive Gearboxes

Important Notes

General Notes

Please make sure that you heed the safety notes in this documentation.



Electrical hazards

Using the machine incorrectly may lead to bodily injury, serious injuries and/or life-threatening situations.



Hazard

Using the machine incorrectly may lead to bodily injury, serious injuries and/or life-threatening situations.



Dangerous situation Slight injury may result.



Harmful situation Damage to the drive or the environment could be caused.



Helpful information



Disposal Please obey the regulations in force.



Important information on ATEX explosion protection

Spare parts

Only use original spare parts. Any guarantee lapses should unauthorised spare parts be used.

Important Notes

Safety notes



Before working on the machine (assembling, operating, maintaining, inspecting etc.), please read these operating instructions through carefully so that you know exactly how to operate the gearbox properly, you know the safety regulations to be applied and the warnings to be heeded. Keep these instructions near by the machine so that you can refer to them at any time if necessary.



Transport, installation, lubrication, operation, maintenance and inspections should only be carried out by properly trained technicians, otherwise injury or damage to the machine may result.

Keep hands and all foreign objects away from the internal moving parts of the unit, otherwise injury or damage to the machine may occur.



The gearbox unit must be put out of action and disconnected from the power supply for maintenance and assembly work.

The unit must only be used for the intended purpose, otherwise there is the risk of injury or damage to the machine.

Intended use



The BBB4 gearbox is a motor-driven gearbox for industrial and commercial systems. The permitted speeds and performances are to be observed in accordance with the technical data and name plate. Where the gearbox load deviates from the permissible values or where the system is to be used for applications other than industrial and commercial systems, the BBB4 gearbox may only be used in consultation with the manufacturer.

Their use in explosion-risk areas is not permitted, unless specific provision in this regard has been made. The components of the BBB4 gearbox are intended for installation in machines and systems according to the EC Machinery Directive 2006/42/EC. The system may not be operated in areas where the EC Machine Directive 2006/42/EC applies until it has been ensured that the end product conforms to this EC Directive.

Safety instructions for use in an ATEX area



Explosive gas mixtures or dust concentrations combined with hot, live and moving parts on the gears may cause serious or fatal injuries.

Installing, connecting, commissioning and maintaining and repairing the gearbox and additional electrical equipment must only be carried out by a qualified professional, taking account of

- these instructions
- the warning and instruction plates on the gearbox
- any other development documents and connection diagrams relating to the drive
- the plant-specific conditions and requirements
- the national and regional standards and regulations in force (explosion protection, safety, accident protection).

The gears are designed for industrial plants and must only be used in accordance with the information in the technical documentation from Sumitomo and the data on the model plate. They comply with the standards and regulations in force and meet the requirements of Directive 2014/34/EU.

Applied standards: ISO 80079-36:2016, ISO 80079-37:2016

A drive motor connected to the gearbox must only be started up after ensuring that the measures set out in the section Motor Installation have been carried out before installation.

A motor connected to the gearbox may only be operated on the frequency inverter if the information on the gearbox rating plate is obeyed.

Notes on transport



The consignment must be checked immediately after receipt for any transport damage. The carrier must be notified of this immediately. If it must be assumed that transport damage will restrict proper operation then the unit must not be started up.

Only prescribed slings of the correct size that can be hooked into the existing eyebolts or can be put round the flange connections must be used. The screwed in eyebolts are only designed for the weight of the drive. No additional loads must be suspended.

Do not allow the unit to drop or fall while moving. Always use the eye bolts attached to the gear housing (and on motor if supplied) when moving the unit. After securing the unit to the machine, remove the moving hooks/ straps from the eyebolts.

Notes on care for the environment



Make sure that when fitting the gearbox there is no explosive atmosphere, oils, acids, gases, vapours or radiation. Check whether the ambient temperature is within the range of application in accordance with section Installation Notes. Ensure that there is enough ventilation to the gear and there is no external heat source (e. g. from couplings). The cooling air must not exceed a temperature of 40 °C.

Check that the configuration matches the configuration specified on the gear's model plate.

Please note: The design may only be changed after prior consultation with Sumitomo, otherwise the ATEX approval will lapse.

Please check that all drive parts to be installed are ATEX approved.

Any add-on parts must not obstruct the discharge of heat by convection and conduction of heat.

With gears with adapters, make sure that the data given on the gear's model plate is not exceeded With mains operated motors:

Check that the data given on the gear and motor model plates matches the environmental conditions of the installation location.

Care for the environment



Make sure to dispose the gearbox and its components in accordance with local regulations at the end of their service life.

The best disposal is to avoid the creation of waste by recycling.

Always observe environment regulations when disposing used oil.
 Do not dump it on garden soil, wooded areas, into open streams or down sewage drains.
 Make sure to remove any spillage at once.

- Sort metal components correctly and offer for recycling.
- Sort electrical components correctly and offer for recycling.
- Materials not suited for recycling must be disposed of in accordance with regulations.

Check list for ATEX approved gears before commissioning

You must check whether the following data on the gear model plate

agrees with the permissible explosive area on site:

- Equipment group
- Ex category
- Ex zone
- Temperature class
- Maximum surface temperature

Labelling on nameplate

O Sumitomo Driv ◆Sumitomo (SHI) Cycle	ve Technolog Drive Germany Gn	jies •¤H
ТҮРЕ		CE
i	S.Fj	
P 1		kW
N 1		1/min
SERIAL NO:		
0 🖗	211527	0
ATEX ID	ATEX classific	ation

ATEX marking according to Directive 2014/34/EU and EN ISO 80079-36

Marking of explosion protection	b) Equipment category	b) Equipment category	c) Potentially explosive atmosphere	Marking	d) Protection type	e) Subdivision group	f) Temperature class / max. temperatur of surface	g) Equipment protection level (EPL)
(Ex)	Ш	2	G	Ex	h	IIC	T3	Gb
(Ex)	Ш	2	G	Ex	h	IIC	T4	Gb
(Ex)	Ш	3	G	Ex	h	IIC	Т3	Gc
(Ex)	11	3	G	Ex	h	IIC	T4	Gc
(Ex)	Ш	2	D	Ex	h	IIIC	T135°C	Db
×3	II	2	D	Ex	h	IIIC	T200°C	Db
×3	II	3	D	Ex	h	IIIC	T135°C	Dc
×3	Ш	3	D	Ex	h	IIIC	T200°C	Dc
2014/34/EU					EN I	SO 80	079-36	

a)	Equipment group	II	Equipment for potentially explosive atmo- sphere (except underground parts of mines)
b)		2	Explosive atmospheres are likely to occur occasionally (zone 1 or 21)
		3	Explosive atmospheres can occur infre- quently and for a short period only (zone 2 or 22)
2	Potentially explosive atmosphere	G	Area with potentially explosive atmospheres caused by gases, vapours, mists
C)		D	Area with potentially explosive atmospheres caused by air/dust mixtures
d)	Protection type	h	Construktive safety "c"
	Subdivision group	IIC	typical gas: Propane, ethylene, hydrogen
e)		IIIC	suitable for flammable suspended solids, non-conductive dust and conductive dust
	Temperature class	T3	Max. temperature of surface ≤ 200°C
f)		T4	Max. temperature of surface ≤ 135°C
.,	Max. temperature of	T135°C	Max. temperature of surface ≤ 135°C
	surface	T200°C	Max. temperature of surface $\leq 200^{\circ}$ C
	Equipment protec-	Gb	Equipment with "high" protection level
g)	tion level (EPL)	Gc	Equipment with "extended" protection level
		Db	Equipment with "high" protection level
		Dc	Equipment with "extended" protection level

Tests before commissioning in Ex area



- Does the data on the gear box's rating plate correspond to the permissible explosive area on site?
- Is the drive undamaged? (Check for any transport or storage damage).
- Is there an explosive atomosphere (oils, acids, gases, vapours, radiation, etc.)?
- Does the design correspond to the information on the model plate? Attention: If the design has not been changed by Sumitomo, the ATEX approval will lapse.
- Is an unrestricted supply of cooling air guaranteed? Is any hot exhaust air being drawn in from other equiment? The cooling air must not exceed a temperature of 40 °C.
- Are all drive parts ATEX-approved?

If possible, the gear box is to be started without load. If it runs quietly and without any odd noises, the gearbox is attached to the driven machine.

Measure the surface temperature after about 3 hours. Maximum permissible difference from ambient temperature: 55 K. At a value of >55 K stop the drive immediately and contact Sumitomo.

With frequency inverter operated gear motors:

Check that the gear motor can be operated by a frequency inverter. The frequency inverter's parameters must be set to prevent overloading of the gear box (see gear box model plate).

Stray currents must not be conducted through the gearbox. These are generated, for instance by the motors operated on frequency inverters, welding plants or cathodic corrosion protection systems. Suitable measures shall be applied to prevent stray currents through the gearbox.

Important Notes

Inspection Upon Delivery



- In order to avoid injury, ensure that the unit is
- in a stable position before unpacking.
 Verify that the unit received matches your order. Using the incorrect product may cause equipment damage or personal injury.
- **Do not** remove the nameplate from the unit.

Upon delivery, inspect the unit for damage that may have occurred during shipment. Notify the shipping company immediately if you find any damage. **Do not** install or operate a damaged unit.

Upon receipt of the reducer/gearmotor, verify that:

- the model number on the unit nameplate matches the purchase order
- the unit was not damaged during shipping
- all bolts and nuts are fully tightened.

Please consult your Sumitomo agent, distributor, or sales office if you find any defects or if you have any questions.

Nameplate Inspection

When contacting Sumitomo about this product, please be prepared to provide the following information from the reducer/ gearmotor nameplate:

- reducer or gearmotor model number (nomenclature)
- reduction ratio
- serial number.

Standard Nameplate

	Input Power							
	Sumitomo Drive	Sumitomo Drive Technologie Sumitomo (SHI) Cyclo Drive Germany GmbH Cyclostrate 92 • 85224 Matk Indersdor • Germany						
	FRAME	P		kW	S		%	6
	V		\triangle				لر	
	Hz	Hz						
	A	A						
Input Speed	▶ 1/min							
PowerFactor	cos							
	eff S	%		IEC 6003	4			
	IP	IP			Ins. class			
	Brake		VAC	A		Nm	IP	
	S/N Year							
	CustData:						212	2959
	L							

Motor nameplate

Lubrication Inspection



- Oil lubricated units are shipped without oil, unless the customer specified otherwise when the unit was ordered. Always fill the unit with the correct type and quantity of lubricant prior to operation.
- Certain models must be filled with lubricant in two separate locations, the Bevel Gear portion (output) and the input portion.

Refer to the lubrication section in this manual for detailed lubrication information.

Gear nameplate



Nomenclature

Nomenclature

Our nomenclature details specific information about our products. Verify that the nomenclature of the unit delivered matches your order.



Nomenclature, continued

– Nominal and Exact Ratio



BBB with Planetary Input				1	BBB with Cyclo Input				
Nomin	al Ratio	Frame	Exact	1	Single Reduction				
Input	Overall	Size	Ratio		Nomir	nal Ratio	Frame	Exact	
		4A10 4A12	10.50		Input	Overall	Size	Ratio	
			4A12			6	21		21.0
		4B14	10.89		7	22	1	22.4	
		4B16				25		24.5	
		4C16	10.05		8	28		28.0	
3	11	4D16 4D17	10.85		11	35		35.2	
		4E17			12	39		38.5	
		4E18	10.50	ĺ	15	40 53		45.5	
		4F18	10.50		17	60		59.5	
		4E19	10.82			67		67.2	
		4F19 4A10	12.00		21	74	All	73.5	
		4A12	12.99	l	25	80		80.0	
		4A14	12.05	ĺ	25	88		87.5	
		4B14	12.95		29	102		101.5	
		4B16	12.00		35	112		112.0	
	13	4C16 4D16	12.80		12	123		122.5	
	5	4D17		1	51	179	1	178.5	
		4E17	12.00		59	207		206.5	
		4E18	15.09		71	249		248.5	
		4F18			87	305		304.5	
		4E19 4F19	13.01		119	417	4A10	416.5	
4		4A10	14.21						
		4A12	14.00			Double	Reduction		
		4A14	14.16		Nomin				
		4B14	14.00		NOMI		Frame	Exact	
	14	4010 4C16			104	Overall	5120		
		4D16			104	364		364.0	
		4D17		121	501		423.3 500.5		
		4E17	14.32		165	578		577.5	
		4E18 4E18			195	683		682.5	
		4F19			231	809	ĺ	808.5	
		4F19	14.23		273	956]	955.5	
		4A10	15.36		319	1117		1116.5	
		4A12	15.65		377	1320		1319.5	
		4A14 4R14	16.00		473	1656		1655.5	
		4B16			559	1957		1956.5	
		4C16	16.26		721	22/2		22/1.2	
	16	4D16			841	2944	All	2943.5	
		4D17 4E17	16.17		1003	3511	1	3510.5	
		4E17			1247	4365	1	4364.5	
		4F18	15.63		1479	5177		5176.5	
		4E19	15 47		1849	6472		6471.5	
5		4F19	16.00		2065	7228		7227.5	
		4A10 4A17	10.80		2537	8880		8879.5	
		4A14	17.12		3045	10658		10657.5	
		4B14	17.50		5481 4427	12184		12183.5	
		4B16			5133	17966		17965 5	
	10	4C16	17.78		6177	21620	1	21619.5	
	١ð	4D10 4D17			7569	26492	1	26491.5	
		4E17	17.68						
		4E18	17 10	1					
		4F18	17.10						
		4E19 4F19	16.92						
				1					

Storing and Transporting

Storage Location

- Store the unit in a clean, dry area.
- **Do not** store outdoors or in an area with high humidity, dust, sudden temperature changes, or corrosive gases.

Generally, the BBB4 gearbox is to be stored indoors, in an ordinary factory or a warehouse. The unit should be sealed, wrapped in plastic and additionally packed with desiccant. Desiccant should be replaced periodically to keep the inside of the box dry. Use of color changing desiccant will aid in identifying when desiccant should be changed.

Storage Period

- **Do not** store the unit for longer than 3 months without following long-term storage procedures recommended by Sumitomo.
- Consult Sumitomo when storing the unit for more than 3 months. Rust proofing procedures are required.
- Consult Sumitomo when exporting the unit. Rust proofing procedures may be required.

If the BBB4 gearbox will be inactive for a long period of time, long-term storage preparation is required to prevent rust or other degradation to the gearbox.

LONG-TERM STORAGE SPECIFIED WITH ORDER:

If long-term storage is specified at the time of order entry, Castrol Alpha oil MW-100 or equivalent rust preventative is already sprayed into the BBB4 reducer and the air vent is replaced with a sealing plug before shipping the reducer from Sumitomo factory. External machined surfaces are coated with Valvoline Tectyl 846/K19 or equivalent. These brands are subject to change without notice.

Consult Sumitomo for Long Term Storage procedures:

- Storage without factory preparations
- Ongoing maintenance during storage period

Operation After Storage

Before operating the unit after an extended storage period, flush unit of rust preventative and ensure that non-metal parts, i.e., oil seals, o-rings, air breather, have not deteriorated. Non-metal parts may deteriorate easily from exposure to ambient conditions (i.e., extreme temperatures, UV rays). Replace deteriorated parts with new before unit start-up.

After starting the unit, verify that there is no abnormal noise, vibration, and/or temperature rise. Immediately stop the unit and call your local distributor, Original Equipment Manufacturer or Sumitomo directly if you observe any abnormality.

Installation Precautions

- Do not use the reducer/gearmotor for specifications other than those shown on the nameplate or in the manufacturing specification documents. Personal injury and/or equipment damage may occur.
- Do not place combustible material on or around the unit; fire may occur.
- Do not place any objects around the unit that will prohibit proper ventilation. Inadequate ventilation may lead to high unit temperature and/or fire.
- Do not step on or hang from the unit. Excessive weight may cause component breakage leading to personal injury and/or equipment damage.
- Do not touch the shaft, keyway, or motor fan with bare hands; injury may occur.
- For applications in which lubricant leaks could adversely affect operations (i.e., package handling, food processing), place an oil pan below the unit to protect against contamination that may occur if oil seals become damaged or worn.
- Do not remove the eye-bolt from the motor. Should the eye-bolt need to be removed for any reason, install a replacement bolt in the tapped hole to prevent water from entering the motor.

Installation Notes

Installation Location

Consult Sumitomo when the unit will operate in conditions other than those specified above. Special unit modifications may be required.

Units manufactured according to customer specified application requirements (i.e. outdoor modifications, hightemperature modifications) are designed to operate within the specified environment.

Install the unit so inspection and/or maintenance procedures may be easily performed. Install all units that are not shaft mounted on a sufficiently rigid base.

Torque arm clearance with machine structure is required to allow for machine shaft run out. Refer to the Torque Arm Installation section in this manual for additional information.

Conditions for installing in an ATEX

area



Ambient temperature: $-10^{\circ} \dots +40^{\circ}$ C Maximum self-heating at nominal rating: 60 K Installation height <= 1000 m Maximum drive speed: 1800 min-1

Short term maximum load: 200 % of the rated load torque 500 % shock overload is not permitted.

The housing of the gearbox must be grounded to prevent electrostatic charging.

Other special provisions for areas with explosive atmospheres:



To be performed weekly or every 100 operating hours:

• Visual control for leaks. The shaft seals must be checked for leakage in order to prevent the gear unit from running down completely.

If a leak begins, a defective shaft seal must be replaced immediately.

- Check the gearbox for unusual running noises and vibrations.
- Remove layers of dust on the housing components.

The gearbox is not meant to run dry, grease is required to maintain explosion safe properties. If signs of grease leaking are observed, the gearbox shall be taken out of service and serviced by a qualified engineer before taking into operation again.

Every 8000 operating hours – Eccentric bearing have to be replaced.

Every 20,000 operating hours – Rolling bearings on input and output have to be replaced.

Installation Angle

Mount the unit in the specified position for which it was ordered. Confirm the mounting position from the gearbox nameplate.

Consult your local distributor, Original Equipment Manufacturer or Sumitomo directly if the mounting angle is to be **other than horizontal or vertical.**

Severe Loading Conditions

For applications with severe vibration and/or frequent starts and stops, Sumitomo recommends the use of high-strength mounting bolts of Grade 8.8 (or greater).

Installation onto the Driven Machine

 Before coupling the reducer/gearmotor to the machine, verify the appropriate/desired rotation of the machine. Differences in the rotational direction may cause personal injury and/or equipment damage.



• Before operating the unit, ensure that all safety guards around the rotating components are in-place and secure. Failure to do so may result in personal injury.

• When joining the reducer or gearmotor to the load, ensure that the center alignment, belt tension, and/or parallelism of the coupling device are within the coupling manufacturer's established recommendations. For applications with a belt, ensure that the belt is properly tensioned to the manufacturer's specification, and the bolts securing the pulley and couplings are sufficiently tightened. Failure to follow these precautions may result in personal injury and/or equipment damage.

Installation onto Driven Shaft

Taper-Grip Bushing



Taper-Grip Bushing Introduction

The keyless Taper-Grip bushing system provides a simple and reliable shaft attachment for Sumitomo speed reducers and gearmotors. This system allows bi-directional shaft rotation operation with a powerful, slip-free grip. To assure peak performance of your equipment, please read, understand and follow these installation instructions.



Prior to installation of the BBB4 onto the driven shaft, ensure that the shaft length meets or exceeds the minimum shaft engagement value "TT" detailed in Table 1.

Do not operate unit until the torque arm has been attached to the unit and fixed to a rigid structure. The torque arm prevents counter-rotation during unit operation. Refer to torque arm installation section in this manual for instructions.



CAUTION: The BBB4 must be externally supported prior to insertion of driven shaft into bushing. External support MUST be maintained until all bushing socket head cap screws have been tightened to the appropriate operational torque.

Components of Taper-Grip Bushing

As shown in the figure on the left, the Taper-Grip bushing includes the **bushing**, thrust collar, and socket head cap screws.

Г

Taper-Grip Bushing Thrust Collar

Table 1. Driven Shaft Tolerance ^[1] and Minimum Shaft Engagement (TT)

Shaft Diameter mm	Tolerance µm
30 - 50	+0/-39
50 - 80	+0 / -46
80 - 120	+0/-54
120 - 180	+0/-63

BBB4 Size	IIMM
4A	208
4B	242
4C	279
4D	326
4E	359
4F	412

Note: [1] Based on ISO/JIS/DIN h8



Taper-Grip Bushing Installation onto Driven Shaft

1

Remove **bushing cover** if unit was supplied with one.

Socket Head Cap Screws

Taper-Grip Bushing



2 Loosen socket head cap screws.



3

Remove (unscrew) Taper-Grip bushing from the unit.



4

Clean all **grease, oil** and/or **anti-seize paste** from the driven shaft. Failure to do so could result in damage to shaft.

Slide Taper-Grip bushing onto driven shaft.



5

Inspect and test Taper-Grip bushing on shaft.

- Check shaft for burrs, corrosion, or warpage. Repair or replace shaft as necessary.
- Slide bushing back and forth along shaft, checking for surface irregularities and fit.
- Verify bushing is sized correctly for the shaft diameter.

Taper-Grip Bushing



6

Remove Taper-Grip bushing from driven shaft.



7

Apply a thin layer of anti-seize paste to the male threads of the Taper-Grip bushing only.



Ensure that the anti-seize paste does not enter the Taper-Grip bushing bore.

Do not apply anti-seize paste to the female threads in the hub.





8

Screw Taper-Grip bushing into BBB4 leaving **approximately 1 mm gap between the bushing flange and thrust collar.**



Do not apply grease, oil, or anti-seize paste to the driven shaft or the bushing bore before placing the unit onto driven shaft. Use of these friction-minimizing products will adversely affect the ability of the unit to transmit torque.



CAUTION: The BBB4 must be externally supported prior to insertion of driven shaft into bushing. External support MUST be maintained until all bushing socket head cap screws have been tightened to the appropriate operational torgue.

9

Mount or slide the **BBB4** onto the driven shaft to the desired location.

Do not rock or pry the unit.



Taper-Grip Bushing



10

Screw Bolts into Taper-Grip bushing.

- Lightly oil threads of each bolt before inserting.
- Finger tighten each bolt to secure in place.
- Be sure to **maintain the 1 mm** (approximate) **gap** between the **thrust collar** and the **bushing flange.**



Apply grease portion of driven shaft.

11

Tighten bushing bolts to the correct torque value.

- Following a star pattern, use a torque wrench to gradually tighten each socket head cap screw in 20% increments.
- Refer to **Table 2, Taper-Grip Bushing Bolt Tightening Torques**, for the correct operational screw torques.

Table 2. Taper-Grip Bushing Bolt Tightening Torques

DDD 4 Cine	Carrow Otrow Cine	Screw Torque
BBB4 Size	Screw Qty x Size	N∙m
4A	6 x M12	75
4B	6 x M12	140
4C	6 x M16	250
4D	6 x M16	300
4E	8 x M16	300
4F	10 x M16	300

12

In order to prevent corrosion, apply grease to the exposed portion of the driven shaft.

• After installing and tightening the bushing bolts with a torque wrench, apply grease or an anti-corrosion product to the exposed portion of the shaft.



13

For units that include a bushing safety cover, reinstall the guard over the Taper-Grip bushing.



Do not operate unit until the torque arm has been attached to the unit and fixed to a rigid structure. The torque arm prevents counter-rotation during unit operation. Refer to torque arm Installation section in this manual for instructions.

Keyed Hollow Bore

Keyed Hollow Bore Installation



Do not operate unit until the torque arm has been attached to the unit and fixed to a rigid structure. The torque arm prevents counter-rotation during unit operation. Refer to torque arm Installation section in this manual for instructions.

CAUTION: The BBB4 must be externally supported prior to insertion of driven shaft into hollow bore.

Bore and Shaft Tolerance Specifications

- Unless otherwise specified, the tolerance of the Hollow Shaft Bore tolerance H8.
- If application involves high shock loading and/or large radial loads, a shaft tolerance of js6 or k6 is recommended.



Keyed Hollow Bore Installation onto Driven Shaft

1

Apply anti seize compound to the driven shaft surface and inside the reducer keyed hollow bore.



2

Align the driven shaft with the reducer/gearmotor bore and carefully slide unit onto the driven shaft to the desired location.



If the fit is tight, strike on the keyed hollow bore with a wooden or hard rubber mallet to assist in the assembly.

If using a mallet during installation, strike **only** against the unit's steel keyed hollow bore. Do not strike the reducer housing or oil seal as damage to the bearings, housing and/or seals may occur.

Note: If the fit is tight, use a jig such as the one shown in Table 3 to ease assembly. **Sumitomo does not supply a mounting jig. This information is provided for reference only.**

Keyed Hollow Bore, Shrink Disc Type Hollow Bore

Size	а	b	c	d	е	Threaded Rod (e) Nut @					
JILC	CC (ISO/JIS)	A2	Bearing	Nut	Threaded Rod						
4A	40	25	51104	M16	M16 x 250						
4B	60	25	51105	M20	M20 x 300						
4C	70	25	51105	M20	M20 x 300						
4D	90	35	51107	M24	M24 x 400						
4E	100	35	51107	M24	M24 x 400	Retaining Ring (a) (C)					
4F	120	46	51109	M30	M30 x 450	\rightarrow A2 \leftarrow					





3

Once driven shaft has been completely inserted into the unit's keyed hollow bore, secure the shaft in place using a keeper plate as shown to the left, or some other means of securing the unit to the driven shaft.



Do not operate unit until the torque arm has been attached. Refer to the Torque Arm Installation section in this manual for instructions.

Shrink Disc Type Mounting Introduction

The **keyless Shrink Disc** provides a reliable commodity shaft attachment for Sumitomo speed reducers and gearmotors. This system allows bi-directional shaft rotation operation with a powerful, slip-free grip.

To assure peak performance of your equipment, please read, understand and follow these installation instructions.



Do not operate unit until the torque arm has been attached to the unit and fixed to a rigid structure. The torque arm prevents counter-rotation during unit operation. Refer to torque arm Installation section in this manual for instructions.

CAUTION: The BBB4 must be externally supported prior to insertion of driven shaft into hollow bore. External support MUST be maintained until all shrink disc socket head cap screws have been tightened to the appropriate operational torque.

Bore and Shaft Tolerance Specifications

- Refer to the certified outline drawing or BBB4 Catalog for recommended machine shaft dimensions.
- Unless otherwise specified, the tolerance of the Shrink Disc Bore H8.
- If application involves high shock loading and/or large radial loads, a shaft tolerance of js6 or k6 is recommended.

Shrink Disc Type Hollow Bore

Shrink Disc Type Hollow Bore Installation onto Shaft

Before placing unit onto driven shaft, **do not apply grease**, **oil**, **or anti-seize paste to the entire driven shaft or to the bore of the shrink disc.** Use of these friction-minimizing products will adversely affect the ability of the unit to transmit torque. Never tighten locking screws before shaft installation. Inner ring may become permanently contracted even at low tightening torques.



1

Clean and degrease contact surfaces; reducer shaft and bore, and the machine driven shaft.

Apply Molykote 321 or an equivalent dry film lubricant to the driven shaft shoulder opposite from the shrink disc.



Do Not apply any friction minimizing compound to the driven shaft at or near the shrink disc.



2

Align the driven shaft with the bore of reducer/gearmotor bore and carefully slide unit onto the driven shaft to the desired location.

• If the fit is tight, strike on the reducer hollow bore with a mallet to assist in the assembly.



If using a mallet during installation, strike **only** against the unit's steel hollow bore. **Do not** strike the reducer housing or oil seal, as damage to the bearings, housing, and/or seals may occur.

If the fit is tight, use a jig such as the one shown in the Keyed Hollow Bore Installation section to ease assembly. **Sumitomo does not supply a mounting jig. This information is provided for reference only.**

Table 4. Shrink Disc Bolt Tightening Torques

fine	Model	Delt	Bolt Torque
Size	(Typical)	BOIT	N•m
4A	TAS-3071-55x68	10 x M6x25 ISO/JIS grade 10.9	12
4B	TAS-3081-65x80	7 x M8x30 ISO/JIS grade 12.9	34
4C	TAS-3081-75x100	12 x M8x35 ISO/JIS grade 12.9	34
4D	TAS-3093-85x110	12 x M10x45 ISO/JIS grade 12.9	68
4E	TAS-3081-100x140	10 x M12x45 ISO/JIS grade 12.9	118
4F	TAS-3071-120x165	8 x M16x55 ISO/JIS grade 12.9	290

Installation onto Driven Shaft, continued

Shrink Disc Type Hollow Bore



- 3
- Set the (untightened) shrink disc on the reducer shaft.



4

Tighten Bolts to the correct torque value.

- For 3-piece design shrink disc, make sure that both plates are parallel when tightening bolts.
- After confirming that the shrink disc is set correctly, tighten the bolts uniformly, in a clockwise pattern while keeping both plates parallel (**not** diagonally or 'star' pattern).
- It is recommended to tighten respective bolts by 30 degrees each time until the specified torque is reached.



5

For units with a safety cover, install the guard over the **shrink disc.**



Do not operate unit until the torque arm has been attached. Refer to the Torque Arm Installation section in this manual for instructions.

Torque Arm Installation

Torque Arm Introduction, Turnbuckle Type Torque Arm



Torque Arm Introduction

A **torque arm** is a device used to prevent counter-rotation of the shaft mounted reducer/gearmotor during operation.



The torque arm **must** be mounted in **tension** when torque arm mounting point is greater than 6 inches (150mm) from machine mounting point or, tie-rod or turn buckle type torque arm is used.

Turnbuckle Type Torque Arm Parts

Turnbuckle Rod Type Torque Arm Parts



Table 5. Turnbuckle Type Torque Arm Parts

Item Number	Description	Item Number	Description
1	Hex Nut	7	Locke Washer
2	Lock Washer	8	Fulcrum Mounting Bracket
3	Threaded Extension Rod	9	Hex Bolt
4	Turnbuckle	10	Locking Nut (if supplied)
5	Threaded Arm	11	Locking Nut (if supplied
6	Hex Bolt	12	Hex Bolt



1

Attach the torque arm threaded extension rod to the bevel housing, as shown in the Figure, at the housing corner eyelet, using the appropriate nut, bolt and lockwasher.

- Insert the bolt through the brackets, torque arm sleeve (if supplied) and reducer housing eyelet.
- Place the lockwasher on the bolt and secure with nut.

Table 6. Bolt Tightening Torques

Unit Size	Bolt Size ^[1]	N∙m
Α	M16 x 75	206 – 227
В	M20 x 100	392 – 431
С	M24 x 105	686 – 755
D	M24 x 125	686 – 755
E	M24 x 125	686 – 755
F	Consult	Factory

Note: [1] Bolt Class equal to ISO/JIS Class 8.8



2

Install the turnbuckle onto the threaded extension rod (gearbox side) and then threaded arm (foundation side) to the turnbuckle

If the assembly was supplied with hex nuts to secure the turnbuckle, install the nuts loosely, ensuring the left hand nut is used on the threaded arm, prior to installing the turnbuckle and threaded arm

Torque Arm Installation, continued

Turnbuckle Type Torque Arm



OPTIMUM MOUNTING

Nu

Lock Washer

3

Position the torque arm so it will be in tension during unit operation and mount the fulcrum mounting bracket to suitable structure or foundation. Consider installing two torque arms for reversing applications to allow torque arm to be in tension for each direction of rotation.

Mounting hardware for fulcrum mounting bracket are NOT supplied by Sumitomo.

4

Position the torque arm as close as possible to 90° relative to the unit output bore / driven equipment shaft.

Sumitomo does not recommend combining torque arm assemblies to achieve a greater overall length. Table 7. Bolt Tightening Torques

Unit Size	Bolt Size ^[1]	N•m	
А	M16 x 65	206 – 227	
В	M16 x 80	206 – 227	
С	M16 x 80	206 – 227	
D	M16 x 80	206 – 227	
E	M16 x 80	206 – 227	
F	Consult Factory		

5

Assemble the threaded

Mounting Bracket

Bolt

Threaded Arm

Note: [1] Bolt Class equal to ISO/JIS Class 8.8

arm to the fulcrum mounting bracket, as shown.

Some adjustment of the turnbuckle may be required to lengthen or shorten the overall length.

Secure it with the appropriate nut, bolt and lockwasher.

• Insert the bolt through the brackets and threaded arm eyelet.

• Place the lockwasher on the bolt and secure with nut.



6

If turnbuckle hex nuts were supplied, secure the turnbuckle position by adjusting the previously installed turnbuckle nuts.

Table 8. Nut Tightening Torques

Unit Size	Nut Size ^[1]	N∙m
А	M20	392 – 431
В	M24	686 – 755
С	M24	686 – 755
D	M24	686 – 755
E	M24	686 – 755
F	Consult	Factory

Torque Arm Installation, continued

T-Type Torque Arm



T-Type Torque Arm Sumitomo Supplied Components for T-Type Torque Arm

Table 9. T-Type Torque Arm Components

Item Number	Description
1	Torque Arm Bracket
2	Bracket Hardware
3	Rubber Bushing (qty 3)
4	Washer (qty 2)







T-Type Torque Arm Installation Procedure

1

Attach the T-Type Torque Arm Bracket to the BBB4 using the supplied mounting hardware.

Tighten mounting bolts according to the values listed in Table 10:

Table 10. T-Bracket Bolt Torques

	Bracket	Torque		
DDD4 SIZE	Bolt Size ^[1]	N∙m		
4A	2 x M16	206 – 227		
4B	2 x M20	392 – 431		
4C	2 x M24	686 – 755		
4D	2 x M30	1373 – 1510		
4E	2 x M30	1373 – 1510		
4F	T-Type Not	t Available		

Note: [1] Bolt class equal to ISO/JIS Class 8.8

2

Place washer and rubber bushing on bolt.

Insert torque arm bolt (supplied by customer) through torque arm mounting tab. T-Type bolt sizes listed in Table 11.

Make sure bolt is parallel to T-Type Torque Arm side when fully installed.

3

Follow these steps to attach the mounting angle bracket:

- Place rubber bushing and mounting angle bracket on bolt.
- Verify that the mounting angle bracket hole is the correct diameter for customer supplied bolt.
- Place remaining bushing, washer and two nuts on the bolt.



22 Manual BBB4_ENG_11_2022_991497

Torque Arm Installation, continued

T-Type Torque Arm

Table 11. T-Type Bolt Dimensions

Unit Size	Bracket Tab Bore	Typical Bolt Size [1]
4A	Ø18mm	M16
4B	Ø18mm	M16
4C	Ø22mm	M20
4D	Ø26mm	M24
4E	Ø33mm	M30

Note: [1] Bolt class should be greater or equal to ISO/JIS Class 8.8. Application with multiple start/stops and/or shock loading should use ISO/JIS 10.9 at a minimum.



Confirm that the **rubber bushings** can still be rotated by hand. This indicates the bushing has not been over tightened.



Compressed bushings will not allow the bushings to properly absorb the loads of the shaft mounted gearbox. This can lead to premature failure.

Mounting angle bracket must be secured to the machine structure.



5

Confirm the mounting angle bracket does not interfere with the torque arm. There should be no metal-to-metal contact between the two during a complete revolution of the driven equipment.



Metal-to-Metal contact between these two components may lead to catastrophic failure of the reducer/ gearmotor.



Removal from Driven Shaft

Removal of BBB4 with Taper-Grip Bushing



Removal of BBB4 with Taper-Grip Bushing



Before starting unit removal process, ensure that electrical power to unit has been safely locked out and that electrical connections to the unit have been disconnected.

1

Externally support the BBB4 unit such that all unit weight is removed from the driven shaft.



The weight of the BBB4 must be externally supported throughout the entire removal process.



Do not raise the unit too high. Shaft binding may occur.



3

Apply a liquid-penetrant onto each of the Taper-Grip bushing socket-head cap screws. Allow time for the penetrant to settle into the threads of the screws.



4

After the penetrant has settled, remove the socket head cap screws one at a time.

Removal from Driven Shaft, continued

Removal of BBB4 with Keyed Hollow Bore



5

Place a soft-metal (i.e. brass) bar against the flange of the Taper-Grip bushing and carefully strike end of bar with a hammer to release the bushing.

If shaft removal is difficult, a jig such as the one shown in Table 12 may be used to ease the removal process. **Sumitomo does not supply the removal jig . This information is supplied for reference only.**



6

Apply a liquid penetrant to the shaft where it contacts the bushing. Allow time for the liquid to settle between the shaft and the bushing wall. Once the penetrant has settled adequately, carefully remove the BBB4 from the driven shaft.

If the Taper-Grip bushing releases but the unit cannot be removed from the driven shaft, a puller may need to be applied to the bushing flange to pull the unit free from the shaft.

Removal of BBB4 with Keyed Hollow Bore



Before starting unit removal process, ensure that electrical power to unit has been safely locked out and that electrical connections to the unit have been disconnected.



1

Remove safety cover and the shaft-retaining device from the driven shaft.

Removal from Driven Shaft, continued

Removal of BBB4 with Shrink Disc



2

Apply a liquid penetrant to the shaft where it contacts the keyed hollow bore. Allow time for the liquid to penetrate between the shaft and the wall of the keyed hollow bore.



3

Once the penetrant has settled adequately, carefully remove the BBB4 from the driven shaft.





Removal of BBB4 with Shrink Disc



Before starting unit removal process, ensure that electrical power to unit has been safely locked out and that electrical connections to the unit have been disconnected.

1

Remove the safety cover and apply liquid penetrant to the shrink disc bolts and shaft/bore allowing adequate time for proper penetration.

Loosen the locking bolts on the shrink disc.

Complete bolt removal should not be required.

Tapping the shrink disc flanges with a rubber dead blow hammer may be required if any fretting corrosion has occurred.

2

Remove the gearbox from the shaft.

If shaft removal is difficult, a jig such as the one shown in the Removal of BBB4 with Taper-Grip Bushing section may be used to ease the removal process. **Sumitomo does not supply the removal jig. This information is supplied for reference only.**

Lubrication

Taconite Seal Lubrication Procedure

Taconite Seal Assembly



1. Introduction

Taconite seals may be used in high dust operating environments. They use a grease purging system to prevent outside contaminants from entering the speed reducer/ gearmotor. Figure to the left details the Taconite Seal assembly as utilized in the 4-Series Bevel Buddybox .

2. Procedure

Please follow these instructions to maintain lubrication of the Taconite Seal system:

- a. Unless otherwise specified, the Taconite output seals are each packed with NLGI #2 EP mineral grease prior to unit shipment from the factory location.
- b. Grease does not need to be added to the seals prior to unit start-up.
- c. Add grease to the seals according to the guidelines indicated in Table 13. Refer to Table 14 for recommended greases.

Table 13. Lubrication Cycle

Output Shaft RPM	Hours of Operation
>200	5,000

Please note that a highly contaminated environment may require a more frequent lubrication cycle.

Table 14. Recommended NLGI#2 Mineral Greases

Grease	BP	Castrol		Castrol Chevron/Texaco		Exxon/Mobil		Shell	Total	
Mineral	Ener-Grease LS EP2	Spheerol AP3	Olista Longtime 3EP	Tribol 3020/ 1000-2	Duralith Grease EP2	Multifak Grease EP2	Beacon EP2	Mobilux EP2	Alvania EP2	Multis EP2
Food Grade					FM EP2					

Taconite Seal Lubrication Procedure, continued

- d. If the unit will <u>not</u> be operated for a period greater than 6 months, apply a thin layer of grease to the outside surface of the seals to prevent dry-out. Before starting the unit, check the seals' integrity and replace if required. If seal replacement is required, purge and add grease to the newly installed seals prior to unit operation.
- e. Units may be equipped with either a spring loaded grease relief fitting, or a plug in the grease purge port.
 - If your unit has a plug, begin by removing the plug.
 - While rotating the reducer shafts to ensure even grease distribution, **slowly** add grease until new grease begins to come out of the grease purge port. **NOTE: Rotate shafts by hand in this process. Exercise caution in rotating shaft in order to avoid injury.**
 - Wipe away excess grease and reinstall plug if necessary.

Lubrication Introduction, Lubrication Nomenclature

Lubrication Introduction



Sumitomo BBB4 units are shipped from the factory without lubricating oil, unless the customer specified otherwise when the unit was ordered.

The unit must contain the correct type and amount of lubrication before operating.

For all Y4 motor down mounting configuration models, the Cyclo portion is filled at the factory with grease. For these units, the Cyclo portion **does not** need to be filled with lubricant before start-up. The Bevel Gear portion of models built for the Y4 mounting configuration requires filling with gear oil before start-up. Refer to the Lubrication Method section for details.

For the BBB4 built for the Y4 mounting configuration, the Cyclo and the bevel gear portions **must** be filled with lubricant separately and maintained separately. Lubricant does not flow from one section to the other.



Lubrication Nomenclature

Refer to the **Model** portion of the unit's nameplate to determine the unit size, reduction ratio, and mounting configuration:



Lubrication Method

Lubrication Method

Using the model number and mounting configuration, refer to Tables 15 and 16 to determine the unit's lubrication method.

Table 15.	Lubrication	Method (for Confia	urations `	Y1. Y	2. Y3.	Y5.	Y6
Tuble 15	Eastication	meenoa	ioi comig	aracions	•••	_,,	,	

		Unit Size			
Mounting Configuration	Bevel Gear Size	Cyclo Size	Lubrication Method		
V1 V2 Only at single Cyclo reduction V3 V5 V5 V5 V5 V5 V5	4A - 4F	100, 105, 110, 115, 120, 125, 140, 145 160, 165, 170, 175, 180, 185, 190, 195 10DA, 12DA, 12DB, 14DA, 14DB, 14DC, 16DA, 16DB, 17DA, 17DB, 17DC	Complete Unit (Bevel Gear Portion and Cyclo Portion)	Common Oil Sump	

Table 16. Lubrication Method for Y4 Configuration

		Unit Size			
Mounting Configuration	Bevel Gear Size	Cyclo Size	Lubrication Method		
		100, 105, 110, 115, 120, 125	Cyclo Portion	Maintenance Free Grease ^[1]	
Y4	10DA, 12DA, 12DB	Bevel Gear Portion	Oil		
	4A-4F	140, 145, 160, 165, 170, 175 180, 185, 190, 195	Cyclo Portion	Grease ⁽²⁾	
		14DA, 14DB, 14DC, 16DA, 16DB, 17DA,17DB, 17DC, 18DA, 18DB, 19DA, 19DB	Bevel Gear Portion	Oil	

Notes: [1] Maintenance Free Grease: the input Cyclo portion is grease lubricated as standard from the factory and usually does not require replacement or replenishment.

[2] Grease: the input Cyclo portion is grease lubricated as standard from the factory. Please refer to Tables 22 and 23 for the proper grease replenishment and change interval.

Recommended Lubricants

Bevel Gear Portion and Cyclo Portion Lubricants

Recommended Oils

Table 17, Recommended Oils, lists the oils that may be used to lubricate the Bevel Gear portion of the unit. These oils may also be used in the Cyclo portion if it is oil lubricated.

Table 17. Recommended Oils.

Manufacturer	Type of oil	Manufacturer	Type of oil
AVIA	Gear RSX	MOBIL	Mobilgear 600XP
CASTROL	Alpha EP	SHELL	Omala S2 GX
DEA	Falcon CLP	TOTAL	Carter EP / XEP
KLÜBER	Klüberoil GEM1		

• Use lubricants with low viscosity for operation during winter or at relatively low temperatures.

• Use a lubricant with a viscosity within the range listed in Table 18, Recommended Oil Viscosity.

• All lubricants that meet the requirements of DIN 51517 part 3 are suitable.

Table 18. Recommended Oil Viscosity

lubricant as per	possible operating temperatures °C							
DIN 51517 part 3		ambient temperature °C						
	-20°C	0°	+20°	+40°	+60°	+80°	+100°	
CLP 68								
CLP 100								
CLP 150								
CLP 220								
CLP 320								

 Consult local distributor, nearest authorized agent or Sumitomo directly when the unit will be operated in ambient temperatures other than -10° – 40°C. Special unit modifications may be necessary.

Cyclo Portion Approved Greases

Table 19, Cyclo Portion Approved Greases, lists the greases that may be used to lubricate the Cyclo portion if grease is the specified lubrication method (refer to the Lubrication Method section for details).

Table 19. Cyclo Portion Approved Greases

Ambient Temp. °C	Overall Reduction Ratio	All Unit Sizes
	11:1 through 18:1	Shell Gadus S2 V220 00
-10º – 50 ºC	19:1 and higher	Esso Unirex N2

Cyclo portions have unique operating characteristics that require specific lubricant properties. Please consult Sumitomo if alternate lubricants are required.

Oil Quantities

Oil Quantities

Table 20. Single Reduction Approximate Oil Quantity

Units: Liter Note: Output = Bevel Gear Portion Input = Cyclo Portion

	Mounting Configuration						
Bevel Gear Unit Size	YI	Y3	Y2	Y4	Input	Y5	Y6
4A10	1.	62	3.17			1.36	1.84
4A11	1.	66	3.26	1 1 1 2	Carrow	1.40	1.88
4A12	1.	71	3.35	1.13	Grease	1.45	1.93
4A14	1.	91	3.77			1.65	2.13
4B12	3.	29	6.50			3.34	3.23
4B14	3.	49	6.97	1.72	Grease	3.54	3.43
4B16	3.	92	7.61]		3.97	3.86
4C14	5.	52	11.1			5.30	5.88
4C16	5.	96	11.8	2.72	Grease	5.74	6.32
4C17	6.	34	12.5			6.12	6.70
4D16	10).1	19.9			9.69	10.4
4D17	10).4	20.5	4.61	Grease	10.0	10.8
4D18	10).7	21.0]		10.3	11.1
4E17	14	1.6	28.8			13.1	16.1
4E18	14	1.7	29.1	6.26	Grease	13.2	16.2
4E19	15	5.7	30.4]		14.2	17.2
4F18	20).0	39.4	7 20	Croose	18.5	21.4
4F19	20).8	40.6	7.28	Grease	19.3	22.2

Oil Quantities

Table 21. Double Reduction Approximate Oil Quantity

	Mounting Configuration							
Bevel Gear Unit Size	YI	Y3	Y2		Y4		Y5	No.
	100 No.		Output	Input	Output	Input		10 +
4A10DA	1	.7					1.4	1.9
4A12DA	1	.7	2.0	Grease	1.1	Grease	1.5	2.0
4A12DB	1	.8					1.5	2.0
4B12DA	3	.3					3.4	3.3
4B12DB	3	.4	20	Grooco	17	Groaco	3.4	3.3
4B14DA	3	.5	2.0	Glease	1.7	Glease	3.6	3.5
4B14DB	3	.6					3.6	3.5
4C14DA	5	.6	3.5	Grease	2.7	Grease	5.3	5.9
4C14DB	5	.6					5.4	6.0
4C14DC	5	.6					5.4	6.0
4C16DA	6	.0					5.8	5.4
4C16DB	6	.1					5.9	6.4
4C17DA	10).2					9.8	10.6
4D16DA	10).1					9.8	10.5
4D16DB	10).2	5.0	Grooco	16	Groaco	9.8	10.6
4D17DB	10).5	5.0	Grease	4.0	Glease	10.2	10.9
4D17DC	10).7					10.3	11.0
4D18DA	10).8					10.5	11.2
4D18DB	11	1.7					11.4	12.1
4E17DA	14	1.6	1				13.1	16.1
4E17DB	14	1.7]				13.2	16.2
4E17DC	14	1.8	7.3	Grease	6.3	Grease	13.3	16.3
4E18DA	14	1.8	1				13,3	16, 3
4E18DB	15	5.7	1				14,2	17,2
4E19DA	17	7.5	1				16.00	19.0
4E19DB	17	7.7					16.2	19.2
4F18DA	20).1					18.6	21.5
4F18DB	21	1.0	12.0	Croose	7.2	Croose	19.5	22.4
4F19DA	22	2.6	12.0	Grease	/.5	Grease	21.1	24.0
4F19DB	22	2.8					21.3	24.2

Units: Liter Note: Output = Bevel Gear Portion Input = Cyclo Portion

Oil Supply and Discharge Procedures

Oil Supply Procedure



- Always stop the unit before adding oil
- Oil level may drop during operation, depending on the oil viscosity, temperature and direction of rotation. Additional oil is not necessary. Check the oil level when the unit is stopped to ensure that it has the correct amount of oil.
- It may take some time for the oil to settle when the oil viscosity is high. Be careful not to add too much oil.
- There may be two different oil fill locations for some combinations; refer to oil fill/ drain locations figure for details.
- Consider implementing an oil analysis program to ensure lubricant continues to operate at peak performance. Follow your lubrication provider's oil analysis recommendations to ensure reducer performance.
- Always consult factory and warehouses for overhaul of gearmotors and reducers. Familiarity with Cyclo products is necessary for proper overhaul.
- 1. Remove the oil fill plug, as referenced in the Figures below.
- 2. Slowly add oil while checking the level through the oil gauge.
- 3. After the oil has settled, make sure the level is midway between the high and low marks on the oil gauge.
- 4. Insert the oil fill plug after wrapping it with sealing compound or tape.

Oil change Intervals

Oil level must be checked every 5,000 hours. If the oil is contaminated, burned or waxed, change the oil immediately, and flush the gear if necessary. The oil level can be checked by the oil level contol device.

Under normal operating conditions oil should be changed every 10,000 hours or after 2 years at the latest. A shorter oil change (every 3,000 or 5,000 hours) will increase the gear lifetime.

We recommend to change the oil after the first 500 hours of operation.

The recommendations above do not apply to abnormal operating conditions, i.e., high temperature, high humidity or corrosive environments. If any of these situations exist, the lubricant may have to be changed more frequently.

Oil Fill/Drain Locations



Grease Quantities



Oil Discharge Procedure

1. Remove the drain plug as shown in the Figures above, to discharge oil.

2. Properly discard or recycle lubricant according to applicable regulations.

3. Replace the drain plug after wrapping it with sealing compound or tape.

Grease Quantities

- Grease quantities listed in this section are for the Cyclo portion of the reducer/gearmotor.
- The Bevel portion is always oil lubricated unless otherwise specified at time of order entry.
- Refer to the Oil Quantities section, Tables 20 & 21. for Bevel portion oil quantities.
- Installing grease into Bevel Gear portion will result in damage to the unit.

The Cyclo (input) portion of **only Y4 double reduction** units is grease lubricated at the factory. Additional grease is not required before initial start-up. All assemblies other than Y4 have oil lubricated Cyclo portions. The following tables are provided for user rebuild or refurbishment reference.

Table 22. Single Reduction Approximate Grease Quantity

Units: gram

Unit Size	Unit Lubrication Portion	Lube Quantity gram Y4
4A100/105		120
4A110/115		190
4A120/125		250
4A140/145		450
4B120/125		250
4B140/145		450
4B160/165		750
4C140/145	Cyclo	450
4C160/165		750
4C170/175		1000
4D160/165		750
4D170/175		1000
4E170/175		1000
4F180/185		1100
4F190/195		1500

		Lube Quantity gram
Unit Size	Cyclo Stage	Y2 V4 only
441004	First (Input)	25
441004	Second	140
441204	First (Input)	25
441204	Second	330
441208	First (Input)	90
4A12DD	Second	330
481204	First (Input)	25
4012DA	Second	330
481208	First (Input)	90
4D12DD	Second	330
401404	First (Input)	25
4D14DA	Second	450
	First (Input)	60
401400	Second	450
401404	First (Input)	25
40140A	Second	450
4C14DR	First (Input)	60
4C14DD	Second	450
461406	First (Input)	120
401400	Second	450
401604	First (Input)	60
40100A	Second	750
ACIEDR	First (Input)	120
401000	Second	750
401604	First (Input)	60
40100A	Second	750
4D16DB	First (Input)	120
401000	Second	750

Table 23. Double Reduction	Approximate Grease Quantity
Units: gram	

		Lube Quantity gram
Unit Size	Cyclo Stage	Y2 V4 only
	First (Input)	60
4DT/DA	Second	1000
401700	First (Input)	120
401708	Second	1000
401706	First (Input)	250
4D17DC	Second	1000
45170.4	First (Input)	60
4E17DA	Second	1000
451700	First (Input)	120
4E17DB	Second	1000
451700	First (Input)	250
4E17DC	Second	1000
451904	First (Input)	120
46160A	Second	1100
4E19DP	First (Input)	450
461600	Second	1100
451004	First (Input)	330
4E19DA	Second	1500
4E10DR	First (Input)	450
461906	Second	1500
461804	First (Input)	120
46100A	Second	1100
4E19DP	First (Input)	450
4F10DD	Second	1100
461004	First (Input)	330
4F19DA	Second	1500
AE10DP	First (Input)	450
4F19DB	Second	1500

Grease Replenishment and Draining Procedure, Grease Replacement

Grease Replenishment and Draining Procedure

Procedure for adding grease to grease-lubrication models (excluding maintenance-free models)

- 1. Remove the grease discharge plug from the outside cover.
- 2. Add grease with a grease gun from the grease nipple in the inside cover section or motor connection cover.
- 3. Insert the grease discharge plug.



Add grease while manually rotating the input shaft to ensure proper, uniform circulation.

Add grease slowly, to prevent internal pressure and possible seal damage.

Do not add more grease than the amount shown in Table 22 and 23. Adding too much grease may cause the grease temperature to rise, or force the grease to leak into the motor.

Always consult factory and warehouses for overhaul of gearmotors and reducers. Familiarity with Cyclo products is necessary for proper overhaul.

Table 24. Grease Replenishment Intervals

Hours of operation	Replenishment interval	Remarks
10 hr. max./day	3 - 6 months	Shorten the supply interval when
10 - 24 hr. max./day	500 - 1000 hours	the operating conditions are severe or the frame size is large

Table 25. Grease Replacement Intervals

Change Interval	Remarks	
Every 20,000 hrs or 3–5 years	Shorten the supply interval when the operating conditions are severe or the frame size is large	

Grease Replacement

• Maintenance free units may be safely operated for an extended time because it is sealed with maintenance free grease. Tables 22 & 23 are provided for generalized reference.



• Adequate care should be taken to ensure the lubricant continues to meet the specified lubrication characteristics.

- If refurbishment or rebuild is required, do not add more grease than the amount shown in Tables 22 and 23.
- Adding too much grease may cause the grease temperature to rise or force the grease to leak into the motor.



- Consider implementing a lube analysis program to ensure lubricant continues to operate at peak performance.
- Follow your lubrication providers analysis recommendations to ensure reducer performance.

• Always consult factory and warehouses for overhaul of gearmotors and reducers. Experience is necessary for proper overhaul.

Y2 Oil Fill & Drain Procedures

Oil Fill Process

Affected Unit Sizes

This document is intended for all Bevel Buddybox (BBB) 4 series units built in the Y2 mounting (motor up) configuration. Images contained within the document show a single reduction input stage, however the process remains the same for double and triple reduction product offerings.



Oil Fill Process

CAUTIONARY NOTE:



- Use the appropriate grade of lubricating oil based on ambient operating conditions of the application.
- Refer to the Sumitomo product catalog and/or Operating & Maintenance manual for a list of Sumitomo approved lubricating oils.
 Prior to beginning the fill process, ensure the Unit Drain Plug is in place and adequately tightened.



1

Identify the bevel portion oil fill plug on the bevel gear housing. Carefully remove the plug and put aside for reinsertion after oil fill is complete.



Fill the bevel portion with the appropriate type and grade of oil.

The bevel portion is considered full when the oil level reaches the oil fill port.

Once fill is complete, re-install and tighten the oil plug into the fill port



Y2 Oil Fill & Drain Procedures, continued

Oil Fill Process



3

Carefully remove the unit Air Breather assembly and put aside for reinsertion after oil fill process is complete.

4



Slowly fill the Cyclo (input) portion with the correct type and grade of oil as used in STEP #2 of this process.

NOTE: The oil fill cup may immediately become full during the process. In such an event, stop the fill process and allow the oil to drain from the cup into the reducer.



5

The input portion is considered full when the oil level stabilizes in the middle of the oil sight gauge.

The input portion is considered full when the oil level stabilizes in the middle of the oil sight gauge or middle of the two red marks.



Check gauge carefully. Oil film from fill procedure can distort view.

Be sure to check the oil level after a few minutes of operation. Stop equipment and check gauge as shown in step 5. Adjust oil level as

required.



6

Once the input portion of the unit is filled to the correct level with lubricant, carefully reinsert the air breather assembly into the oil fill cup.

Y2 Oil Fill & Drain Procedures, continued

Oil Drain Process

Oil Drain Process

CAUTIONARY NOTE:



Exercise extreme caution when draining the lubricating oil from the Bevel Buddybox as it may be hot.
Follow all corporate, local, state and federal government regulations in disposing of the used lubricating oil.



1

Identify the bevel portion oil drain plug on the bevel gear housing.

Carefully remove the plug and put aside for reinsertion after oil fill is complete.



2

Carefully remove the unit air breather assembly and put aside for reinsertion after oil fill process is complete.

Allow used oil to freely flow into an approved lubricant container.

Once the unit is completely drained of oil, reinstall the drain plug and tighten.

Refer to torque tightening values in Table 26.

Table 26. Plug sizes and tightening torque values

Plug Sizes					
Unit Size	Housing	Casing			
4A	1/2	1/2			
4B	1/2	1/2			
4C	3/4	1/2			
4D	3/4	1/2			
4E	3/4	1/2			
4F	3/4	1/2			

Torque Value						
Size	N∙m					
1/2	17.8					
3/4	30.0					
1	41.2					

Motor installation

Electrical installation

Safety notes



Installation, connection and commissioning work as well as maintenance and repairs must only be carried out by qualified experts.

Before any work starts on the motor or the gear motor but particularly before covers are taken off active parts, the motor must be disconnected as prescribed.

The 5 safety rules as set out in DIN VDE 0105 must be obeyed.

These electric motors comply with the standards and regulations in force and meet the requirements of the Low Voltage Directive 2014/35/EG.



The installation is subject to all regulations in force and must be done by qualified personnel.

Area of application

The motors are completely sealed and air-cooled. Standard protection type: IP 55 with IP 44 brake.

Ambient temperature: -10°C to +40°C

Installation height: < 1000 m

The coil is designed to be in insulation class F (150 °C). If operated properly the temperatures on the motor surface may reach more than 100 °C. Do not touch. Temperature-sensitive parts must not be fixed on or rest against it.



When connecting motors via brackets or an IEC flange, a suitable IP65 seal must be provided. The customer is responsible for fitting this seal.

The ventilation openings in the fan hood must not be blocked.

For sufficient cooling, the distance between the hood and the wall must not fall below the FB measurement. FA is the minimum distance required to remove the fan hood.



Table 27. Cooling and removing distances for fan hood

	Standard motor										
Motor frame Motorbaugröße	VA63S VA63M	VA71M	N80S N80M	N90S N90L	N100L N112S	N112M N132S	N132M N160M	N160L	N180M SN180M N180L	N200L	N200LL N225S
FB (mm)	20	25	25	20	20	25	30	30	30	30	30
FA (mm)	52	60	63	64	66	69	92	120	155	155	207
					Brake mot	or					
Motor frame Motorbaugröße	63-71	80	90	100	112-132S		132M- 160M	160L	180M	-	-
FB (mm)	20	25	25	20	20	25	30	30	30	-	-
FA (mm)	66	103	127	133	144	159	197	255	329	-	-

Electrical installation



Table 28. Conduit threat sizes

Frame	Conduit threat	Frame	Conduit threat
63-71	1 x M16 x 1.5 1 x M25 x 1.5	180	2 x M 40 x 1.5
80-132S	2x M25 x 1.5	200-225	2 x M50 x 1.5
132M-160	2 x M32 x 1.5	250	2 x M63 x 1.5

Cable glands must comply at least with the motor protection class specified on the model plate. Unused cable glands must be closed depending on the type of motor protection. Existing plugs must be tightened firmly.

Table 29. Technical data of standard motors

	Standard Motors													
P _M	Motor	n _M	T _M	I [A]	I [A]	cos φ	Eff. Class	η@	400V/5	0Hz	M _A /M _N	M _K /M _N	I _A /I _N	٦ ^w
kW 4p	size	[rpm]	[Nm]	230V 50Hz	400V 50Hz	400V 50Hz		100%	75%	50%	%	%	%	[10 ⁻⁴ kg m ²]
0.12	VA63S	1430	0.80	0.70	0.41	0.59	IE3	72.5	68.5	61.9	283	346	575	5.00
0.18	VA63M	1420	1.21	1.03	0.60	0.57	IE3	76.4	68.2	61.1	310	371	586	6.50
0.25	VA63M	1400	1.71	1.19	0.69	0.69	IE3	76.1	71.3	67.1	219	262	511	6.50
0.37	VA71M	1430	2.47	1.80	1.04	0.65	IE3	79.2	76.5	72.2	338	393	578	12.0
0.55	N80S	1430	3.67	2.31	1.33	0.71	IE3	83.5	81.5	78.9	293	365	646	21.0
0.75	N80M	1440	4.97	3.54	2.05	0.63	IE3	84.6	83.8	80.7	423	446	643	23.5
1.1	N90S	1440	7.30	4.50	2.60	0.71	IE3	85.6	85.8	84.1	336	387	672	33.7
1.5	N90L	1430	10.0	6.17	3.56	0.72	IE3	85.8	86.1	84.5	338	375	631	39.1
2.2	N100L	1450	14.5	8.56	4.95	0.74	IE3	88.7	88.5	86.9	382	465	839	88.0
3	N112S	1440	19.9	11.2	6.45	0.77	IE3	87.9	88.5	87.6	352	419	766	100
4	N112M	1460	26.2	14.4	8.30	0.79	IE3	89.1	89.4	88.3	273	388	768	194
5.5	N132S	1460	36.0		11.6	0.76	IE3	90.6	90.4	88.9	351	524	985	291
7.5	N132M	1460	49.1		16.0	0.76	IE3	91.2	91.1	89.9	206	350	738	409
11	N160M	1460	72.0		22.2	0.78	IE3	91.6	92.0	91.4	229	322	621	561
15	N160L	1480	96.8		30.6	0.76	IE3	92.5	92.6	91.6	256	338	680	995
18.5	N180MS	1480	119		35.4	0.80	IE3	93.9	93.8	92.7	272	375	816	2560
22	N180M	1480	142		40.9	0.83	IE3	93.8	93.9	93.3	227	314	707	2560
30	N180L	1480	194		59.1	0.78	IE3	94.0	93.8	92.8	265	382	767	3260
37	N200L	1480	239		69.5	0.81	IE3	94.1	94.3	93.6	266	361	791	3900
45	N200LL	1480	290		82.5	0.84	IE3	94.6	94.6	93.8	317	411	886	7310
55	N225S	1480	355		97.0	0.86	IE3	95.1	95.2	94.6	358	409	963	8640
kW 6p														
18.5	N-180LS	980	180		37.6	0.8	IE3	93.7	93.6	92.6	318	364	770	4510
22	N-180L	980	214		43.3	0.83	IE3	93.3	93.6	93	267	305	669	4510
30	N-200LS	990	289		62.5	0.78	IE3	94.3	94.1	92.8	304	391	819	10600
37	N-200LL	990	357		74	0.8	IE3	94.6	94.6	93.7	285	370	800	11900
45	N-2255	990	434		90	0.8	IE3	94.7	94.6	93.7	284	371	795	13200
55	N-250S	990	531		108	0.81	IE3	94.5	94.1	92.6	342	363	813	31600

Electrical installation

Legend table 29 and table 30:

$$\begin{split} & \mathsf{P}_{\mathsf{M}} = \text{motor power [kW]} \\ & \mathsf{n}_{\mathsf{M}} = \text{motor speed [min-1]} \\ & \mathsf{I}_{\mathsf{N}} = \text{rated current [A]} \\ & \text{cos } \phi = \text{power factor} \\ & \eta = \text{efficiency [\%]} \\ & \mathsf{M}_{\mathsf{A}}/\mathsf{M}_{\mathsf{N}} = \text{starting torque/rated torque [\%]} \\ & \mathsf{M}_{\mathsf{K}}/\mathsf{M}_{\mathsf{N}} = \text{breakdown torque/rated torque [\%]} \\ & \mathsf{I}_{\mathsf{A}}/\mathsf{I}_{\mathsf{N}} = \text{starting current/rated current [\%]} \end{split}$$



Please refer to the rating plate and these operating instructions as well as the current catalogue for technical data and information on the permissible operating conditions. You will find information on special versions on your order confirmation. If anything is unclear, we urgently recommend you to contact the factory or your sales centre giving the model description and the serial number.

Sumitorno Drive Tec Sumitorno (SHI) Cyclo Drive G Cyclostraße 92 • 85229 Markt Inderso	hnologies ermany GmbH dorf • Germany	3 P IND MOT	HASE UCTION FOR	U C	K A	C	E	EUC
FRAME	P		k٧	/		S		%
٧		\triangle						X
Hz								
A								
1/min								
COS								
eff %			IEC 60	034	F .			
IP		IE	3		Ins.	class		
Brake	1	VAC		А		Nm	IP	
S/N				Yea	r			
CustData:								212959

Connect the protective earthing conductor to this terminal.





A circuit diagram is located in the terminal box. The motors can be connected to the terminal board depending on the connection voltage as follows:

220 - 240 V 50 Hz	380 - 420 V 50 Hz 440 - 480 V 60 Hz	380 - 420 V 50 Hz 440 - 480 V 60 Hz
W2 U2 V2 O O O U1 V1 W1 O O L1 L2 L3	W2 U2 V2 OOO U1 V1 W1 O O O L1 L2 L3	W2 U2 V2 Q Q Q U1 V1 W1 Q Q Q L1 L2 L3

The rated voltage range as set out in EN 60 034-1 applies to the specified voltages with a \pm 5 % voltage or \pm 2 % frequency deviation.

The following tightening torques apply to the threaded bolts on the terminal board: **Table 30. Tightening torques**

Screw thread:	Permissible tightening torque in Nm
M4	1.2
M5	2.5
M6	4.0
M8	7.5

Brake motors

Brake motors



Standard brake

Rapid action brake

The brake motors are connected in accordance with the following circuit diagrams:





Motor

The brake control voltage is noted on the rating plate.

Brake

Moto

If the stop position of the application is not reached on starting up, this may not have anything to do with the brake torque.

- + MN

Brake

Rectifler

- ++

Brake

For motors driven by an inverter, the brake must be supplied separately, as shown below:

Rectifie



Brake motors

D1	P1		Brake	Optional max.	Brake rea	ction time	Brake motor	Total braking	Brake	current	Option
[kWxP]	Motor	Brake	torque [Nm]	torque [Nm]	standard [sec]	fast [sec]	inertia [10 ⁻⁴ kg m²]	energy [10 ⁶ J]	230 V 50 Hz		400 V 50 Hz
0.12 x 4	VA63S	FB-02A	2.0	2.7	0.15 - 0.20	0.015 - 0.02	5.50	67	0.2	-	0.07
0.18 x 4	VA63M	FB-05A	4.0	5.4	0.10 - 0.15	0.01 - 0.015	6.75	67	0.2	-	0.07
0.25 x 4	VA63M	FB-05A	4.0	5.4	0.10 - 0.15	0.01 - 0.015	6.75	67	0.2	-	0.07
0.37 x 4	VA71M	FB-1D	7.5	10	0.20 - 0.30	0.01 - 0.02	11.1	331	0.2	-	0.1
0.55 x 4	N80S	FB-1E	7.5	10	0.25 - 0.45	0.01 - 0.03	23.3	387	0.2	-	0.1
0.75 x 4	N80M	FB-1E	7.5	10	0.25 - 0.45	0.01 - 0.03	25.8	387	0.2	-	0.1
1.1 x 4	N90S	FB-1HE	11	15	0.45 - 0.65	0.01 - 0.03	39.6	463	0.4	-	0.2
1.5 x 4	N90L	FB-2E	15	20	0.35 - 0.55	0.01 - 0.03	45.0	463	0.4	-	0.2
2.2 x 4	N100L	FB-3E	22	30	0.75 - 0.95	0.02 - 0.04	97.8	1053	0.5	-	0.2
3.0 x 4	N112S	FB-4E	30	40	0.65 - 0.85	0.02 - 0.04	110	1053	0.5	-	0.2
4.0 x 4	N112M	FB-5E	40	55	1.1 - 1.3	0.02 - 0.04	209	3828	0.8	-	0.4
5.5 x 4	N132S	FB-8E	55	72	1.0 - 1.2	0.02 - 0.04	306	3828	-	0.4	-
7.5 x 4	N132M	FB-10E	80	110	1.8 - 2.0	0.02 - 0.04	450	5511	-	0.4	-
11 x 4	N160M	FB-15E	110	150	1.6 - 1.8	0.02 - 0.04	602	5511	-	0.4	-
15 x 4	N160L	FB-20	150	220	-	0.06 - 0.14	1150	11500	-	0.4	-
18.5 x 4	N180MS	FB-30	190	220	-	0.03 - 0.11	2710	11500	-	0.4	-
22 x 4	N180M	FB-30	220	220	-	0.03 - 0.11	2710	11500	-	0.4	-
30 x 4	N180L	FB-30	200	200	_	0.03 - 0.11	3420	11500	-	0.4	-

If only the alternating current is switched off, the braking times as set out in the table below apply. **Table 31. Technical data for motor brakes**

If the direct current circuit is cut off after the rectifier, the brake is applied up to 10 times faster. This is particularly important for lifting devices.



To ensure that the brake (connected to the DC side) is applied quickly, a separate cable must be run to an external contact. The contact must be protected by a Varistor (see Table 33).

Table 32. Varistor voltage range

	Motor	voltage	AC 200-240V	AC 380 - 460V
Varistor range voltage			AC 260-AC 300V	AC 510V
Varistor threshold voltage			430 - 470V	820V
	Type of brakes	FB-01A, 02A, 05A		> 0.4 W
		FB-1B, 1D, 1E	> 0.4 W	> 0.6 W
Varistor output		FB-2B, 3B, 2D, 3D, 1HE, 2E, 3E, 4E	> 0.6 W	> 1.5 W
		FB-5B, 8B, 5E, 8E	> 0.6 W	> 1.5 W
		FB-10B, 15B, 10E, 15E	> 1.0 W	> 1.5 W

Checking for brake wear

Checking for brake wear

The brake is normally assembled as shown in the picture below.



Table 33. Brake parts

Part no Teil Nr.	Part name	Name des Teils
1	Stator packet	Statorpaket
2	Spacer	Abstimmring
3	Brake lining	Bremsbelag
4	Assembling bolt	Screw
5	Boss	Nabe
6	Shaft retaining C-ring	Lock washer
7	Cover	Abdeckung
8	Fan set bolt	Sicherungsschraube
9	Fan (Not provided for FB-01A1 and FB-01A)	Lüfter
10	Leaf spring	Blattfeder
11	Brake disk	Bremsscheibe
12	Armature plate	Ankerscheibe
13	Spring	Feder
14	Electromagnetic coil	Magnetspule
15	Ball bearing	Kugellager
16	Motor shaft	Motorwelle

Brake with manual hand release

Pull up release lever from the holger, press it to the left or right for brake releasing.

Before running the motor, put back the lever to the holder



CAUTION:

Operating the motor with release lever impromerly set may result in an inoperative brake and damage lever.

If the brake is released by operating the lever, this can lead to unwanted movement of components.

The following air gaps	apply to	the FB	brakes:
Table 34. Air gaps			

Tures of busics	Air gap G	(mm)
Туре от ргаке	Nominal dimensions	Limit
FB-01A FB-02A FB-05A	0.2~0.35	0.5
FB-1B, 1D, 1E FB-2B, 2D, 1HE, 2E	0.3~0.4	0.6
FB-3B, 3D, 3E, 4E		0.7
FB-5B, 5E FB-8B, 8E	0.4~0.5	1.0
FB-10B, 10E FB-15B, 15E	0.4~0.5	1.2
FB-20 FB-30	0.6~0.7	1.5

If the air gap limit is exceeded it can be adjusted as set out in the table below.

Table 35. Brake lining limits

Tupo of brokes	Thickness of brake lining	Thickness limit	
Type of brakes	Thickness of brake lining	x (mm)	
FB-01A FB-02A FB-05A	<u>+ to</u>	one-off adjustment	
FB-1B, 1D, 1E		6.0	
FB-2B, 2D, 1HE, 2E		7.2	
FB-3B, 3D, 3E, 4E		8.0	
FB-5B, 8B, 5E, 8E	to	6	
FB-10B, 15B, 10E, 15E		7	
FB-20, 30		12	



STOP

The air gap must be checked at at least three positions (each offset to 120).

If the adjustment is repeated the thickness of the brake lining must be checked.



Brakes are safety-related components. Brake liners and friction discs are not sold as separate parts. Brakes are only available as a complete set.

Converter operation



When operating the motors on the frequency converter the converter manufacturer's EMC notes must be observed. Appropriate suppression measures must be taken. Metal shielded cables and cable glands should be provided. The motor's torque depends on the respective converter. With brake motors the brake's rectifier must be fitted with a separate, sinusoid voltage.

The motor must be protected from excessive overheating by cold conductors, thermo contacts and/ or by external fans.

Motor protection



Motor protection switches (overload protection) must be set to the current value specified on the rating plate depending on the voltage.

Thermo contacts are normally designed as openers.

The resistance of cold conductors (PTC's) at 20 °C is not significant. The value may vary between 60 Ω and a maximum of 750 Ω.

External fans



- The voltage and wiring of the external fan are different depending on the type of fan.
- The external fan has a separate terminal box.

Information on the voltage, frequency and wiring of the external fan is in this terminal box. These are different depending on the size.



ATTENTION : Depending on the controls, the external fan may operate even if the motor is not turning.

Some external fans can only be operated in single phase.

Other fan motors can be operated both in single phase in a Steinmetz circuit and also in triphase.

3 phase motor: In a star circuit or a triangular circuit, depending on the voltage as in the section "Electrical connection".

Commissioning the input drive



Ensure that all safety instructions have been explicitly obeyed once more.

Mains power conditions and the information on the rating plate must be the same. There is additional information in the motor terminal box for additional equipment, such as standstill heating.

The cross section of the connection cables must be adapted to the motor currents. The installation is subject to all regulations in force and must be done by gualified personnel.



Before starting the gear motor, ensure that all safety regulations have been obeyed, the machine has been installed and aligned properly, all fastenings and earth connections have been tightened properly, the auxiliary and additional devices are working properly and have been connected properly and that the feather key on any second shaft end key cannot be flung out.



If possible, the gear box is to be started without load. If it runs quietly and without any odd noises, the motor is attached to the driven machine. On starting up it is advisable to look at the currents being used when the motor is connected to its driven machine so that potential overloads and asymmetries on the mains side can be detected immediately.

Parts

BBB4 Reducer

BBB4 Reducer Parts



Table 36. BBB4 Reducer Parts

Number	Description
1	BBB4 Gear Assembly
2	Cyclo Ring Gear Housing Pins
3	Cyclo Ring Gear Housing Rollers
4	Cyclo Ring Gear Housing
5	Snap Ring
6	Gasket Set
7	High Speed Shaft A Bearing
8	Spacer
9	Cycloid Discs
10	Cyclo Eccentric Cam Assembly
11	Spacer
12	High Speed Shaft B Bearing

Number	Description			
13	Cyclo High-Speed End Shield			
14	Eccentric Key			
15	High Speed Shaft Oil Seal Collar			
16	High Speed Shaft Oil Seal			
17	High Speed Shaft			
18	Snap Ring			
19	Cycloid Disc Spacer			
20	Retaining Bolts			
21	Lock Washers			
22	End Plate			
23	Pin Carrier Rollers			
24	Pin Carrier			

Cyclo Planetary Reduction Component Parts

Cyclo Planetary Reduction Component Parts (Cyclo Ratios 11 - 18:1)

Cyclo Planetary Reduction Component



Table 37. Cyclo Planetary Reduction Component Part Numbers (Ratios 11 - 18:1)

	Reduction I	Ratio (nominal)			C ₃	/clo Planetary	Reduction P	art Numbers				
Unit Size	Overall	Cyclo Planetary	Reduction Block Set (gears & bearings)	Planet Gear	Ring Gear	Sun Gear	Needles	Spacer	Washer	Input Carrier	Bevel Shaft Pin Carrier	
44100	11	3:1	931SD610-003G	AN8911G	AN8303G	AN8910G						
4A100 4A105	13, 14	4:1	931SD610-004G	AN8870G	AN8871G	AN8869G] -	AW5434G	-	-	BL515LG	
-1/(105	16, 18	5:1	931SD610-005G	AN8305G	AN8306G	AN8304G						
44420 44425	11	3:1	931BB612-003G	AP8712G	CJ584LG	AP8711G						
4A120, 4A125 4B120, 4B125	13, 14	4:1	931BB612-004G	AP8706G	CJ554LG	AP8705G	AX2806G	AX2543G	AX2761G	CJ244LG	CI701LG (for 4A)	
40120, 40125	16, 18	5:1	931BB612-005G	AP8714G	CJ585LG	AP8713G						
4A140, 4A145	11	3:1	931BB614-003G	AP8717G	CJ586LG	AP8716G					C J702I G (for 4A)	
4B140, 4B145	13, 14	4:1	931BB614-004G	AP8708G	CJ555LG	AP8707G	AX2807G	AX2763G	AX2544G	CJ588LG	CJ704LG (for 4B)	
4C140, 4C145	16, 18	5:1	931BB614-005G	AP8719G	CJ587LG	AP8718G	1				CJ706LG (for 4C)	
	11	3:1	931BB616-003G	AP8721G	CJ589LG	AP8720G	1					
4B160, 4B165	13, 14	4:1	931BB616-004G	AP8710G	CJ556LG	AP8709G	AX2808G	AX2555G	AX2554G	CJ591LG	CJ705LG (for 4B)	
40100, 40105	16, 18	5:1	931BB616-005G	AP8726G	CJ590LG	AP8722G	1					
4C170 4C175	11	3:1	931BB617-003G	AP9278G	CJ993LG	AP9277G	1				C 19381 G (for 4C)	
4D170, 4D175	13, 14	4:1	931BB617-004G	AP9280G	CJ994LG	AP9279G	AX3077G	AX3061G	AX3060G	CJ996LG	CK009LG	
4E170, 4E175	16, 18	5:1	931BB617-005G	AP9282G	CJ995LG	AP9281G	1				(for 4D, 4E)	
	11	3:1	931BB618-003G	AP9285G		AP9284G		AX3061G			CK001LG	CJ961LG (for 4D, 4E) CJ965LG (for 4F)
4D180, 4D185 4E180, 4E185 4F180, 4F185	13, 14	4:1	931BB618-004G	AP9287G	CJ997LG	AP9286G	AX3077G		AX3060G	CK002LG	CJ960LG (for 4D, 4E) CJ966LG (for 4F)	
	16, 18	5:1	931BB618-005G	AP9289G		AP9288G				CK003LG	CJ959LG (for 4D, 4E) CJ967LG (for 4F)	
	11	3:1	931BB619-003G	AP9292G		AP9291G				CK007LG	CJ962LG (for 4E) CJ968LG (for 4F)	
4E190, 4E195 4F190, 4F195	13, 14	4:1	931BB619-004G	AP9294G	CK004LG	AP9293G	AX3077G	AX3061G	AX3060G	CK006LG	CJ963LG (for 4E) CJ969LG (for 4F)	
	16, 18	5:1	931BB619-005G	AP9296G		AP9295G				CK008LG	CJ964LG (for 4E) CJ970LG (for 4F)	

Note: [1] Consult Factory [2] 18:1 ONLY

Cyclo Reduction Component Parts

BBB4 Reduction Component Part Numbers (Ratios≥ 19:1)

BBB4 Reduction Components - 4A100 thru 4F195



Table 38. BBB4 Reduction Component Part Numbers (Ratios \geq 19:1)

	Reduction	on Ratio		Part Numbers]		Reduction	on Ratio		Part Numbers	
Unit Size	Overall	Cyclo	Input Kit	Reduction Kit	Bevel Pin Carrier	Unit Size		Overall	Cyclo	Input Kit	Reduction Kit	Bevel Pin Carrier
	19, 21	6		931SD610-006G				19, 21	6		931SD611-006G	
	22, 25	7]	See Note [1]				22, 25	7]	See Note [1]	
	26, 28	8]	931SD610-008G				26, 28	8		931SD611-008G	
	35, 39	11	1	931SD610-011G				35, 39	11]	931SD611-011G	
	42, 46	13	1	931SD610-013G				42, 46	13]	931SD611-013G	
	48, 53	15]	931SD610-015G				48, 53	15		931SD611-015G	
	54, 60	17]	931SD610-017G		441		54, 60	17		931SD611-017G	
44100	67, 74	21	02047610	931SD610-021G			44110	67, 74	21		931SD611-021G	
4A100	80, 88	25	95001010-	931SD610-025G	BL514LG		44110	80, 88	25		931SD611-025G	BL514LG
4A105	93, 102	29	EOLG	931SD610-029G			4A115	93, 102	29	EOLG	931SD611-029G	
	112, 123	35]	931SD610-035G				112, 123	35	7	931SD611-035G	
	138, 151	43]	931SD610-043G				138, 151	43]	931SD611-043G	
	163, 179	51	1	931SD610-051G				163, 179	51]	931SD611-051G	
	189, 207	59	1	931SD610-059G				189, 207	59]	931SD611-059G	
	227, 249	71	1	931SD610-071G				227, 249	71		931SD611-071G	
	278, 305	89]	931SD610-087G				278, 305	89		931SD611-087G	
	364, 417	119	1	931SD610-119G				364, 417	119]	931SD611-119G	

Note: [1] Consult Factory

Cyclo Reduction Component Parts

Table 39. BBB4 Reduction Components Part Numbers (Ratios >19:1), continued

	Reduction	n Ratio		Part Numbe	ers			Reduction	n Ratio		Part	lumbers		
Ilnit Sizo					4A12	4B12	Ilnit Sizo			Innut		4A14	4B14	4C14
onit Size	Overall	Cyclo	Input Kit	Reduction Kit	Bevel Pi	n Carrier	onic Size	Overall	Cyclo	Kit	Reduction Kit	Be	Bevel Pin Carrier	
	19, 21	6		931SD612-006G				19, 21	6		931SD614-006G			
	22, 25	7		931SD612-007G				22, 25	7		931SD614-007G			
	26, 28	8		931SD612-008G				26, 28	8		931SD614-008G			
	35, 39	11		931SD612-011G				35, 39	11		931SD614-011G			
	42, 46	13		931SD612-013G			4A140	42, 46	13		931SD614-013G			
44120	48, 53	15		931SD612-015G			44145	48, 53	15		931SD614-015G			
44125	54, 60	17		931SD612-017G			40140	54, 60	17		931SD614-017G			
4A125	67,74	21	930HY612-	931SD612-021G			48140	67,74	21	930HS614-	931SD614-021G			
4B120	80, 88	25	FOLC	931SD612-025G	CJ691LG	CJ693LG	4B145	80, 88	25	FDDC	931SD614-025G	CJ692LG	CJ694LG	CJ696LG
4B125	93, 102	29	EOLG	931SD612-029G			4C140	93, 102	29	EBBG	931SD614-029G			
	112, 123	35		931SD612-035G			AC145	112, 123	35		931SD614-035G			
	138, 151	43		931SD612-043G			40145	138, 151	43		931SD614-043G			
	163, 179	51		931SD612-051G				163, 179	51		931SD614-051G			
	189, 207	59		931SD612-059G				189, 207	59		931SD614-059G			
	227, 249	71		931SD612-071G				227, 249	71		931SD614-071G			
	278, 305	87		931SD612-087G				278, 305	87		931SD614-087G			
	364, 417	119		931SD612-119G				364, 417	119		931SD614-119G			

Reduction Ratio		Part Numbers						Reduction Ratio Part Numbers			ers		
		Input		4B16	4C16	4D16						4 C 17	4D17,
Overall	Cyclo	Kit	Reduction Kit	Be	evel Pin Carr	ier	Unit Size	Overall	Cyclo	Input Kit	Reduction Kit		4E17
19, 21	6		931SD616-006G									Bevel Pi	n Carrier
22, 25	7		931SD616-007G					19 21	6		931SD617-006G		
26, 28	8		931SD616-008G					22 25	7	1	931SD617-007G		
35, 39	11		931SD616-011G					26,28	8	1	931SD617-008G		
42, 46	13		931SD616-013G					35 39	11	1	931SD617-011G		
48, 53	15		931SD616-015G					42 46	13	-	931SD617-013G		
54, 60	17		931SD616-017G				4C170	48 53	15	1	931SD617-015G		
67, 74	21	930HY616-	931SD616-021G				AC175	54 60	17	1	9315D617-013G		
80, 88	25		931SD616-025G	CJ695LG	CJ697LG	CJ699LG	401/5	67 74	21	1	9315D617-077G		
93, 102	29	JRRG	931SD616-029G				4D170	80.88	25	-930HY617-	0315D617-0256	C 16091 C	C 17001 C
112, 123	35]	931SD616-035G				4D175	00,00	20	JBBG	0315D617-025G	CJ090LG	CJ700LG
138, 151	43]	931SD616-043G				/E170	112 122	25	-	0215D617 025C		
163, 179	51	1	931SD616-051G				4170	120 151	12	-	02150617 0426		
189, 207	59	1	931SD616-059G				4E175"	162 170	43 E1	-	02150617-0430		
227, 249	71	1	931SD616-071G					105, 179	51	-	93130017-0310		
278, 305	87	1	931SD616-087G					227 240	71	-	93130017-0390		
364, 417	119	1	931SD616-119G					227, 249		-	93150017-071G		
								2/8,305	0/	4	9315D017-08/G		
	Reduction 19, 21 22, 25 26, 28 35, 39 42, 46 48, 53 54, 60 67, 74 80, 88 93, 102 112, 123 138, 151 163, 179 189, 207 227, 249 277, 8305 364, 417	Reduction Ratio Overall Cyclo 19, 21 6 22, 25 7 26, 28 8 35, 39 11 42, 46 13 48, 53 15 54, 60 17 67, 74 21 80, 88 25 93, 102 29 112, 123 35 138, 151 43 163, 179 51 189, 207 59 227, 249 71 278, 305 87 364, 417 119	Reduction Ratio Overall Cyclo Input Kit 19, 21 6 22, 25 7 26, 28 8 35, 39 11 42, 46 13 48, 53 15 54, 60 17 6 35, 39 93, 102 29 112, 123 35 138, 151 43 163, 179 51 189, 207 59 227, 249 71 278, 305 87 364, 417 119	Reduction Ratio Part M Overall Cyclo Input Kit Reduction Kit 19, 21 6 931SD616-006G 22, 25 7 931SD616-007G 26, 28 8 931SD616-007G 35, 39 11 931SD616-001G 42, 46 13 931SD616-011G 48, 53 15 931SD616-017G 54, 60 17 931SD616-012G 67, 74 21 931SD616-012G 80, 88 25 931SD616-012G 931SD616-025G 931SD616-025G 931SD61	Reduction Ratio Part Numbers Overall Cyclo Input Kit Reduction Kit 4816 19, 21 6 931SD616-006G 931SD616-006G 931SD616-007G 931SD616-007G 931SD616-001G 931SD616-001G 931SD616-011G 931SD616-021G 931SD616-021G 931SD616-021G 931SD616-021G 931SD616-021G 931SD616-025G 931SD616-025G </td <td>Reduction Ratio Part Numbers Overall Cyclo Input Kit Reduction Kit 4816 4C16 19, 21 6 931SD616-006G 931SD616-007G 931SD616-007G 931SD616-007G 931SD616-001G 931SD616-001G 931SD616-001G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-012G 931SD616-012G 931SD616-021G 931SD616-021G</td> <td>Part Numbers Overall Cyclo Input Kit Reduction Kit 4816 4C16 4D16 19, 21 6 22, 25 7 931SD616-006G 931SD616-007G 931SD616-008G 931SD616-0016G 931SD616-0016G 931SD616-0016G 931SD616-0116G 931SD616-0116G 931SD616-0116G 931SD616-017G 931S</td> <td>Part Numbers Part Numbers Overall Cyclo Input Kit Reduction Kit 4B16 4C16 4D16 19, 21 6 9315D616-006G 9315D616-007G 9315D616-007G 1000000000000000000000000000000000000</td> <td>Reduction Ratio Input Kit Reduction Kit 4816 4C16 4D16 Mark Reduction 19, 21 6 9315D616-006G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-0016G 9315D616-0016G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 35, 39 11 42, 46 13 9315D616-017G 9315D616-017G 9315D616-017G 35, 39 42, 46 35, 39 14, 42, 46 42, 46 42, 46 42, 46 44, 46 <td< td=""><td>Reduction Ratio Part Numbers Reduction Ratio Reduction Rat</td><td>Reduction Ratio Part Numbers Reduction Ratio Reduction Ratio 0verall 0verall</td><td>Reduction Ratio Part Number Reduction Ratio Ratio</td><td>Reduction Ratio Reduction Ratio Input Kit Addition Action Ratio Reduction Ratio Reduction Ratio Reduction Ratio Reduction Ratio Part Numbers 4816 4C16 4D16 General Reduction Ratio Reduction Ratio</td></td<></td>	Reduction Ratio Part Numbers Overall Cyclo Input Kit Reduction Kit 4816 4C16 19, 21 6 931SD616-006G 931SD616-007G 931SD616-007G 931SD616-007G 931SD616-001G 931SD616-001G 931SD616-001G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-011G 931SD616-012G 931SD616-012G 931SD616-021G 931SD616-021G	Part Numbers Overall Cyclo Input Kit Reduction Kit 4816 4C16 4D16 19, 21 6 22, 25 7 931SD616-006G 931SD616-007G 931SD616-008G 931SD616-0016G 931SD616-0016G 931SD616-0016G 931SD616-0116G 931SD616-0116G 931SD616-0116G 931SD616-017G 931S	Part Numbers Part Numbers Overall Cyclo Input Kit Reduction Kit 4B16 4C16 4D16 19, 21 6 9315D616-006G 9315D616-007G 9315D616-007G 1000000000000000000000000000000000000	Reduction Ratio Input Kit Reduction Kit 4816 4C16 4D16 Mark Reduction 19, 21 6 9315D616-006G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-007G 9315D616-0016G 9315D616-0016G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 9315D616-017G 35, 39 11 42, 46 13 9315D616-017G 9315D616-017G 9315D616-017G 35, 39 42, 46 35, 39 14, 42, 46 42, 46 42, 46 42, 46 44, 46 <td< td=""><td>Reduction Ratio Part Numbers Reduction Ratio Reduction Rat</td><td>Reduction Ratio Part Numbers Reduction Ratio Reduction Ratio 0verall 0verall</td><td>Reduction Ratio Part Number Reduction Ratio Ratio</td><td>Reduction Ratio Reduction Ratio Input Kit Addition Action Ratio Reduction Ratio Reduction Ratio Reduction Ratio Reduction Ratio Part Numbers 4816 4C16 4D16 General Reduction Ratio Reduction Ratio</td></td<>	Reduction Ratio Part Numbers Reduction Ratio Reduction Rat	Reduction Ratio Part Numbers Reduction Ratio Reduction Ratio 0verall 0verall	Reduction Ratio Part Number Reduction Ratio Ratio	Reduction Ratio Reduction Ratio Input Kit Addition Action Ratio Reduction Ratio Reduction Ratio Reduction Ratio Reduction Ratio Part Numbers 4816 4C16 4D16 General Reduction Ratio Reduction Ratio

	Reduction Ratio			Part N			Reduction Ratio Part Numbers			ers				
Ilnit Cizo			Innet		4D18	4E18	4F18	Ilnit Cizo			Lunat		4E19	4F19
onit size	Overall	Cyclo	Kit	Reduction Kit	Be	vel Pin Carı	rier	onit size	Overall	Cyclo	Kit	Reduction Kit	Bevel Pin Carrier	
	19, 21	6		931SD618-006G					19, 21	6		931SD619-006G		
	22, 25	7		931SD618-007G	CJ95	5LG	CJ957LG		22, 25	7		931SD619-007G		
	26, 28	8		931SD618-008G					26, 28	8		931SD619-008G		
	35, 39	11		931SD618-011G					35, 39	11		931SD619-011G		
	42, 46	13		931SD618-013G					42, 46	13		931SD619-013G		
4D180	48, 53	15		931SD618-015G					48, 53	15		931SD619-015G		
4D185	54, 60	17		931SD618-017G				4E190	54, 60	17		931SD619-017G		
4F180	67,74	21	930HY618-	931SD618-021G				4F195	67, 74	21	930HY619-	931SD619-021G		
45105	80, 88	25		931SD618-025G				45100	80, 88	25	IDDC	931SD619-025G	CJ956LG	CJ931LG
46185	93, 102	29	JBBG	931SD618-029G	CKU	1216	CK0161G	4F190	93, 102	29	IBBG	931SD619-029G		
4F180	112, 123	35]	931SD618-035G	CIU	1210	CINOTOLO	4F195"	112, 123	35		931SD619-035G		
4F185"	138, 151	43		931SD618-043G					138, 151	43		931SD619-043G		
	163, 179	51]	931SD618-051G					163, 179	51		931SD619-051G		
	189, 207	59	_	931SD618-059G					189, 207	59		931SD619-059G		
	227, 249	71		931SD618-071G					227, 249	71		931SD619-071G		
	278, 305	87		931SD618-087G					278, 305	87		931SD619-087G		
	364, 417	119		931SD618-119G					364, 417	119		931SD619-119G		

Manual BBB4_ENG_11_2023_991497 51

Bearings and Oil Seals

Bearings and Oil Seals

BBB4 Bearings and Oil Seals



Table 40. BBB4 Reducer Bearings and Oil Seals

11.11.61			Bearings				Oil Seals ^[1]	
Unit Size	B1	B2	B3	B4	B5	S1 ^[2]	S2 ^[3]	\$3
4A100 4A105 4A110 4A115		22202	32011	6302RSH2	6302Z	D	S	S 20 x 35 x 7
4A120 4A125	32017	32308	32013	6304	6305Z	85 x 110 x 13	50 x 68 x 9	D 32 x 52 x 8
4A140 4A145			30215	6305R	6306			D 38 x 58 x 11
4B120 4B125	_		32013	6304	6305Z		c	D 32 x 52 x 8
4B140 4B145	32020	32310	30215	6305R	6306	D 100 x 125 x 13	5 60 x 75 x 9	D 38 x 58 x 11
4B160 4B165			30217	6307R	6308			D 55 x 78 x 12
4C140 4C145	-		30215	6305R	6306		S 70 x 95 x 13	D 38 x 58 x 11
4C160 4C165	32024	32312	30217	6307R	6308	120 x 150 x 14		D 55 x 78 x 12
4C170 4C175			30220	6406	6407			D 62 x 82 x 12
4D160 4D165	_		30217	6307R	6308		c	D 55 x 78 x 12
4D170 4D175	32028	32314	30220	6406	6407	140 x 170 x 14	5 90 x 115 x 13	D 62 x 82 x 12
4D180 4D185			30222	6407	6409			D 65 x 88 x 12
4E170 4E175			30220	6406	6407			D 62 x 82 x 12
4E180 4E185	32032	32315	30222	6407	6409	D 160 x 190 x 16	S 90 x 115 x 13	D 65 x 88 x 12
4E190 4E195			30226	6408	6411		201110110	S 70 x 88 x 10
4F180 4F185	22026	22210	30226	6407	6409	D	S	D 65 x 88 x 12
4F190 4F195	32036	32319	30230	6408	6411	180 x 210 x 16	140 x 170 x 14	S 70 x 88 x 10

 Notes:
 [1] D = Double Lip Seal. S = Single Lip Seal. Seal Dimensions are in mm.

 [2] A total of 4 seals are needed - two on top and two on bottom
 [3] for "Y4" assembly and grease lubricated units only

Bevel Gearing Parts and Tooth Count

Bevel Gearing Parts and Tooth Count

Bevel gear and pinions are sold in sets only. Individual components are not available for purchase. The information below regarding tooth count of the bevel gearset is provided for vibration analysis purposes.

BBB4 Bevel Gearing Tooth Count



Table 41. BBB4 Ratios

BBB4	Bevel	Cyclo
Nominal Ratio	Ratio	Input Ratio
11	3.5	3[1]
13	3.2	4[1]
14	3.5	4[1]
16	3.2	5[1]
18	3.5	5[1]
19	3.2	6
21	3.5	6
22	3.2	7
25	3.5	7
26	3.2	8
28	3.5	8
35	3.2	11
39	3.5	11
42	3.2	13
46	3.5	13
48	3.2	15
53	3.5	15
54	3.2	17
60	3.5	17
67	3.2	21
74	3.5	21

BBB4	Bevel	Cyclo
Nominal Ratio	Ratio	Input Ratio
80	3.2	25
88	3.5	25
93	3.2	29
102	3.5	29
112	3.2	35
123	3.5	35
138	3.2	43
151	3.5	43
163	3.2	51
179	3.5	51
189	3.2	59
207	3.5	59
227	3.2	71
249	3.5	71
278	3.2	87
305	3.5	87
364	3.5	104
417	3.5	119
424	3.5	121
501	3.5	143
578	3.5	165
683	3.5	195

BBB4	Bevel	Cyclo
Nominal Ratio	Ratio	Input Ratio
809	3.5	231
956	3.5	273
1117	3.5	319
1320	3.5	377
1656	3.5	473
1957	3.5	559
2272	3.5	649
2559	3.5	731
2944	3.5	841
3511	3.5	1003
4365	3.5	1247
5177	3.5	1479
6472	3.5	1849
7228	3.5	2065
8880	3.5	2537
10658	3.5	3045
12184	3.5	3481
15530	3.5	4437
17966	3.5	5133
21620	3.5	6177
26492	3.5	7569

Note: [1] Planetary Input

To determine the bevel tooth count, identify the BBB4 nominal ratio and corresponding bevel ratio from Table 38. Then reference Table 39 to identify the actual number of bevel gear and pinion teeth.

Table 42. Bevel Tooth Count and Part Numbers

Bevel Ratio	Number	of Teeth	Bevel Gear Set Part Number													
	Pinion Gear		4A10, 4A11 4A12, 4A14	4B12, 4B14, 4B16	4C14, 4C16, 4C17	4D16	4D17, 4D18	4E17, 4E18, 4E19	4F18, 4F19							
3.2	10	32	998BBB-4ABG	998BBB-4BBG	998BBB-4CBG	998BBB-4D16BG	998BBB-4D17BG	998BBB-4EBG	998BBB-4FBG							
3.5	10	35	998BBB-2AG	998BBB-2BG	998BBB-2CG	998BBB-2DG	998BBB-2D17-G	998BBB-2EG	998BBB-4FAG							

Cyclo Portion Disassembly/Assembly

Disassembly Procedure

Disassembly/Assembly

The Bevel Gear portion is designed for lower speeds and therefore has lower operating cycles when compared to the Cyclo input assembly, therefore in most cases does not require rebuilding. Always consult our specialized factory and warehouses for overhaul of gearmotors and reducers. Experience is necessary for proper overhaul.

The Cyclo portion has significantly higher operating cycles than the Bevel Gear portion, rebuild and repair is a convenient way to extend the useful life of your gearbox.



Cyclo repairs should be conducted by experienced personnel to prevent damage to components or persons.

Cyclo Portion – General Disassembly

1

Before starting the disassembly process, Sumitomo recommends draining and properly disposing of all lubrication.

2

Carefully remove the entire BBB4 from the driven shaft by following the instructions outlined in the Removal From Driven Shaft section of this manual.



3

While carefully supporting the entire unit, place the unit on a level work surface so that the high speed portion (Cyclo portion) is facing down.

Cyclo Portion Disassembly/Assembly, continued

Disassembly Procedure



4

While continuing to externally support the entire BBB4 unit, remove each of the bolts from the Cyclo ring gear housing (shown in horizontal position for clarity).

5

Cyclo Reduction Components Carefully separate the **bevel gear housing assembly** from the Cyclo portion to gain access to the **Cyclo reduction components.**



6

Remove the **slow speed rollers.** Additionally, check the pins on the pin carrier to see if any of the rollers have adhered to them.



7

Remove the **snap ring**, the **ball bearing** and the **spacer** from the high speed shaft.

Disassembly Procedure



8

Using both hands, carefully remove the top Cycloid disc.



9

For Cyclo units supplied with a **spacer**, remove the **Cycloidal disc spacer**.



10

Remove the **eccentric bearing** from the high speed shaft.



11

Using both hands, carefully remove the remaining **Cycloid disc.**

Disassembly Procedure



12

Remove the ring gear housing



13

Remove the **spacer** and the **snap** ring from the **high speed end shield**.



14

Remove the **high speed shaft**, along with its associated bearing, from the **high speed end shield**.

Reassembly Procedure

Cyclo Portion – General Reassembly

The Cyclo portion of the speed reducer may be reassembled by reversing the disassembly procedure. All parts must be returned to the original order from which they were removed during disassembly. Take care to keep the moving reduction components free of dust or foreign material, and properly align all gaskets in order to keep the assembly oil tight/leak free.

Remember these important notes when assembling the Cyclo reducer:



1

Place the **ring gear housing** on the Cyclo **high speed end shield** (or the motor flange) and insert the ring gear housing **pins** and **rollers** (if they had been removed during the disassembly process). Rotate each of the pins and rollers by hand to assure that they freely move/rotate.

If the Cyclo portion of the BBB4 is grease lubricated, liberally apply grease to the ring gear pins and rollers before they are inserted into the ring gear housing.



If the Cyclo portion of the BBB4 unit is oil lubricated – do not add any grease during the reassembly process.



2

Cycloid discs are a matched pair, both discs have the same code etched on one side.

When inserting these discs into the ring gear housing, be sure that the etched number is facing up.



3

When reinserting the **eccentric bearing assembly**, use only a wooden or hard rubber mallet to tap it into place.

Reassembly Procedure



4

Insert the **top Cycloid disc** so that the code engraved on its surface is 180° opposed to the corresponding etched code on the **lower Cycloid disc**.

5



If the Cyclo portion of the BBB4 unit is grease lubricated, refill the reduction components with the amount specified in Grease Quantities section of this manual; **or,** fill to 80% of the space around the reduction mechanism and bearings of single reduction units, and 50% of the space around the reduction mechanism of both the first and second stage of double reduction units.



If the Cyclo portion of the BBB4 unit is oil lubricated – do not add any grease during the reassembly process.



6

When reassembling the BBB4 gear housing onto the Cyclo reduction stage, ensure that the **carrier pins** are inserted and aligned with the corresponding bores of the **rollers.**

Troubleshooting

Reducer Troubleshooting

Reducer Troubleshooting

This troubleshooting guide provides assistance in identifying and overcoming common problems with reducers and motors. If a problem with the reducer and/or the motor is not listed below, please consult the factory for assistance.

Reducer Troubleshooting

Problem	with the Reducer	Possible Causes	Suggested Remedy							
	Overloading	Load exceeds capacity of the reducer	Check the rated capacity of the reducer, replace with unit of sufficient capacity or reduce the load							
Runs Hot		Insufficient lubricant	Check lubricant level and increase to recommended level							
	Improper lubrication	Excessive lubricant	Check lubricant level and reduce to recommended level							
		Incorrect lubricant	Flush old lubricant from the unit and refill with correct recommended lubricant							
	Loose foundation bolts	Weak mounting structure	Inspect mounting of reducer. Tighten loose bolts and/or reinforce mounting & structure							
		Loose hold-down bolts	Tighten bolts							
Vibration or Noise	Worn disc and/or bevel gearing	Load exceeds capacity of reducer	If bevel gearset is damaged, contact the factory. If Cycloid discs are damaged, disassemble the Cyclo portion and replace discs. Re-check the rated capacity of the unit							
	Bearing failure	Insufficient lubricant	If output bearings are damaged, contact the factory If bearings in Cyclo portion are damaged, replace the affected bearings. Clean & flush the reducer and fill with the correct type and quantity of lubricant							
		Load exceeds capacity of reducer	Check the rated capacity of the reducer. Replace with unit of sufficient capacity or reduce the driven load							
	Insufficient lubricant	Insufficient lubricant	Check lubricant level and adjust to recommended level							
	Damaged Cyclo pins and rollers	Load exceeds capacity of reducer	Disassemble Cyclo portion of reducer and replace ring gear housing pins and rollers. Check load on reducer							
	Motor shaft broken	Load avgoade capacity of reducer or	Replace broken shaft. Check rated capacity of reducer							
Output Shaft/Hub	Key missing or sheared off on input shaft	repetitive shock loading	Replace key							
does not turn	Eccentric bearing broken	Insufficient lubricant	Replace the Eccentric Bearing in the Cyclo portion. Flush and refill the unit with the recommended lubricant							
	Motor does not turn	Motor	Refer to the "Motor" portion of this Troubleshooting guide							
	Worn seals	Caused by dirt or grit entering the seal area	Replace the oil seals							
		Excessive lubricant	Check the lubricant level and adjust to the recommended level							
Oil Leakage	Leakage into motor	Air breather clogged	Clean or replace element, being sure to prevent any dirt from falling into the reducer							
		Improper mounting position, such as other than designed mounting angle	Mount the unit in its designed mounting angle							

Problem	with the Motor	Possible Causes	Suggested Remedy						
		Faulty switch contact	Adjust the contact						
		Blown fuse	Replace fuse						
	Makes a "groaning" sound	One phase wire of the power supply open	Rewire connection						
	grouning sound	Stator coil open	Repair by rewinding or replacing the stator assembly						
Load is disconnected		Stator and rotor touching due to bearing housing wear	Replace the bearing and bracket						
but motor does not rotate	Starts in either direction when turned by hand	Three-phase is operating as singlephase	Consult the power source with a voltmeter						
		Stator coil open	Repair by rewinding or replacing stator assembly						
	Doesn't make any	External power failure	Contact the local power company.						
	noise	Open connection wire Faulty Switch contact Faulty Starter contact	Check the source wiring Adjust the contacts						
	Rotates in the wrong direction	Connection error	Change any two of the three-phase source connections						
	Fuse blows	Shorted lead wire	Replace fuse and rewire short						
Rotates with	Speed does not increase	Faulty starter contact	Replace or adjust starter contact						
the load disconnected	Makes a "groaning"	Overcurrent/Overheating due to Rotor and Stator touching	Repair by rewinding or replacing stator assembly						
but.	sound	Overcurrent due to one phase of Stator Coil shorted	Replace the stator winding						
	Makes a highpitched "metallic" noise	Faulty bearing	Replace the bearing						
	Switch overboots	Insufficient switch capacity	Replace with switch having the rated capacity						
	Switch overheats	Overload	Decrease load to the rated value						
Rotates when	Fuse blows	Insufficient fuse capacity	Replace with fuse having the rated capacity						
disconnected	Overbeats	Overload	Decrease load to rated value						
but when the	Overneats	Voltage drop	Consult with local power company						
connected:	Speed suddenly drops	Voltage drop	Consult with local power company						
		Overload	Decrease load to rated value						
	Stops	Bearing damaged by overheating	Replace the bearings						

EC machinery directive Gearboxes



Gearboxes are considered as "machinery components" and are not subject of the EC machinery directive 2006/42/EG. The start of operation within the ambit of the EC machinery directive is forbidden, as long as it is not confirmed, that the machine, where the gearbox is built in, complies with this directive.

Gearmotors

For gearmotors a conformity declaration according low voltage directive will be issued.

Notes

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Notes

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Notes

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