



BARUFFALDI

Machine tool components division

Drive instruction manual
used with brushless turrets

DMS08-BF

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COMPATIBILITY WITH PREVIOUS MODELS

The drive DMS08-BF is compatible with all drives and motors previously used with brushless turrets.

In case of replacing an old drive where the turret or motor are differents from the actually it's necessary execute the SETUP configuration following the procedere explained on page 10.

The sequence of steps for the position request and general management of the dialogue between plc and drive is common and compatible among all drives.

The installation of the new drive on CNC instead of a drive of previous versions to the model DMS08-BF requires rewiring the connector J1 or the adoption of an adapter DB37 to DB26: ask details and price to Baruffaldi service or commercial department.

► TIMELINE OF DRIVE AND ENGINES

Year	2000	2004	2005	2006	2007	2009	2016
Model	SA.01A.TB		SA.02A.TB		DMS08-BF ►		
Series N°	0÷1837	1838÷2330	2331÷3122	3123÷4272	4273÷6459	6460÷9952	9952 ►
Motor type	Magnetic 5KHz	Lafert 5KHz		Lafert 10KHz			
Turret			K2		K2/K5	K2/K5*	K2/K5/K3
		New motor	New drive	New motor	New drive and turret	*New version with drive setup	New turret and firmware

Drive code

► DMS08-BF 999.192.08150

Motor code

► Lafert 10KHz B5602P-01121
 ► Lafert 5KHz B5602P-01101
 ► Magnetic BLQ43-L45

DB26-37 adapter

► Adapter 999.192.08199

Safety considerations and installation constrains

It is important to ensure that cable and connection set-up is carried out by a qualified technician. Wrong connections can cause damage to the device or generate dangerous situations for the user.

< WARNING >

Dangerous voltages can be found inside the drive and on the external clamps, therefore maximum attention should be paid during all phases of installation and/or maintenance so that people are not placed in dangerous situations.

- ▶ After switching off the drive, the internal components and the output connectors can still be powered for several seconds. Before doing anything else, check with a Volt meter that there are no dangerous voltages on the external clamps.
- ▶ Between the control signals and the main power supply the insulation is guaranteed only for functional purposes and not for user safety.
- ▶ All the logic signals, besides the power lines, must be protected against the user direct contact.
- ▶ During installation or normal operation, don't use damaged cables or spoiled ones.
- ▶ Connect to the ground all the shields and the ground cables. Avoid untidy or twisted cables.
- ▶ The converter must be installed in vertical position into the cabinet. Ventilation conditions and surrounding atmosphere have to be settled in a way that the converter can not work without nominal temperature range (0÷40°C).
- ▶ **A 100mm clearance area must be considered under the drives and 10mm on the sides** in order to guarantee an high cooling efficiency to the fan.
- ▶ The converter heat sink can reach high temperature during normal operations. Avoid direct contacts and remove inflammable components into the closeness of the converter.
- ▶ Before proceeding with the set-up of the device it is necessary to check the ground connections, network voltage and the correct connection (according to this manual) of the control signal connections.

EMC advices

It is advisable to install the power parts of the motor control unit (drive, transformer, filters and resistances) in metallic divisions separate from those assigned to command and control devices. If the power supplies of the power groups are the same as the control apparatus, they should be connected in the same position (entrance point of the electronic device) in a star configuration.

External line filters are recommended (ie: Arctronics F.LL.D3.016A.BN.R1 for 10A)

It is advisable to maintain maximum separation between the lay out of power and signal cables, using as an example, separate canalisations (with a distance of at least 30cm one from the other) when laying cables. Where it is necessary to intersect the lay out between signal cables and power cables, it is better that the intersections are made with cross angles of 90°.

An insulation transformer on the power line decoupling the drives from the grid is always an high efficiency EMC barrier

2

SPECIFICATIONS

Parameter	Nominal value
Power supply	3x220Vac +10/-15% 50÷60Hz 2KW
Logic power supply	24VDC ±10%
Current	4/16Arms
Method of current control	SPWM, chopper frequency 3÷10 KHz
Motor control method	Torque control, speed control, angular position control
Clamp resistance	47Ω/50W

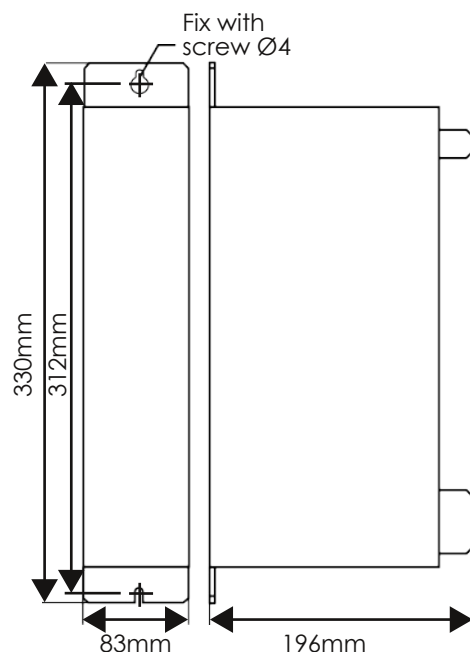
Limits of use

Atmospheric temp.	0/+40°C
Storage	-10°C/+60°C
Relative humidity	<90% *Absence of condensation on inner parts
Altitude	<1000m slm

Volume and weight

Width	83 mm
Height	330 mm
Depth	196 mm
Weight	1,6 Kg

Protection grade	IP 20
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M1

POWER SUPPLY

Power net (L1-L2-L3)

220Vac 3 phase +10 - 15%

P_{min} power transformer 2KVA

4Arms / 16Arms peak - Class S3

Size cable Ø_{min}=1,5mm²

Protection devices and breakers are needed on the power line. Delayed fuses or a thermal switch and a differential breaker are recommended size 16A - Differential protection (Id) 300mA

OUTPUT SUPPLY MOTOR

Motor (U-V-W-T)

3 phase shielded cable Ø_{min}=1,5mm² with ground

M2

LOGIC SUPPLY

Pin (+24 - OP)

24Vdc ±5% I_{max} 3A.

M3

ELECTROVALVES OUTPUT

Lo15 Unlocking command

Lo16 Locking command

OP Com 0V

24Vdc I_{max} 3A.

We recommend the use of auxiliary relays for supply the solenoid valves.

M4

INDUCTIVE SENSORS

+24 Proximities supply (out)

OP Comon (out)

Li.12 Unlocked turret prox.switch

Li.13 Locked turret prox.switch

Li.14 Zero proximity switch

J1

DIGITALS INPUT/OUTPUT

Out 24Vdc x 100mA

In sink 24Vdc ≤5mA

Level H (min): 20VDC (typ.7mA@24VDC,

Vin(max)=30VDC Level L (max): 12VDC

D26-sub connector pin used for dialogue between plc and drives (details page 6).

J2

ANGULAR POSITION TRANSDUCER

Use cable with shielded twisted pairs and external shield Ø_{min}=0,22mm² up to 25m, more than 25m: 0,50mm².

We recommend to use only high quality cable in order to prevent electromagnetic noise issues.



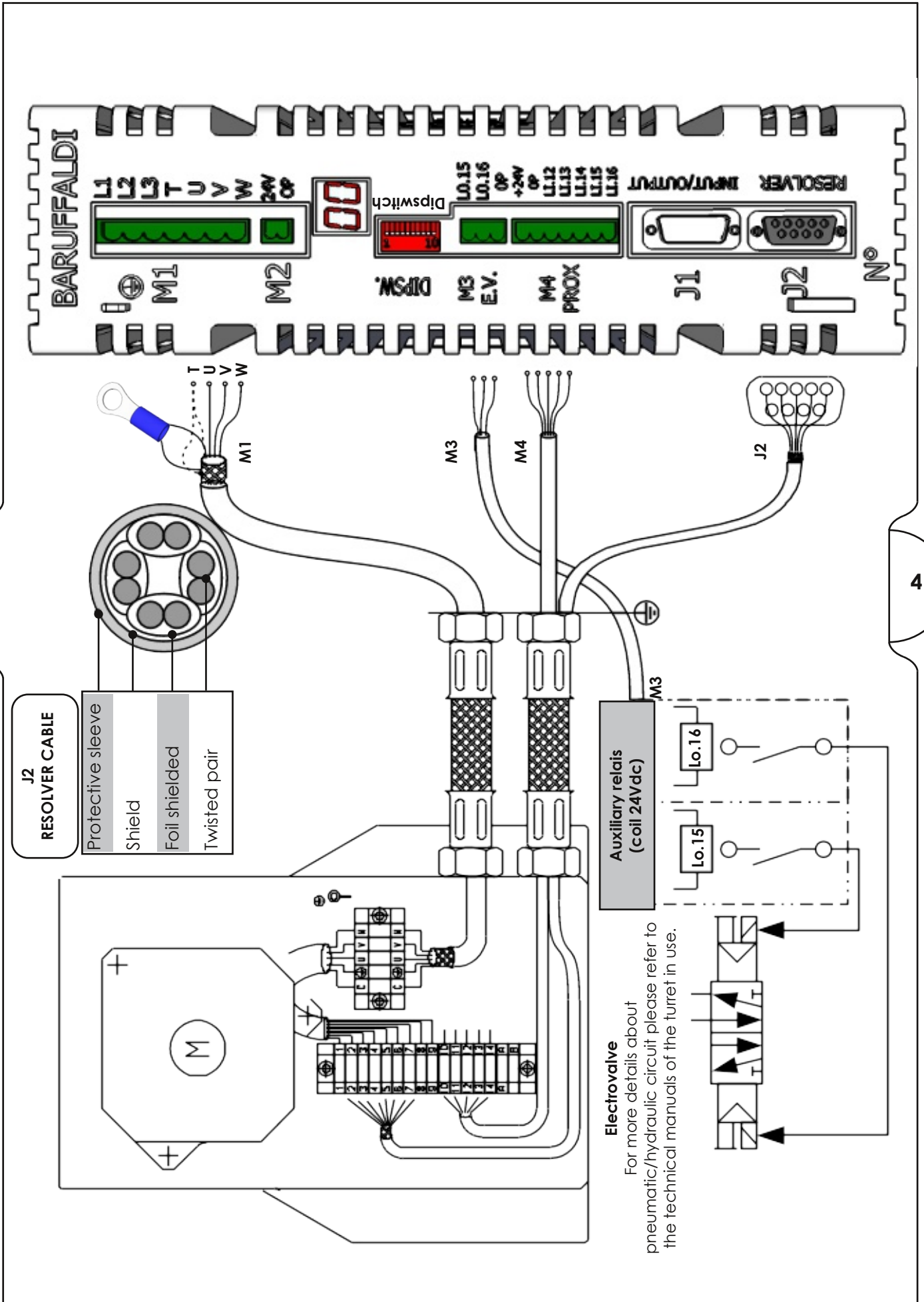
SERIAL

SERIAL PORT

The converter can be interfaced to the PC via a serial cable RS-232 In order to use the diagnostic software and firmware update.

The supervisor software allows:

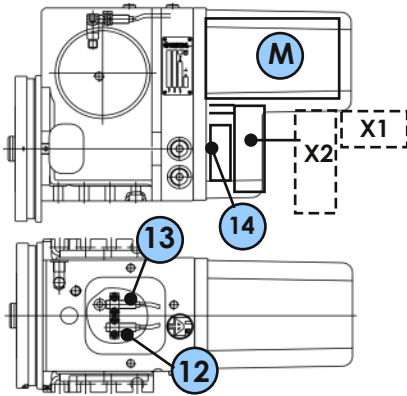
- ▶ shows setup of the drive and signal status from the CNC
- ▶ calls the stations from the PC (simulation machining)
- ▶ creates a customized dynamic profile
- ▶ firmware upgrade
- ▶ digital oscilloscope



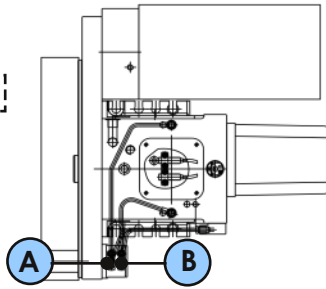
Electrovalve

For more details about pneumatic/hydraulic circuit please refer to the technical manuals of the turret in use.

STANDARD TURRET VERSION



LIVE TOOL TURRET VERSION



- (M)** Motor and resolver
- (12)** Px turret unlock
- (13)** Px turret lock
- (14)** Px Zero
- (A)** Px live tool engaged
- (B)** Px live tool disengaged
- (X1)** Motor terminal board
- (X2)** Signal terminal board

TURRET ON BOARD CONNECTIONS

MOTOR (SHIELDED CABLE 4X1.5MM²)

X1	Black	U	Motor phase
	Blue	V	Motor phase
	Pink	W	Motor phase
	Green-Yellow	⏏	PE
	White	C	Shield

DRIVE

U	M1	L1
V		L2
W		L3
⏏		

Power supply
220Vac +10-15%
P_{min} = 2KVA

+24	M2
OP	

Auxiliary supply
24Vdc ±10%
Circuit consumption is 500mA. Total consumption depend of relais/electrovalve.

Unlock	M3	Lo.15
Lock		Lo.16
Com		OP

Electrovalve outputs
Use auxiliary relays to pilotate the electrovalve.
I_{max} Output = 2,5A

PROXIMITY 24Vdc no pnp LMax=200mA

STANDARD TURRET VERSION

X2 10÷14	Brown	10	+24V
	Blue	11	0V
	Black	12	Turret unlock
	Black	13	Turret lock
Black	14	Zero swtich	

+24V	M4
OP	
Li.12	
Li.13	
Li.14	
Li.15	
Li.16	

LIVE TOOL TURRET VERSION

X2 10÷B	Brown	10	+24V
	Blue	11	0V
	Black	12	Turret unlock
	Black	13	Turret lock
	Black	14	Zero swtich
	Black	A	Live tool engaged*
	Black	B	L.T.Disengaged AND
Brown	T	Unlock	

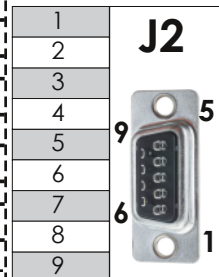


Digital I/O Connect to PLC.

Details at page N°6.
All signals are optoisolated.
After a short circuit is necessary to switch off the auxiliary supply.

RESOLVER (SHIELDED CABLE 4X(2X0.25MM²))

X2 1÷9	Yellow	1	Thermal switch
	Yellow	2	Thermal switch
	White-Red	3	ref
	White-Yellow	4	0 ref
	Black	5	0 cos
	Red	6	cos
	Yellow	7	sin
	Blue	8	0 sin
	Pink	9	Shield

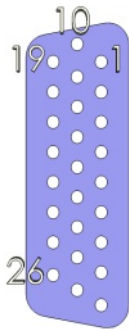


INPUT

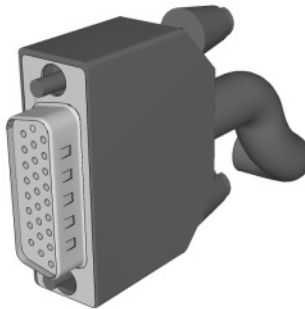
+24VDC-MAX 100mA

PIN	DESCRIPTION
3	Mode bit_1
12	Mode bit_2
20	Mode bit_3
13	Position bit_1
21	Position bit_2
5	Position bit_3
14	Position bit_4
22	Position bit_5
23	Parity bit
25	Start

J1 Sub-D 26



soldered side



OUTPUT

+24VDC-MAX 100mA

PIN	DESCRIPTION
1	Feedback bit_1
10	Feedback bit_2
2	Feedback bit_3
11	Feedback bit_4
19	Feedback bit_5
6	Alarm bit_1
15	Alarm bit_2
7	Alarm bit_3
16	Alarm bit_4
24	Alarm bit_5
8	Turret in position
17	Turret closed

TABLE 1: OPERATIVE MODE

Details on page 9

Description	Bit		
	1	2	3
0-Reset/Emergency	0	0	0
1-Auto shortest way and Zero search	1	0	0
2-Auto force clock-wise rotation	0	1	0
3-Auto force counterclock-wise rotation	0	0	1
4-Next/Previous tool	0	0	0
5-Service	0	0	0
6-Autotest	0	0	0
7-Resolver acquisition	0	0	0

TABLE 2: POSITION REQUIRED

P=Parity

Position	Bit					
	1	2	3	4	5	P
0*	0	0	0	0	0	0
1	1	0	0	0	0	1
2	0	1	0	0	0	1
3	0	0	1	0	0	1
4	0	0	0	1	0	1
5	0	0	0	0	1	1
6	1	0	0	0	0	0
7	0	1	0	0	0	0
8	0	0	1	0	0	0
9	0	0	0	1	0	0
10	0	0	0	0	1	0
11	1	0	0	0	0	0
12	0	1	0	0	0	0

*Zero search

It is recommended to manage the parity bit using the Boolean function EXOR (available in all PLCs) applied to the position bit.

START COMMAND

Should be minimum 100ms.

It is important that the command is given with a delay of at least 50ms after the setting of the required position.

WARNING

CONSENT TO WORK

It is possible to start to work only when both signals are active:

- ▶ **ST INDEX (J1-pin.8) = turret in position**
- ▶ **ST LOCK (J1-pin.17) = turret closed**

In addition to these two signals is possible using the binary outputs of the **POSITION FEEDBACK** to make sure that the turret is in the position required.

Outputs are reset:

- ▶ in case of alarm
- ▶ during rotation of the turret
- ▶ drive reset (mode = 0)

POSITION FEEDBACK

N° 5 binary outputs communicate the position of the turret.

The position can be seen on display in the front of the drive.

The outputs are only active with turret indexed ie has already been done a positioning or zero search (even hidden).

The outputs are active when:

- ▶ the turret is closed in the position
- ▶ no alarms are present
- ▶ the drive is not in reset mode (mode bit off)

The POSITION FEEDBACK is in binary code (see table at left) without the parity bit.

ALARMS

N°5 binary outputs communicate the presence of an active alarm.

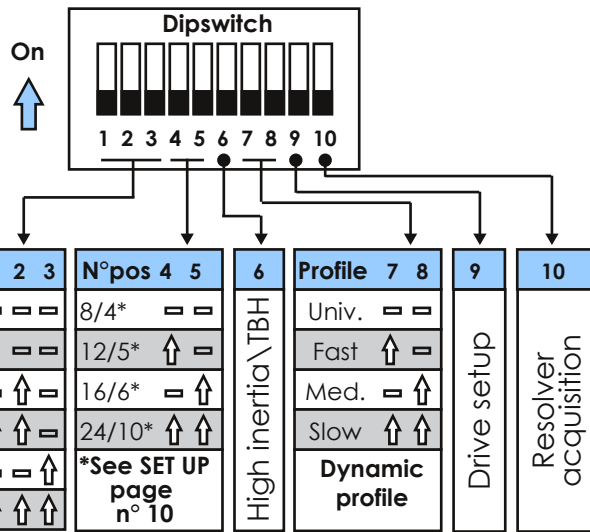
In order to facilitate the diagnosis, the active alarm is displayed on the front display.

The activation determines:

- ▶ rotation stop
- ▶ deactivation of outputs St index, St lock and position feedback.

To perform a new positioning is necessary to reset the alarm by setting the operating mode zero.

K2/5 TB..
K3 TAB



TURRET SELECTION

The setting of the turret type, the number of positions and dynamic profile **must be performed before starting the drive (24Vdc).**

CUSTOM PROFILE

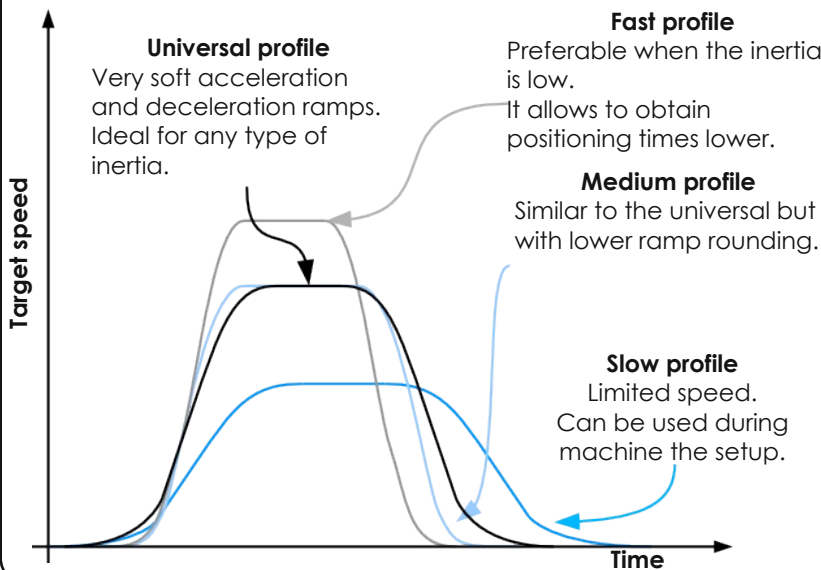
For non-standard applications can be set via software a specific profile setting manually the transmission ratio (T.R.), number of stations and dynamic profile, in this case a red label will be applies on the drive.

In order to replace the drive will be necessary re-set the profile via p.c. on the new one.

The custom profile is added to the standard profiles.

DYNAMIC PROFILE

It is possible to optimize the dynamic response of the drive according to the real load condition and unbalance applied to the turret. The dynamic profile acts on the values of rounding ramp, target speed, acceleration, deceleration and compensation of inertia.



To choose the dynamic profile to keep in mind the inertia applied to the turret and the unbalance.

HIGH INERTIA

Set to on in case of TBH turrets or in case it's preferred a speed decreasing.

DRIVE SETUP

Special feature that allows you to set the drive to operate with previous turrets and engines.

See page 10 for details.

RESOLVER ACQUISITION

With this operation will be stored in the drive the value of the resolver when the turret is in position 1, this value will be used to verify that the required station is reached by the turret at the end zero research (also hidden zero research).

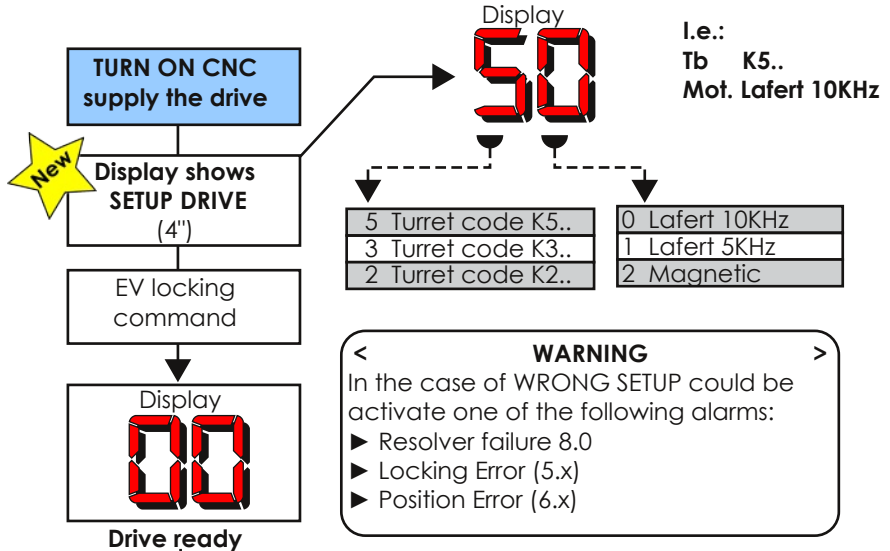
This procedure is performed in the factory during the test drive-turret and need to be repeated only in the case that the drive or the motor are substituted or when the motor is removed from the turret.

SEQUENCE

- ▶ Make sure the turret is closed in position 1
- ▶ Switch on the drive
- ▶ Set to **ON DIP No. 10**
The display will start a count from 0 to 5 "
- ▶ At the end of the count back to **OFF the DIP No.10**
- ▶ The **SA** message on the display means that the data has been saved
- ▶ Switch off the drive or make a reset then call a station.

Drive startup

During the start it's important that the operative mode 1 is selected so any possible alarm will be displayed.



I.e.: Zero research and station N°7 inquiry

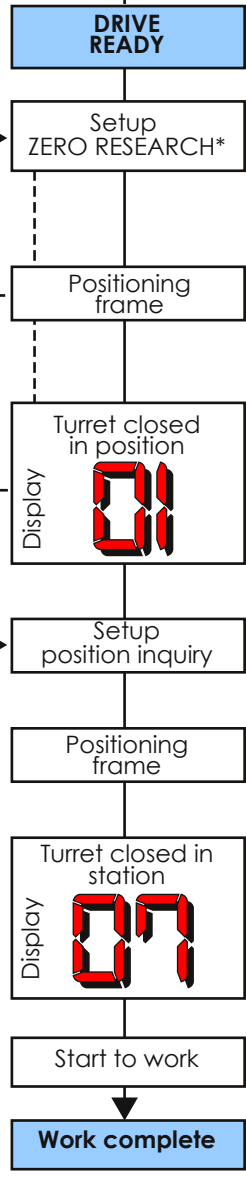
Operative mode 1
Position required 0
Delay start ≥50ms
START (duration) ≥100ms

EV unlocking On
Px switch turr.unlock On
Motor rotation clockwise
Arrival in the position ok
EV locking On
Px switch turr.lock On

ST INDEX and ST LOCK On
Output FEEDBACK 1

Operative mode 1
Position required >0 (i.e.7)
Delay start ≥50ms
START (duration) ≥100ms

TURRET IN POSITION
At the end of the positioning, the outputs ST INDEX, ST LOCK and FEEDBACK are actives and the display shows the position of the turret.



ZERO SEARCH*
Zero search (also hidden) has to be performed after switch on the drive or a reset.

ZERO SEARCH
▶ Operative mode 1
▶ Position required = 0
▶ Wait ≥50ms
▶ START (≥100ms)
The turret will rotate in the CW direction at low speed and will stop in the mechanical station 1.

HIDDEN ZERO SEARCH
▶ Operative mode 1
▶ Position required ≥ 2
▶ Wait ≥50ms
▶ START (≥100ms)
The turret will rotate in the CW direction at low speed, pass over through the mechanical station 1 without stops and goes straight to the position required.

IF SOMETHING GOES WRONG ALARM CONDITION
When an alarm occurs:
▶ The motor is disabled
▶ Outputs ST INDEX, ST LOCK = Off
▶ FEEDBACK POSITION = 0

Display 10 i.e. Power fault

Description

By setting the bit on the J2 connector you can select one of the following operative mode:

▶ **0-RESET/ EMERGENCY [Li.1, Li.2, Li.3 = Off]**

RESET duration ≥ 300ms

Setting Off all bits the drive is disabled, in this condition the engine and outputs st index, st lock and position feedback are reset.

This mode is necessary to reset an alarm.
After a reset to recall a position you must repeat the zero search or hidden zero search.

WARNING

The operative mode n°2-3-4 are enabled only after a positioning in the operating mode 1.

▶ **1-AUTOMATIC POSITIONING IN THE SHORTEST WAY AND ZERO SEARCH**

[Li.1=On Li.2,Li.3 = Off]

Use this modality by default.

When the mode 1 is selected the turret will reach the required position by choosing the shortest way. The mode 1 is necessary also to perform a zero search or hidden zero search.

It is recommended to set this mode already at switch on otherwise an alarm is not displayed.

▶ **2-AUTOMATIC POSITIONING WITH FORCED CLOCK-WISE ROTATION**

[Li.2=On Li.1,Li.3 = Off]

▶ **3-AUTOMATIC POSITIONING WITH FORCED COUNTERCLOCK-WISE ROTATION**

[Li.1,Li.2=On Li.3 = Off]

The turret will reach the required position respecting the direction of rotation chosen even though this means a greater distance.

▶ **4-NEXT/PREVIOUS TOOL REQUEST (JOG MODE)**

[Li.3=On Li.1,Li.2 = Off]

With this modality the user is able to change the turret position without a program. This function is useful for manual operations (presetting, tool replacement).

For each START command the turret will perform a jump of 1 station in the direction of rotation set:

- Mod.4 + 1 position clockwise rotation
- Mod.4 + 2 position counterclockwise rotation

▶ **5-SERVICE MODE**

[Li.1,Li.3=On Li.2 = Off]

Use this function for understand if the electrovalve system it's ok or evaluate the turret noise.

These operations are only possible if st index, st lock and feedback are disabled.

For each START command the turret will do one of the following:

- Mod.5 + Position 1 fast continuous rotation clockwise
- Mod.5 + Position 2 " " counterclockwise
- Mod.5 + Position 5 slow continuous rotation clockwise
- Mod.5 + Position 6 " " counterclockwise
- Mod.5 + Position 4 EV locking turret
- Mod.5 + Position 8 EV unlocking turret

Set RESET (mod.bit = 0) to stop continuous rotation.

The parity bit should be managed according to the required position.

▶ **6-AUTOTEST**

[Li.2,Li.3=On Li.1 = Off]

Use the autotest to skip the plc program and check if the turret works correctly.

Set the mode to 6, give the START command , wait 5" after the turret will search for zero and at intervals of 5" recall some positions.

Set RESET (mod.bit = 0) to break the cycle.

▶ **7-RESOLVER ACQUISITION**

[Li.1,Li.2,Li.3=On]

This is an alternative procedure to the one made with dipswitch pin n°10, with the difference of the unlocking turret.

Set the turret locked in the position 1.

Set mode 7

- Give the 1st START > EV unlocking command will be executed
- Give the 2st START > EV locking command will be executed

SEQUENCE FOR DRIVE SETUP

This procedure is used to change the setting of the drive in order to use it with all turrets type and motor produced.

Follow the timeline for understand the correct setup to apply to the drive.

Timeline

Drive model	2000	2004	2005	2006	2007	2009	2015
Drive model	SA.01A.TB		SA.02A.TB		DMS08-BF		
Drive SN°	0÷1837	1838÷2330	2331÷3122	3123÷4272	4273÷6459	6460	
Motor type	Magnetic 5KHz	Lafert 5KHz		Lafert 10KHz			
Turret type			K2		K2/K5	K2/K5	K2/K5/K3

Sequence of operations:

- ▶ Drive off (24Vdc Off)
- ▶ Set to off all dipswitch
- ▶ Set to on dipswitch n°9
- ▶ Select the turret type and the motor
- ▶ Turn on the drive (auxiliary supply 24Vdc)
- ▶ Display shows ="AF"
- ▶ Set to on the dipswitch n°10 and after 5" switch to off.

▶ The message on the display = "SA" means that the setup has been saved

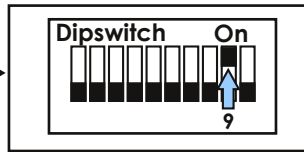
▶ Switch off the drive

▶ Set up the dipswitch according to the turret to use (see below the **table_1**)
End of sequence

In order to use the turret will be necessary acquire the resolver position.

- ▶ Turret closed in station 1
- ▶ Switch on the drive and check on the display that the drive setup is correct
- ▶ Set to on the dipswitch n°10 and after 5" switch to off.

At the end of countdown the drive will be ready to use.



1	2	MOTOR TYPE	5	6	TURRET TYPE
<input type="checkbox"/>	<input type="checkbox"/>	LAFERT 10KHz B5602P-01121	<input type="checkbox"/>	<input type="checkbox"/>	K2
<input type="checkbox"/>	<input type="checkbox"/>	LAFERT 5KHz B5602P-01101	<input type="checkbox"/>	<input type="checkbox"/>	K5
<input type="checkbox"/>	<input type="checkbox"/>	MAGNETIC BLQ43-L45	<input type="checkbox"/>	<input type="checkbox"/>	K3

K2/5 TB.. Display I.e.: 50

K3 TAB Tb K5..

 Mot. Lafert 10KHz

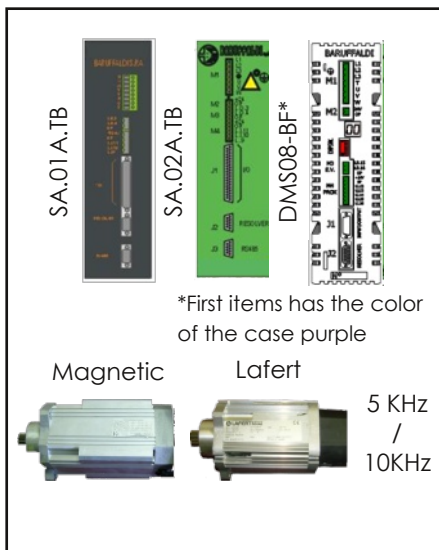
5 Turret code K5..	0 Lafert 10KHz
3 Turret code K3..	1 Lafert 5KHz
2 Turret code K2..	2 Magnetic

WARNING

In the case of WRONG SETUP could be activate one of the following alarms:

- ▶ Resolver failure 8.0 at startup
- ▶ Locking Error (5.x) after position inquiry
- ▶ Position Error (6.x) after position inquiry

10



Table_1: turret type selection

On

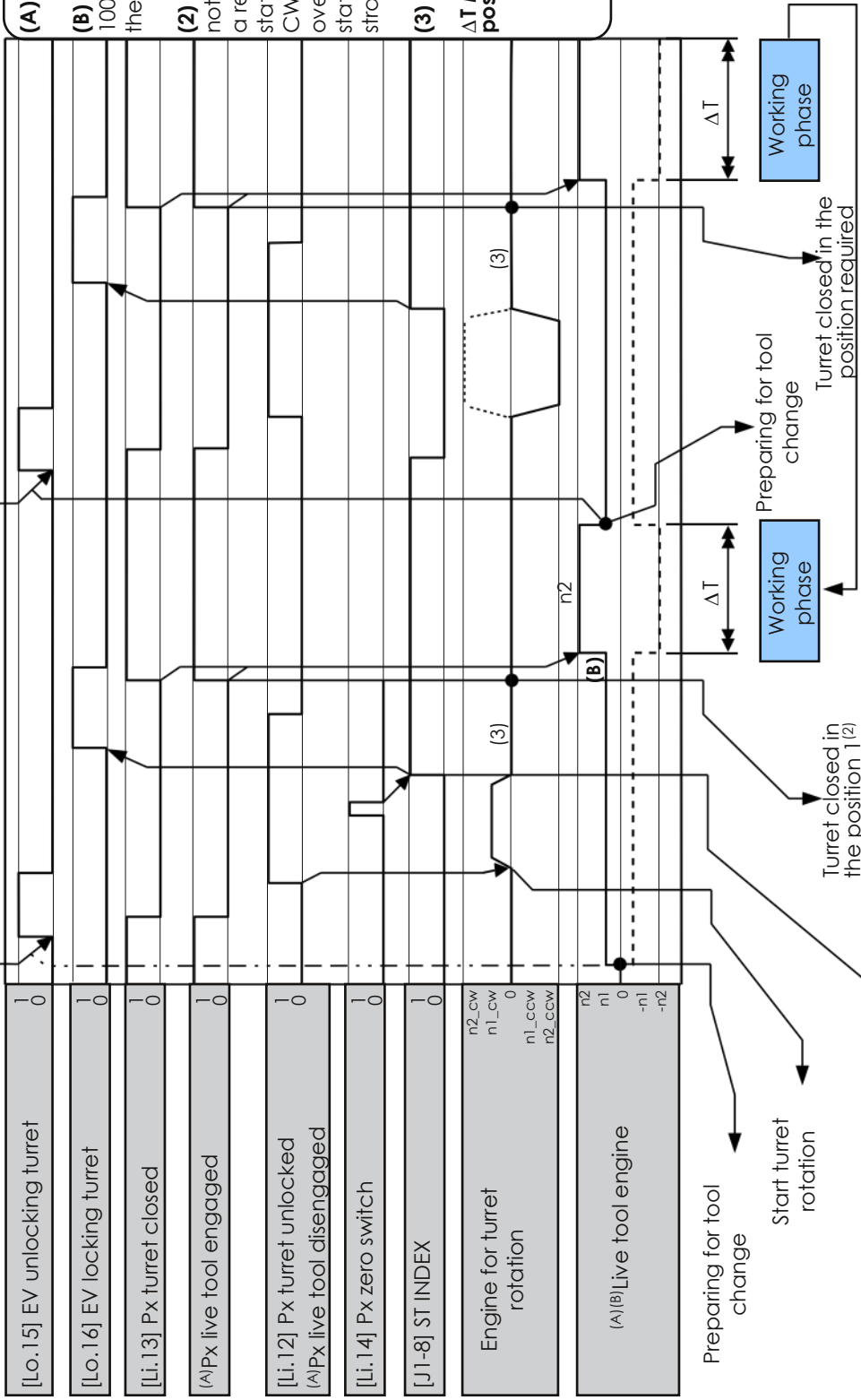
TB	TAB	1	2	3	N°pos 4	5	6	Profile 7	8	9	10
120/160		=	=	=	8/4*	=	High inertia \TBH	Univ.	=	Drive setup	Resolver acquisition
200/250	210/265	↑	=	=	12/5*	↑		Fast	↑		
320	340	=	↑	=	16/6*	=		Med.	=		
400	440	↑	↑	=	24/10*	↑		Slow	↑		
100		=	=	↑	*K3 turret			Dynamic profile			
Custom	1:	↑	↑	↑							

Position inquiry

Start

ZERO search

Start



- (A) Only motorized turrets
 - (B) Keep the live tool engine at 100±150rpm during the closing of the turret
 - (2) Hidden Zero search: with turret not indexed (for ie after start up or a reset) you can directly call a station, the turret will rotate in the CW direction at low speed, pass over through the mechanical station 1 without stops and goes straight to the position required.
 - (3) Engine stays in position control
- ΔT Minimum time before the new position request
- Tb1 20/160 ΔT ≥ 2"
 - Tb200/250 ΔT ≥ 4"
 - Tb320/400 ΔT ≥ 5"

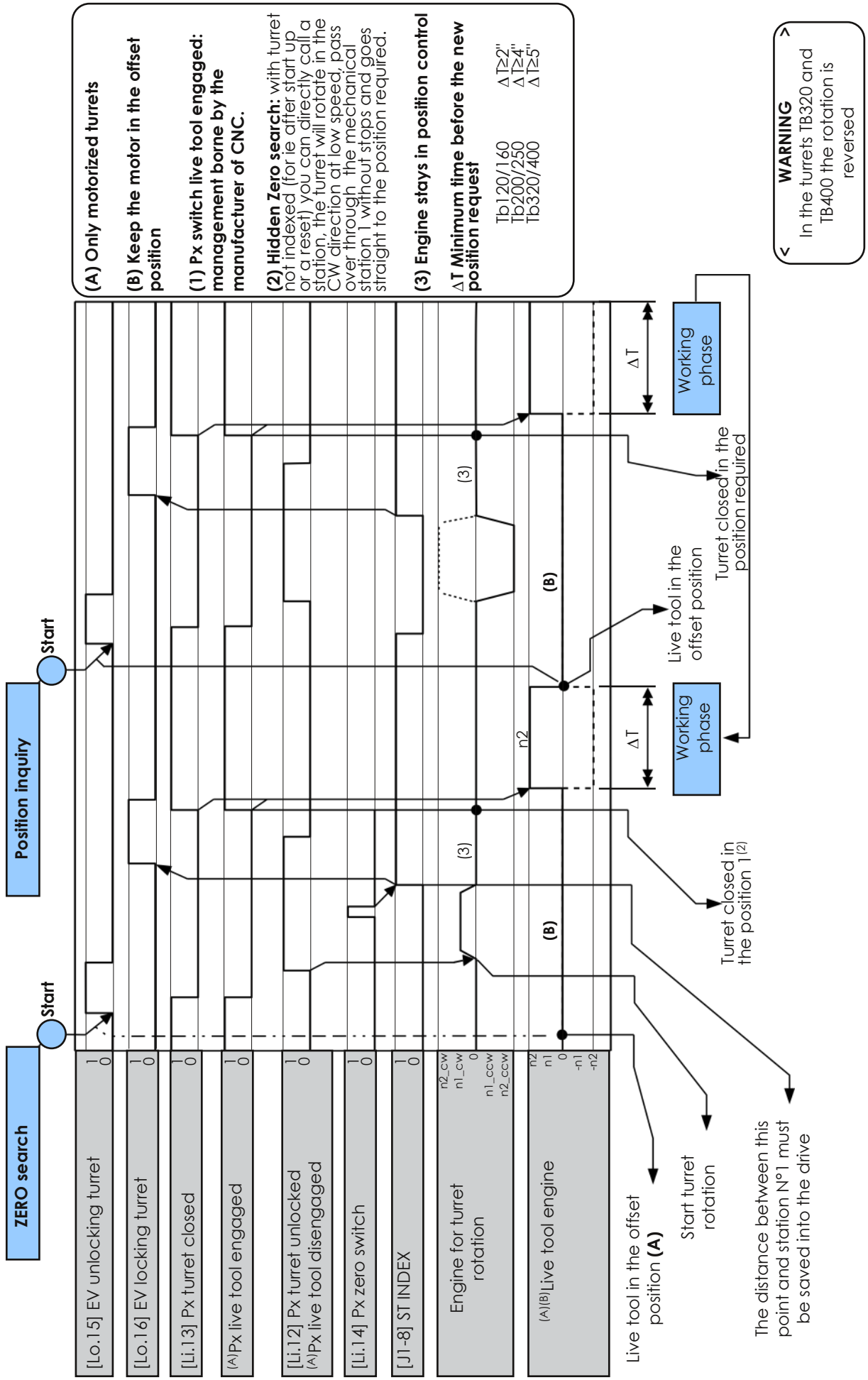
WARNING

In the turrets TB320 and TB400 the rotation is reversed

The distance between this point and station N°1 must be saved into the drive

(1) Management of the proximity live tool switch engaged

The use of the signal of the live tool engaged is optional and at the discretion of the manufacturer of the CNC. If you wish to handle the signal of live tool engaged, keep in mind that the live tool may not be engaged even if the turret is closed due to the fact that the teeth of the motor and live tool are affixed. This condition is provided, the effective coupling and therefore also the signal from the proximity switch will arrive as soon as the tool will lean to the workpiece.



- (A) Only motorized turrets
 - (B) Keep the motor in the offset position
 - (1) Px switch live tool engaged: management borne by the manufacturer of CNC.
 - (2) Hidden Zero search: with turret not indexed (for ie after start up or a reset) you can directly call a station, the turret will rotate in the CW direction at low speed, pass over through the mechanical station 1 without stops and goes straight to the position required.
 - (3) Engine stays in position control
- ΔT Minimum time before the new position request**
- Tb120/160 ΔT≥2"
 - Tb200/250 ΔT≥4"
 - Tb320/400 ΔT≥5"

WARNING
 In the turrets TB320 and TB400 the rotation is reversed

ZERO search

Position inquiry

Start

Start

[Lo.15] EV unlocking turret 1 0

[Lo.16] EV locking turret 0 1

[Li.13] Px turret closed 0 1

(A)Px live tool engaged 0 1

[Li.12] Px turret unlocked (A)Px live tool disengaged 1 0

[Li.14] Px zero switch 0 1

[J1-8] ST INDEX 1 0

Engine for turret rotation n2_cw 0 n1_cw n1_ccw 0 n2_ccw

(A)(B)Live tool engine n2 0 n1 -n1 -n2

Live tool in the offset position (A)

Start turret rotation

The distance between this point and station N°1 must be saved into the drive

Turret closed in the position 1(2)

Live tool in the offset position

Turret closed in the position required

Working phase

DRIVE ALARM

When malfunctioning occurs:

- ▶ are disabled the outputs ST INDEX, ST LOCK and POSITION FEEDBACK
- ▶ the display shows the active alarm
- ▶ are activated the alarm bit in the J1 connector (binary coded)

WARNING

In the table the **CODE** field is the sum of all bits of alarm active.

Example: All.7.0- Time out rotation Code 7, on connector J1 will be activated the output:
Lo.6 (1), Lo.7 (2), Lo.8 (4) = 1 +2 +4 = 7

Display	Description	Code
1.0	Undervoltage (only with turret unlocked)	1
2.0	Overvoltage	2
3.0	(A0) Failed attempt to save data in EEPROM	3
3.1	(A1) EEPROM contains altered data	
3.2	(A2) Absolute sensor alarm	
3.4	(A4) Radiator thermal alarm	

Malfunctioning during turret unlocking

4.0	During unlocking the turret stays closed [Li.12=Off, Li.13=On]	4
4.1	No signal from unlock proximity switch [Li.12=Off, Li.13=Off]	10
4.2	Lock proximity switch in short circuit [Li.12, Li.13=On]	11
4.3	The unlock proximity switch signal has been lost during rotation [Li.12=Off]	12

Malfunctioning during turret locking

5.0	During locking the turret stays unlocked [Li.12=On, Li.13=Off]	5
5.1	No signal from lock proximity switch [Li.12=Off, Li.13=Off]	16
5.2	Unlock proximity switch in short circuit [Li.12, Li.13=On]	17
5.3	The lock Px switch signal has been lost during work (turret indexed) [Li.13=Off]	18
5.7	Turret not locked at the start up [Li.13=Off]	30

Positioning error

6.2	Zero search error	22
6.3	Positioning error	23
7.0	No signal from Zero proximity switch	7
7.1	Zero proximity switch in short circuit	25
7.2	Time out rotation (60")	26

Resolver failure

8.0	Resolver malfunctioning	8
8.1	Motor PTC	13

Position inquiry errors

9.0	Parity error	9
9.1	A non-existing position has been called	28
9.2	Zero search in operative mode different from 1	29

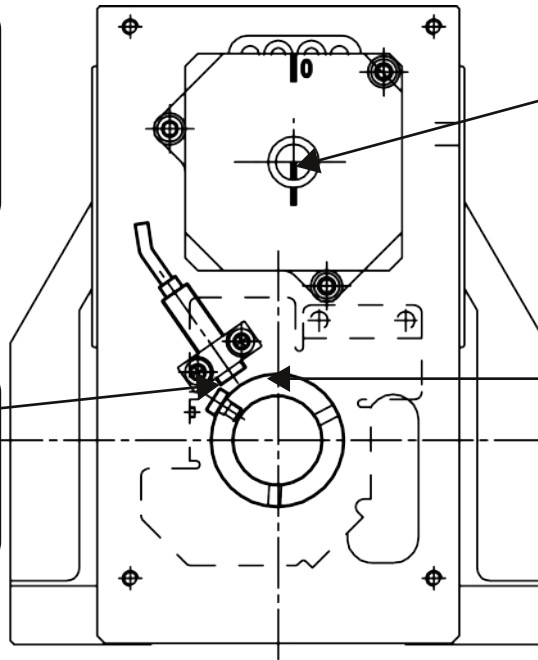
Display	Description	Code
1.0	Undervoltage (only with turret unlocked)	1
The power supply voltage on the M1 connector is less than 80V.	Check with a multimeter the voltage on the L1-L2-L3 connector. If the alarm occurs during the rotation the reason could be that the power transformer is not enough powerful: check that is at least 2KVA.	
2.0	Overvoltage	2
Input voltage over the range. Due to excessive regeneration during braking the bus voltage has risen.	Check with a multimeter the voltage on the L1-L2-L3 connector (220+10%). Check that the inertia and unbalancing applied to the turret does not exceed the stated limits and also the profile selected with the dipswitch is appropriate to the load condition.	
3.0	(A0) Failed attempt to save data in EEPROM	3
Contact Baruffaldi service.		
3.1	(A1) EEPROM contains altered data	3
Contact Baruffaldi service.		
3.2	(A2) Absolute sensor alarm	3
Contact Baruffaldi service.		
3.4	(A4) Radiator thermal alarm	3
Contact Baruffaldi service.		

Display	Description	Code
4.0	During unlocking the turret stays closed [Li.12=Off, Li.13=On]	4
After 30" from the unlocking command (Lo.15) there isn't the signal from the unlock proximity switch (Li.12) and the turret remains closed (Li.13 = On)	<ul style="list-style-type: none"> ▶ Check the functionality of proximity switch. ▶ Check the hydraulic/pneumatic circuit. ▶ Check the electrovalve/auxiliary relais connection. 	
4.1	No signal from unlock proximity switch [Li.12=Off, Li.13=Off]	10
After 30" from the unlocking command (Lo.15) there isn't the signal from the unlock proximity switch (Li.12) and the lock proximity switch is Off (Li.13).	<ul style="list-style-type: none"> ▶ Check the functionality of proximity switch. Remove the upper cover and verify that the movement of the pin is not hindered. ▶ Check the hydraulic/pneumatic circuit. If present: check the live tool disengaging and the live tool disengaged signal functionality. 	
4.2	Lock proximity switch in short circuit [Li.12, Li.13=On]	11
During unlocking sequence the lock proximity switch remains On (Li.13)	<ul style="list-style-type: none"> ▶ Check the functionality of lock proximity switch 	
4.3	The unlock proximity switch signal has been lost during rotation [Li.12=Off]	12
During the rotation the unlock proximity switch(Li.12) is lost.	<ul style="list-style-type: none"> ▶ Check the functionality of unlock proximity switch. ▶ Check the connection on turret pin 12(both side client and turret) and on M4 connector. 	
5.0	During locking the turret stays unlocked [Li.12=On, Li.13=Off]	5
After 30" from the locking command (Lo.16) there isn't the signal from the lock promity switch (Li.13) and the turret remains unlock (Li.12 = On).	<ul style="list-style-type: none"> ▶ Check the functionality of proximity switch. ▶ Check the hydraulic/pneumatic circuit. ▶ Check the electrovalve/auxiliary relais connection. 	
5.1	No signal from lock proximity switch [Li.12=Off, Li.13=Off]	16
After 30" from the locking command (Lo.16)) there isn't the signal from the lock promity switch (Li.13) and the unlock proximity switch is Off (Li.12).	<ul style="list-style-type: none"> ▶ Check the functionality of proximity switch. Remove the upper cover and verify that the movement of the pin is not hindered. ▶ Check the hydraulic/pneumatic circuit. ▶ Check the turret setup made with the dipswitch ▶ Check the drive configuration K2/K5. 	
5.2	Unlock proximity switch in short circuit [Li.12, Li.13=On]	17
During locking sequence the unlock proximity switch remains On (Li.12)	<ul style="list-style-type: none"> ▶ Check the functionality of unlock proximity switch. 	
5.3	The lock Px switch signal has been lost during work (turret indexed) [Li.13=Off]	18
During working phase the lock proximity switch (Li.13) has been lost.	<ul style="list-style-type: none"> ▶ Check the functionality of lock proximity switch. 	
5.7	Turret not locked at the start up [Li.13=Off]	30
At the start up the drive gives a command for locking the turret, if the lock proximity switch (Li.13) is off the alarm is activated.	<ul style="list-style-type: none"> ▶ Check the functionality of proximity switch. ▶ Check the hydraulic/pneumatic circuit. ▶ Check the electrovalve/auxiliary relais connection. 	

Display	Description	Code
6.2 Zero search error		22
This alarm occurs when at the end of zero search also hidden, the turret is closed and the resolver value is different from the value stored with the resolver acquisition sequence.	If the turret has reached the station N°1 to repeat the acquisition of position resolver otherwise remove the back cover of the turret and with turret locked in station N°1, verify that the mechanical position of the zero camshaft as the same shown in Fig.	

< WARNING >
 In the turrets TB320/400 the camshaft is located on the right side of zero switch. In the TBH turrets the camshaft is fixed inside the turret body.

< PROXIMITY ACTIVATION THRESHOLD >
 Set the proximity distance at $0.5 \pm 0.8\text{mm}$ respect the head of the screw.



Turret locked in mechanical position 1, the reference on the engine must be turned down.

The camshaft of zero is calibrated to activate the px zero switch one lap before the mechanical position 1.

6.3 Positioning error		23
This alarm occurs at the end of a position inquiry with turret locked in a position different from that expected. The value of the resolver calculated on the basis of the acquisition value differs from the final position resolver.	Check at start up that the drive SETUP matches the turret in use (K2/K5). Be sure the proper set-up of the dipswitch according to the turret in use (trasmission ratio and number of stations - page 7).	

7.0 No signal from Zero proximity switch		7
After to call a zero research (hidden too) Zero proximity switch (Li.14) is always Off.	<ul style="list-style-type: none"> ▶ Check the functionality of zero proximity switch ▶ Check the calibration of zero camme 	

7.1 Zero proximity switch in short circuit		25
Il proximity di zero (Li.14) è sempre On.	▶ Verificare il corretto funzionamento del proximity.	

7.2 Time out rotation 60"		26
Turret has not reached called position within 60" from calling.	<ul style="list-style-type: none"> ▶ Make sure there are no mechanical interferences that prevent the rotation of the turret. ▶ Check the wired connections between drive and turrett (M1 U-V-W and J2) 	

Display	Description	Code
8.0	Resolver failure	8

<p>This alarm is activated when the signal from the resolver is low or absent.</p>	<ul style="list-style-type: none"> ▶ Check wiring of connector J2 and connections in the terminal block signals on the turret. ▶ Check the integrity and continuity of the cable. ▶ Check that the Drive is set to the motor in use.
--	---

**LAFERT MOTOR 10KHz
B5602P-01121**

▶ **Resolver value**
 3-4 40Ω
 5-6 60Ω
 7-8 60Ω

▶ **Motor phases value**
 U-V/ V-W/ U-W 4,5Ω

**MOTORE LAFERT 5KHz
B5602P-01101**

▶ **Resolver value**
 3-4 46Ω
 5-6 120Ω
 7-8 120Ω

▶ **Motor phases value**
 U-V/ V-W/ U-W 4,5Ω

**MOTORE MAGNETIC 5KHz
BLQ43L45**

▶ **Resolver value**
 3-4 46Ω
 5-6 120Ω
 7-8 120Ω

▶ **Motor phases value**
 U-V/ V-W/ U-W 2,8Ω

8.1	Motor PTC	13
------------	------------------	-----------

<p>This alarm is activated when is not detected the continuity between pin 1 and 2 of J2. The temperature sensor (PTC) of the motor indicates an excessive winding temperature.</p>	<ul style="list-style-type: none"> ▶ Make sure that the ambient temperature (near the motor) is within the limits allowed. ▶ If the alarm persists even when the engine is cold, check the wires connecting the sensor (pins 1 and 2 of J2 on board and the terminal turret).
---	---

9.0	Parity error	9
------------	---------------------	----------

<p>This alarm occurs before the turret is unlocked when the START command is sent and the parity bit is not set correctly.</p>	<ul style="list-style-type: none"> ▶ Check the connection J1 pin 23 with the plc. ▶ Ensure that the program plc correctly handles the parity bit ▶ Check that there is a delay in the plc of at least 50ms between the setting of the position and parity to the START command.
--	---

9.1	A non-existing position has been called	28
------------	--	-----------

<p>Has been requested a position higher than the number of station provided.</p>	<ul style="list-style-type: none"> ▶ Check the setting of dipswitch. ▶ Check code management of the position in the plc. ▶ Check wiring of connector J1. ▶ Check/Reset the drive setup (page n°10).
--	---

9.2	Zero search in operative mode different from 1	29
------------	---	-----------

<p>The alarm is activated after the START command, before unlocking the turret when:</p> <ul style="list-style-type: none"> ▶ Operation Mode ≥ 2 ▶ Position code = 0 	<ul style="list-style-type: none"> ▶ Check code management of the position in the plc. ▶ Check wiring of connector J1.
--	--

For order or set up the new drive it's necessary to know:

► **Serial number of the drive to replace**

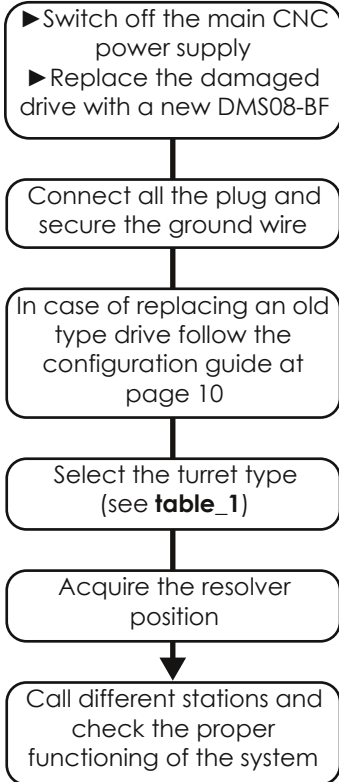
The code is printed on two labels, one is in the front of the drive and other is on the right side.

► **Turret type**

The code is printed on a metallic label on the turret and it's present on the turret report. The code is necessary to understand if the turret is K2, K3 or K5 type.

► **Motor type used on the turret**

The code is printed on the label attached to the motor. It's also possible to know the motor type checking the drive's serial number (never replaced before) so it's not necessary remove the rear cover of the turret.



< IMPORTANT >

► Pay attention to respect the power in (L1-L2-L3) and out(U-V-W) terminal. In the drive model SA.01A.TB the input was named R-S-T, after that model has been renamed in L1-L2-L3.

► In case of replacing a drive with Sn°<4273 it's necessary make an adapter for I/O connector. On request Baruffaldi supply this adapter (code 999.192.08199), contact service dept. for check details and price.

See the pinout at page 21

Connect to CNC original cable

< KNOWN ISSUES >

► Search zero is ok but error become when calling stations far	K2/K3/K5 wrong set up	Repeat drive setup (page 10)
► No rotation or 8.0 alarm	Wrong set up of motor	
► No turret unlocking at any position inquiry	Start lenght too short (<100ms)	Modify the plc program

Table 1: turret type selection

On ↑

Dipswitch

T.R. Trasmission ratio

Turret	T.R.	1	2	3	N°pos	4	5	6	Profile	7	8	9	10
120/160	1:25	☐	☐	☐	8/4*	☐	☐	High inertia \TBH	Univ.	☐	☐	Drive setup	Resolver acquisition
200/250	1:49	↑	☐	☐	12/5*	↑	☐		Fast	↑	☐		
320	1:145	☐	↑	☐	16/6*	☐	↑		Med.	☐	↑		
400	1:217	↑	↑	☐	24/10*	↑	↑		Slow	↑	↑		
100	1:17	☐	☐	↑	*K3 turret				Dynamic profile				
Custom	1:	↑	↑	↑									

Next sequence must be performed without voltage in the circuit and without pressure in the air/oil lock/unlock turret circuit.

MOTOR REPLACEMENT

- ▶ Turret must be closed in the station n°1
- ▶ Remove the cover of the motor (1)*
- ▶ Disconnect the motor wires from the terminal block (2)
- ▶ Remove the motor (3)
- ▶ Fix the new motor with the mark (X) on its shaft setted down (fig.1)
- ▶ Connect the motor wires to the terminal block (2)
- ▶ Reassemble the cover (1)

Resolver acquisition

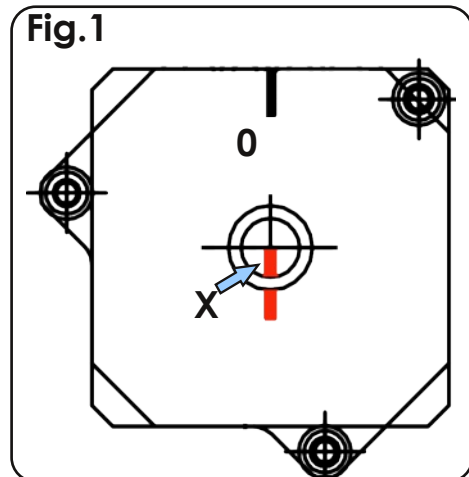
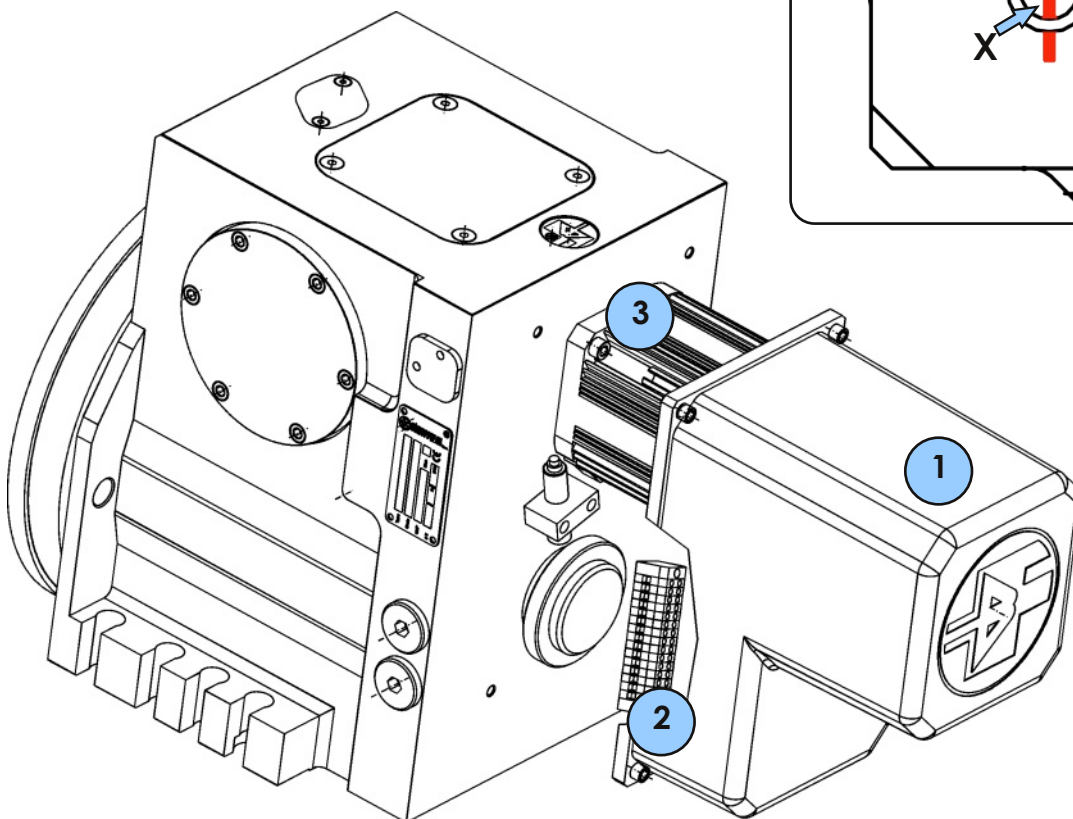
- ▶ Set to on dipswitch n°10
- ▶ Turn the machine on
- ▶ At the end of 5" counting re-set the pin n°10 off
- ▶ The "SA" letters on the display means that the acquisition is finished
- ▶ Turn the machine off

End of sequence

It's possible turn on the machine and call a station.

***NOTE**

- ▶ The sequence is made for standard turret without tool drive unit.
- ▶ Follow the instruction on the specific mechanical manual for the unmounting sequence.
- ▶ The electric drawing is the same for every turrets.



In order to execute this procedure it is necessary to supply the proximity switch (24Vdc) and have pressure in the lock/unlock turret circuit.

OPERATIONS SEQUENCE

- ▶ Supply the drive with only 24Vdc (M2-Logic supply)
- ▶ Turret must be closed in the station n° 1
- ▶ Remove the motor cover
- ▶ Loosen the two socket head screw (1a - 1b) that fix the ring (1)
- ▶ Unlock the turret acting on valve
- ▶ With a screwdriver twist the motor shaft for 1 turn in clockwise direction as shown in Fig.1
- ▶ Rotate the ring (1) in clockwise direction (Fig.2) (counterclockwise for Tb320/400 - Fig.3) till proximity is activated.
- ▶ Lock the two socket head screws (1a - 1b)
- ▶ Twist the motor shaft back one turn
- ▶ Lock the turret acting on valve
- ▶ Reassemble the motor cover

IMPORTANT

It's recommended, whit machine doesn't supply, remove the M1 connector from the drive.

End of sequence

Switch of the machine, re-connect plug M1 (if removed).

After reboot the machine will be possible call a station.

Note

Phasing the camme don't change the position of the resolver so it's not necessary repeat the acquisition of resolver position.

After removing the cover, ensure that the X mark on the motor shaft is pointing down, if not dismantle the motor, rotate the shaft holding the sign X down and reassemble it then proceed with the sequence and before to call a station repeat the acquisition of the resolver position (page 7).

Fig.1

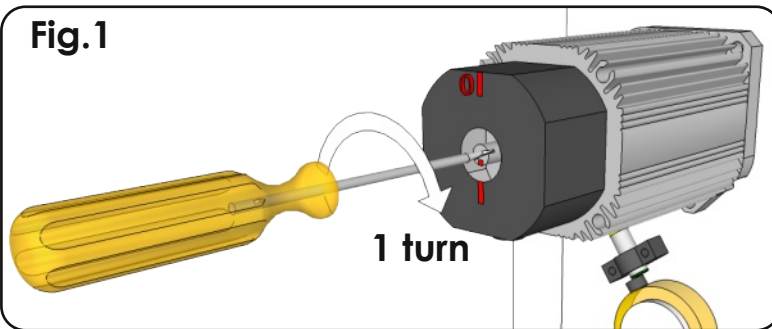


Fig.2

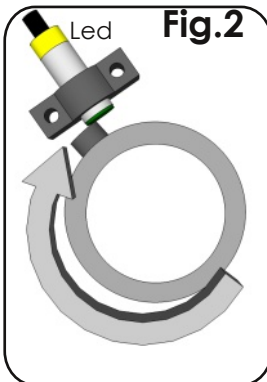
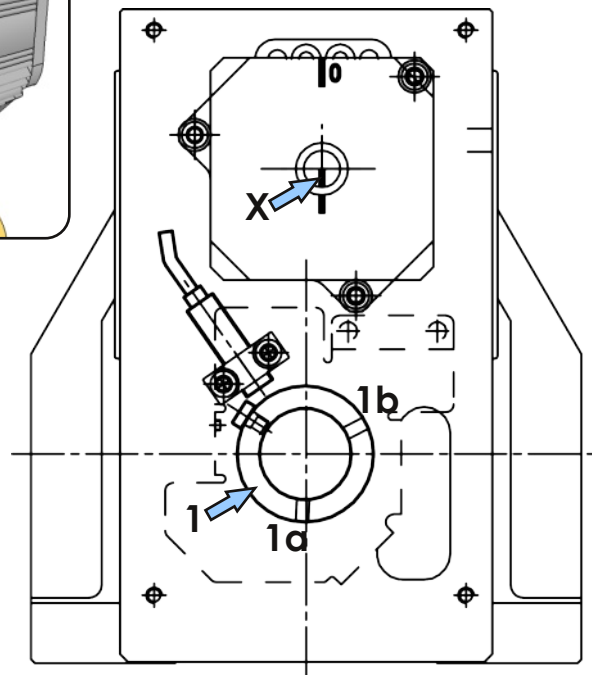
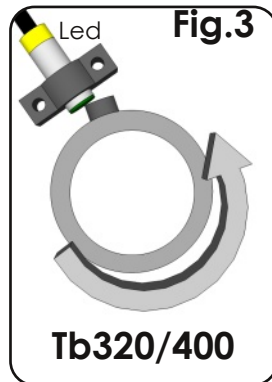


Fig.3



The installation of the new drive on CNC instead of a drive of previous versions to the model DMS08-BF requires rewiring the connector J1 or the adoption of an adapter DB37 to DB26: ask details and price to Baruffaldi service or commercial department.

PINOUT BARUFFALDI ADAPTER

Db 26 pin n°	DESCRIPTION	WIRE COLOR	Db 37 PIN N°
1	Feedback bit 1	black	1
2	Feedback bit 4	orange-blue	2
3	Mode bit 1	green-blue	17
4	Not used	gray-blue	
5	Position bit 4	yellow-green	32
6	Alarm bit 1	orange	27
7	Alarm bit 4	red-blue	26
8	St Index	pink	28
9	Not connected		
10	Feedback bit 2	white-blue	20
11	Feedback bit 8	green-brown	21
12	Mode bit 2	yellow-red	35
13	Position bit 1	white-red	33
14	Position bit 8	red-black	13
15	Alarm bit 2	red-brown	8
16	Alarm bit 8	yellow-blue	7
17	St Lock	black-blue	9
18	Not connected		
19	Feedback bit 16	red	6
20	Mode bit 4	purple	16
21	Position bit 2	cyan	14
22	Position bit 16	gray	31
23	Parity	blue	34
24	Alarm bit 16	brown	
25	Start	white	15
26	Not connected		

	LOGIC SUPPLY 24VDC	
New Drive		Old Drive
M2	+24	DB37 3-22-4
M2	0V	DB37 5

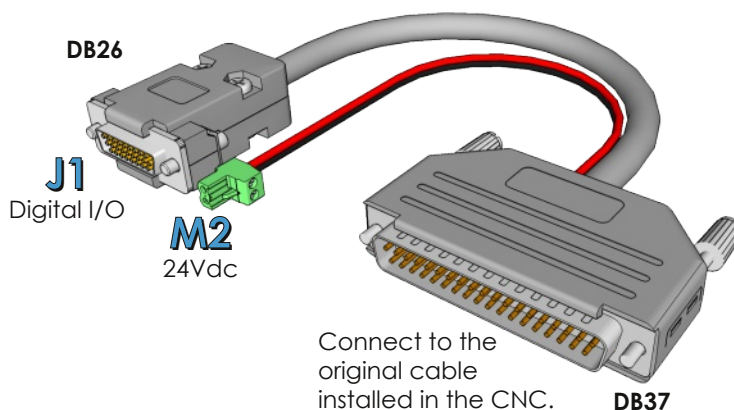
POSITION FEEDBACK

The outputs of the position feedback are not present in the drive before type DMS08-BF. These outputs communicate the station of the turret and gives a supplementary information to help the turret management, however it's possible continue to use the turret checking the ST INDEX and ST LOCK signals as consent to work, so it is not necessary modify the plc program.

ALARM BIT 16

In the new drive has been added 1 bit to the alarm code so it is possible that the description on the operator panel gives a wrong message, in case of alarm always check the code on the 7 segment display on the drive.

21



Connect to the original cable installed in the CNC.

