INSTALLATION AND OPERATING INSTRUCTIONS FOR THE

SONOR MONITORING UNIT

CBN 30

MECASON®

This document concern particularly following good:

Customer:

Purchase order N°:

Delivery date:

Electronic box N°:

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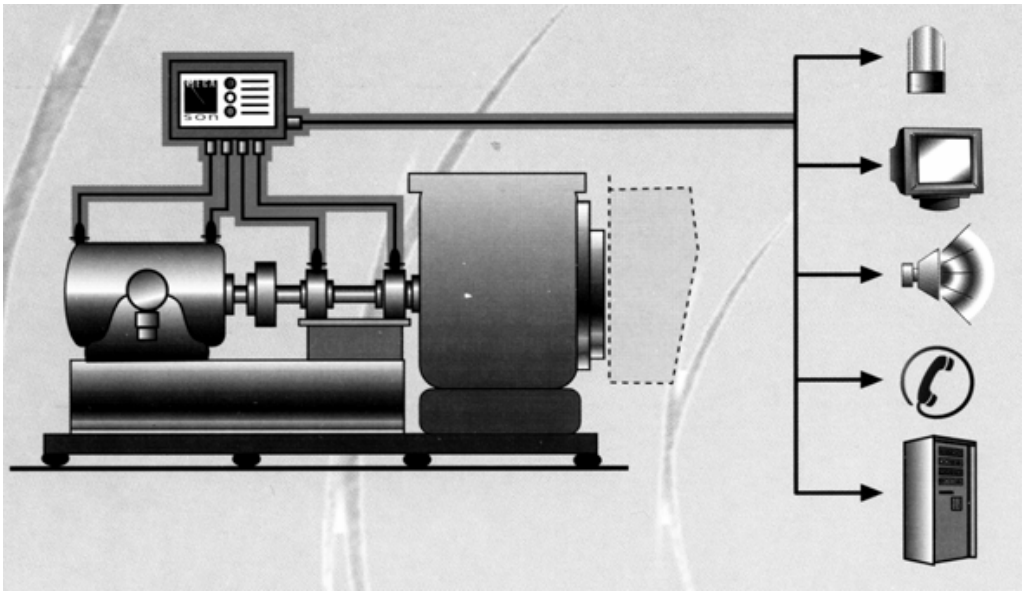
N-CBN30EN-030205



- Preamble -

Thank you for choosing to install a device of surveillance *MECASON*! If you meet in the installation, or later, any difficulty, do not hesitate to contact us, your total satisfaction is our first objective.

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I - SYSTEM FUNCTION

Each sensor input is activated and read individually and sequentially for 4 to 12 seconds by the sensor input scanning electronics.

Only the changes in the measurement levels are monitored.

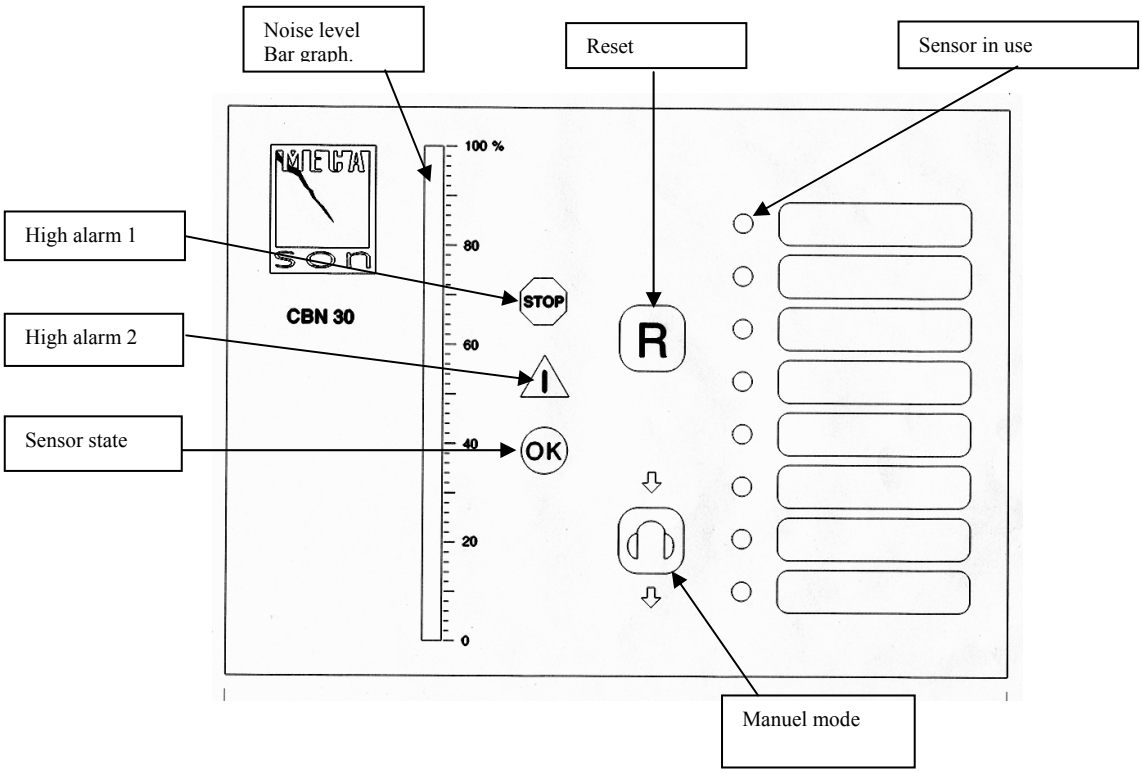
The alarm limits are not expressed in terms of physical units, thus avoiding an important source of monitoring error. With MECASON, the reference level established by the initial sensor input adjustment forms the base for the alarm levels. The alarm levels, in turn, represent then factors of increase over the individual reference level and allow a closer monitoring of each measurement point.

MECASON can not, therefore, be used to establish the mechanical condition of the machine upon installation. Only the developments in the measured levels, or lack thereof, over time can be considered a reliable source of information. The rate of change in measurement levels being the most useful indicator in judging the condition of the mechanical component in question.

The electronics unit can latch the alarms internally (see § IIID). If you choose such a configuration, the unit will show which sensor caused the alarm. The sensor input that tripped the alarm can be identified by the colour of the LED indicating the activation of the sensor. Green meaning no alarm, orange meaning Alarm 1 and red meaning Alarm 2. Pressing the button R on the unit's front panel can reset the alarms.

The alarm levels chosen can be displayed on the bar graph level indicator (see § IIIF).

The screw cap covered plug position on the electronics unit housing permits the connection of an audio headset. When the headset is plugged in, the automatic scanning of the sensor inputs stops and the alarm outputs are blocked. To pass from channel to channel the button marked  must be pressed each time. When the headset is unplugged the automatic sensor input scanning is re-activated.



MECASON CBN 30

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II - TECHNICAL SPECIFICATIONS

ELECTRONICS UNIT

- Number of available inputs	8
- Sampling time of each selected Input during the scanning cycle	6 to 14 s
- Number of inputs scanned, selectable via jumper	1 to 8 inputs
- Frequency band monitored	100Hz to 12kHz
- Two independently adjustable alarm limits	
- Internal latching of alarms	yes/no, (selectable via jumper)
- Alarm outputs in positive and negative security	
- delays	3 approx.
- maximum voltage limit	230 volts
- maximum current limit	5 A
- maximum power limit	250 VA for AC, 50 to 150 for DC (please consult us)
- Analogue outputs	
- front panel indicator length	0 to 100%, 125mm
- standard analog output (card MARD 31, 32 or 34)	4 - 20 mA
- Terminal connection wire cross-section	1,5 mm^2
- Power supply	220 V, 50 Hz
- Power consumption less than	10 VA
- Electrical protection	fuse 5 x 20 slow burn plus GMOVE
- Operating temperature limits	0 to 50 °C
- Polycarbonate housing rating	IP 65
- Housing dimensions	160 x 240 x 90 mm (excluding cable passages)
- Weight	approx. 1.5 kg

SENSORS

- Operating temperature limits	-20 °C to +60°C
- Rating	IP 65 (upon demand, submersible 5 bars)
- Installation hardware	floating washer and screws CHC Ø 5
- Weight excluding cable	approx. 50 g
- Sensor cable	flexible, shielded 0,22 mm^2, PVC
- Sensor body	stainless steel 316 L

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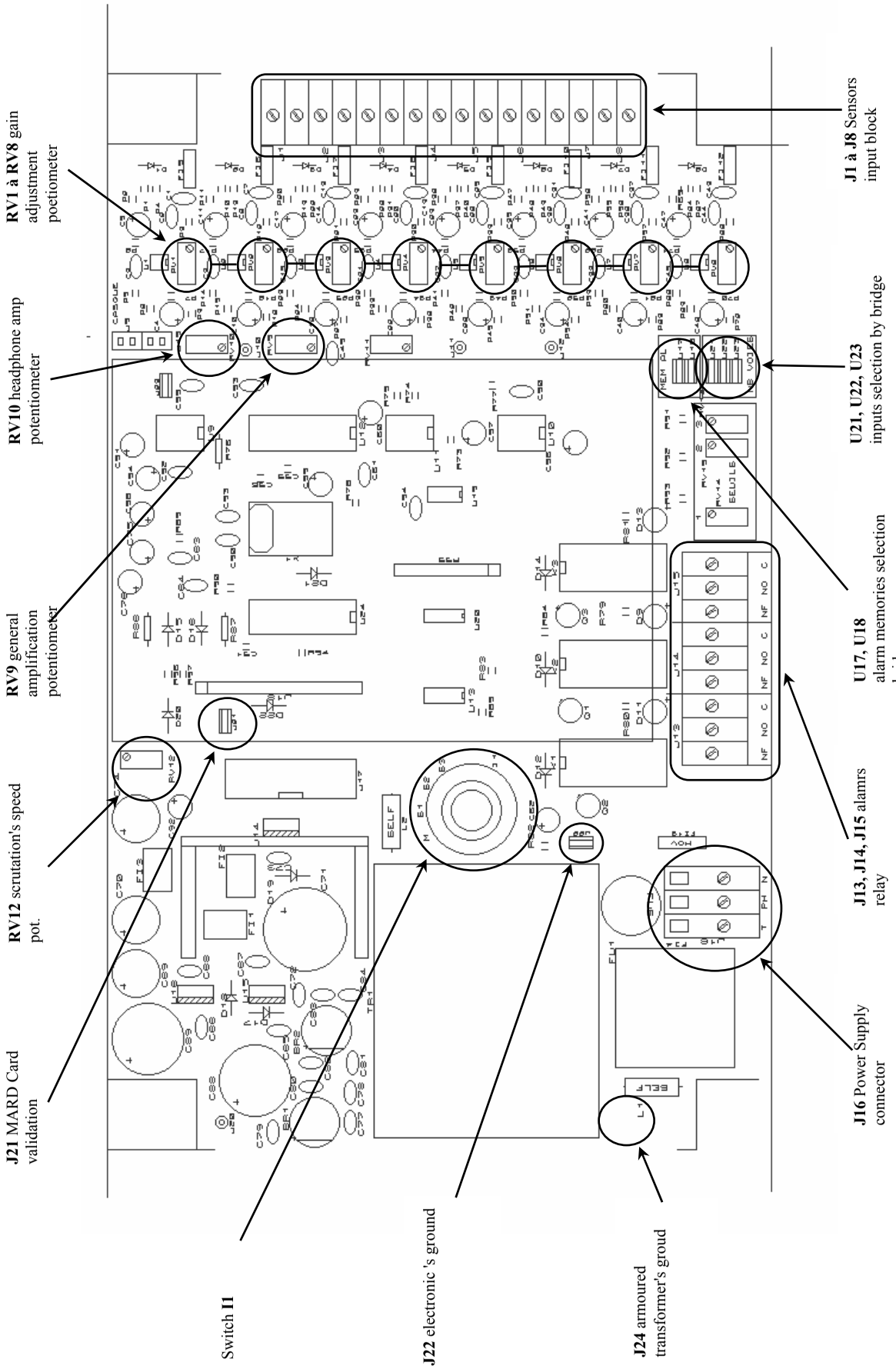

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III - OPTIONAL CARDS

The MARD card offers diverse functions according to the version ordered.

MARD 30	Permits up to 4 separate Alarm 2 outputs for monitoring several machines with the same unit. To disarm the alarms in the case of machine shut down, 4 optocoupler inputs are provided to activate the monitoring only with the presence of a pre-defined voltage at the input.
MARD 31	Same as MARD 30 + multi-plexed analog output 4-20 mA with integrated identification of input 1.
MARD 32	Multi-plexed analog output 4-20 mA with integrated identification of input 1 only.
MARD 33	Optocoupler inputs only, to restrict monitoring to predefined conditions (eg. hydro electric turbines; monitoring only during production of electricity, screw type compressors; monitoring only under load, ski-lift station gear boxes; monitoring only more than 20 secs after system start, etc.)
MARD 34	Function MARD 32 + Function MARD 33

III.A - MARD 30

Provides up to 4 separate Alarm 2 outputs.

Necessary when several machines (up to 4) are to be monitored with the same electronics unit and *MECASON* must shut down the machines individually upon reaching the alarm level 2.

To prevent a false "defective sensor" alarm when a single machine is shut down, the optocoupler inputs can be used to validate the alarm conditions only when the machine is in operation.

With this card, the alarm N°1 and the "defective sensor" alarm are generated by the motherboard (a single output per electronics unit).

To validate the alarm outputs, a pre-defined voltage must be present at the optocoupler input. The absence of the input voltage blocks all alarm outputs for the corresponding machine and can be used to avoid false alarms during machine power-up or when the machine is operating in abnormal modes. For example; power-up of a ski lift station (no monitoring until a stable speed has been attained), the operation of a hydroelectric turbine (no monitoring until the generator has been connected to the distribution network), or operation of a screw type compressor (no monitoring while the screws are not delivering compressed air). In all cases, the system controlling the machine must generate the alarm validation voltage to activate monitoring (24, or 48 volts, DC or AC). The above mentioned control voltage level and the grouping of the alarm outputs for the machines to be monitored must be defined when ordering the card

III.B - MARD 33

This option features the optocoupler input function only and is used to block the standard alarm outputs ("defective sensor", Alarm 1 and Alarm 2) available on the electronics unit motherboard.

ASSIGNMENT OF SENSOR INPUTS TO MACHINES

The assignment of the sensor inputs to the individual machines to be monitored can be done by the placement of jumpers at the positions U1, U2 and U3 as follows:

Sensor input	Output assignment	Jumper positions
1	Machine 1, Relay K1	Fixed association
2	Machine 1, Relay K1	Fixed association
3	Machine 1, Relay K1	U1 has no jumper
3	Machine 2, Relais K2	U1 has a jumper
4	Machine 2, Relay K2	Fixed association
5	Machine 2, Relay K2	U2 has no jumper
5	Machine 3, Relay K3	U2 has a jumper
6	Machine 3, Relay K3	Fixed association
7	Machine 3, Relate K3	U3 has no jumper
7	Machine 4, Relay K4	U3 has a jumper
8	Machine 4, Relay K4	Fixed association

III.C - MARD 31, 32 et 34 (ANALOG OUTPUT 4-20 mA)

The 4-20 mA analog output permits a transmission of measured values to remote information systems.

The transmission of measured values coming from all sensors connected is in the form of a multiplexed string. This string of values being identical to the sequence of the levels indicated on the front panel during the automatic scanning of the sensor inputs

To identify the measurement belonging to input 1 in the multiplexed string of values a "top" in the form of an impulse to 0mA is transmitted during the initial seconds of the scanning dwell time for input 1.
In this fashion, the input 1 is identified for each sensor input scanning cycle. The impulse width can be chosen between 0.5 secs and 2.5 secs (specify when ordering).

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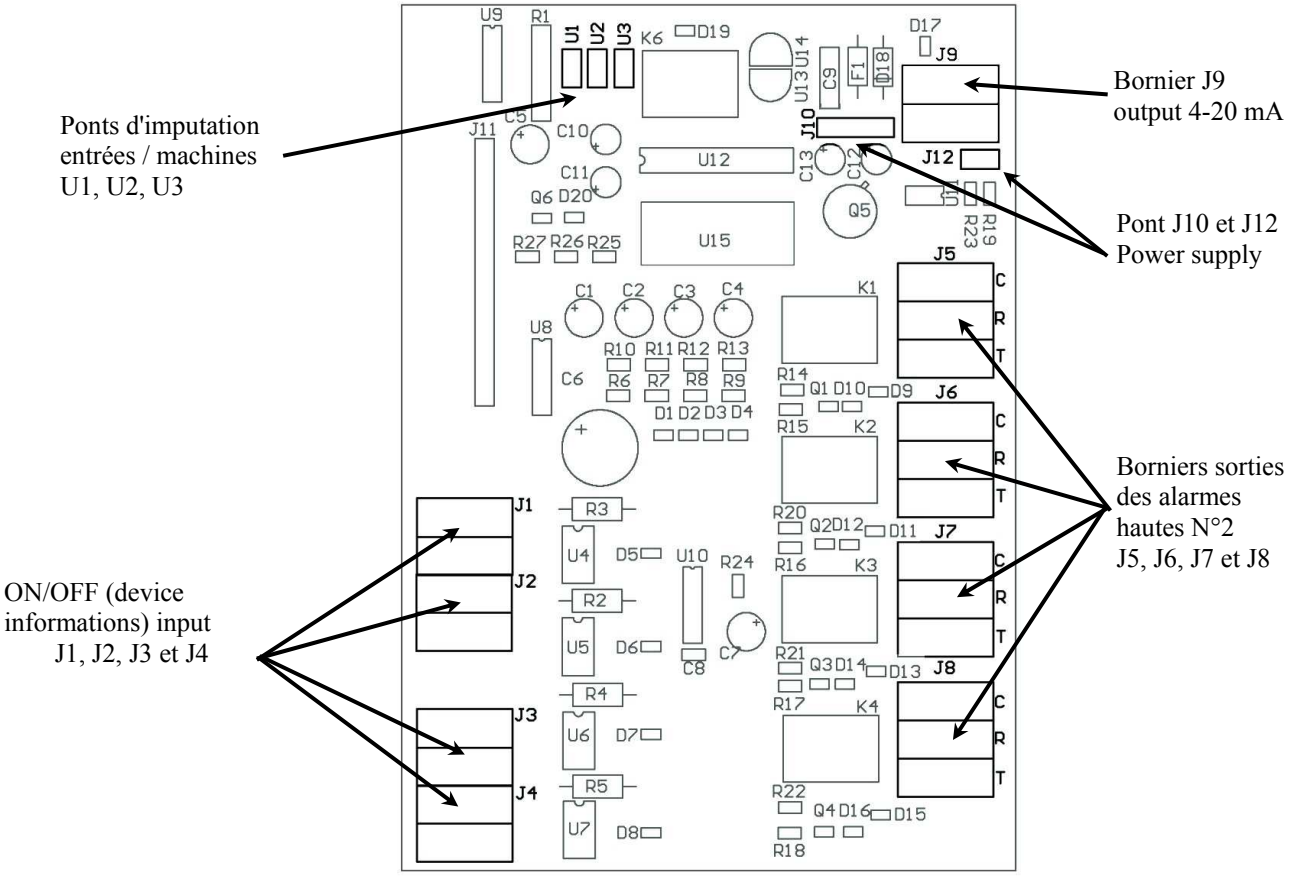
TECHNICAL CARACTERISTICS

- Installation on the electronics unit motherboard	plug-in
- Maximum allowable transmission path resistance	400 Ohms, (500 on demand)
- Relays outputs (positive and negative security)	
- Maximum switching voltage	125 volts
- Maximum switching current	1 amp
- Maximum switching power	60 VA (AC.), 50 W (DC.)
- Optocoupler input voltage	specify upon ordering

CONNECTIONS

IMPORTANT ! Disconnect the power supply to the electronics unit before installing the MARD card. Otherwise you may destroy the microprocessor in the event of a misplaced connection!
Before installing the MARD card (with the exception MARD 32, not necessary), also plug the jumper at position J21 on the electronics unit motherboard.



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IV - ELECTROMAGNETIC COMPATIBILITY

The system working with weak currents, the risks of electromagnetic disturbances are important. It is thus particularly important to verify well the quality of the signals by listening in the helmet to all the ways, but before, we invite you to respect well some elementary precautions during the installation, namely: - to install(settle) the case far from the sources of disturbances (contacteurs, cable of powers crossed(gone through) by common(current) "minced meats")

On engines, avoid implanting the sensors towards(as for) the box with borders (especially on machines with variable speed) - avoid absolutely making walk the cables of the sensors on the same cable tray as the drivers of power, especially for machines with variable speed (in case of obligation, protect them by a métalloplastique girdle (kind(genre) CAPRIPLAST) earthed by its two extremities).

In case of doubt, please, do not hesitate to consult us!

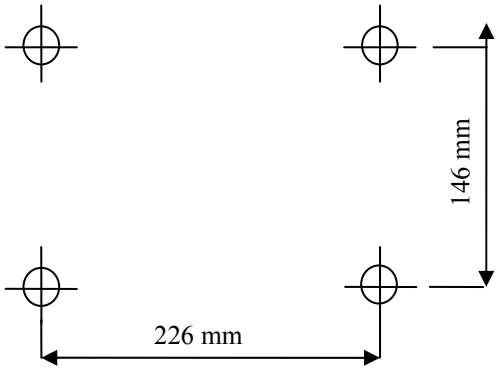
V - MECHANICAL INSTALLATION

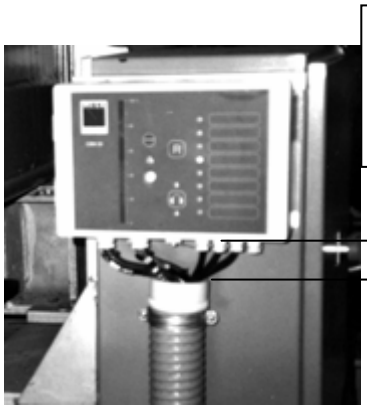
V.A - ELECTRONIC UNIT INSTALLATION

Thanks to the IP 65 rated housing, the electronics unit can either be placed outdoors close to the machines or in a rack. By placing the unit close to the machines, the measured levels can be directly observed on the front panel during grease applications and thus provide a direct confirmation that the grease has actually reached the bearing.

The distance between the sensors and the electronics unit can easily exceed 100m (case encountered where the machines are in an intrinsic protection zone) and allows a problem free placement of the housing.

4 screw holes are available allowing the installation of the unit using TR 4 screws positioned as follows:





V.B - SENSORS INSTALLATION

The sensors should be placed on the surface of the machine as close as possible to the component to be monitored. As close as possible meaning, the position on the surface of the machine allowing the shortest noise propagation path through metal and which possesses the least number of discontinuities. The orientation of the sensor itself is very important

Differences in the length of the noise path are compensated for by the sensor input gain adjustments made during installation. However, one must take care not to approach other noise sources as the noise path becomes longer. If two or more noise sources (components to be monitored) are at equal distances to the sensor, the sensor will measure the sum of the individual noise levels. If all components are producing roughly the same noise intensities, one sensor can be used to monitor several components in the case above, but the sensitivity of the monitoring for each component will be somewhat reduced

In cases where the speeds of rotation are very low (30 or 40 rpm), it is best to place the sensor on the side of the bearing mount carrying the load, with an orientation parallel to the load direction.

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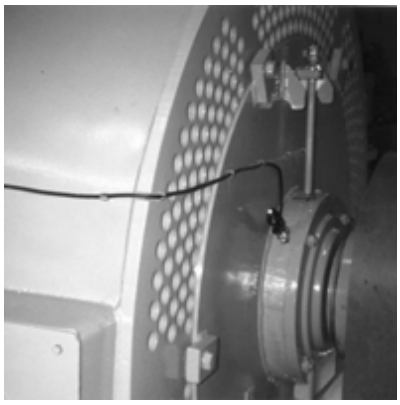


In the example (fig. 1), the sensor should be placed at position A. At position B, even though physically closer to the noise source, the attenuation of the noise caused by the discontinuity makes this choice less desirable.

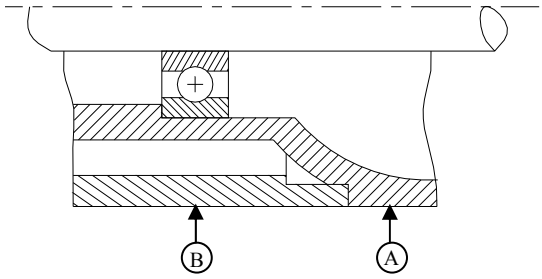
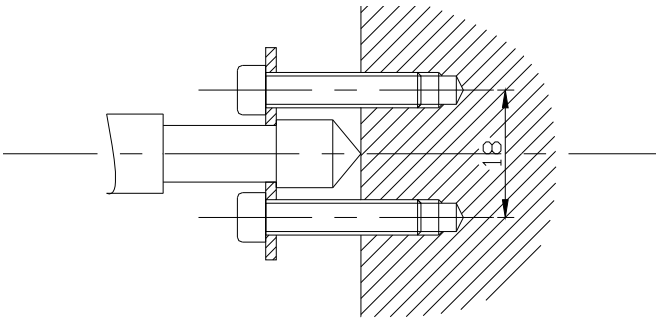


fig. 1

A good guide in deciding where to place a sensor is to imagine a mechanic listening to a bearing with a screw drive in contact with the machine surface and the handle against his ear. How the mechanic chooses the listening position is analogous to the placement of MECASON sensors. In case of doubt, feel free to consult your *MECASON* representative.



NOTE: In placing the sensor on the machine, don't overlook the fact that a sensor mounted horizontally is a potential foothold for personnel. To minimise the possibility of sensor breakage place the sensor in a protected area or with cable end slanting downward

To install a sensor outfitted with a sliding washer, 2 screws CHC 5x20 and 2 holes M5 place at 18 mm centre to centre and tapped to a depth of 7mm minimum are needed. With a hammer and point or with a drill, create a light indentation at the point where the sensor tip touches the machine, so as to remove any unstable material and provide a solid contact with the machine surface.

To prevent loosening of the sensor mounting, apply a drop of "LOCTITE" to the screws and tighten them until the washer flexes slightly.

To protect the fragile point where the cable is attached to the sensor, the cable has been attached with a plastic collier to the sensor body

To install the probe on the opposite side of the coupling up on engine with external fan, it will generally be necessary to realize a bight in the crankcase of the fan.

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VI - CONNECTION AND ADJUSTEMENTS

VI.A - SENSOR CONNECTIONS

The centre conductor for each sensor must be connected to the upper terminal of each input terminal pair. The cable shield in turn is to be connected to ground (lower terminal).

Note: To ensure an easy orientation in the case of MECASON alarms, choose a logical sequence for the sensors connected. For example, first the sensors of the motor followed by the sensors of the pump in the order that they are found on the machines along the axis of rotation.

VI.B - POWERSUPPLY CONNECTIONS

The circuit is outfitted with a triple terminal. (See point B)
The ground wire must be connected. If not, the electronics unit's shielding against induced noise will not function.
A 160mA slow burn fuse is used to protect the circuits powered by 230VAC.
A GMOVE V250L20 is used to protect against voltage peaks.

VI.C - UNIT CONFIGURATION

VI.C.1 - CHOOSING THE NUMBER OF ACTIVE SENSOR INPUTS.

The *MECASON* Electronics unit is designed to accommodate from 1 to 8 sensors. To restrict the automatic scanning of the sensor inputs to only those inputs outfitted with sensors (active inputs), 3 jumper positions are available (points U21, U22, et U23) on the circuit board. The last input scanned is determined as follows:

N° of input	1	2	3	4	5	6	7	8
U21	-	J	-	J	-	J	-	J
U22	-	-	J	J	-	-	J	J
U23	-	-	-	-	J	J	J	J

J=jumper

VI.C.2 - INTERNAL LATCHING OF ALARMS

The jumpers U17 and U18 allow you to latch internally the alarm conditions for Alarm 2 and Alarm 1 respectively with the jumper in position the alarms are latched and with the jumper out of place the alarms are not latched. The alarm "defective sensor" cannot be latched.

If you wish to latch the alarms only under certain conditions (for example machine operating or machine under load), you have two possibilities:
- Latch the alarms with exterior relays only
- Install the optional circuit MARD 33 which provides a signal input for validation of the alarms under pre-defined conditions.

VI.C.3 - ADJUSTEMENT OF THE SENSOR INPUT SCANNING RATES

Using the potentiometer RV 12 (position K) the dwell time for each sensor input during scanning can be adjusted between 6 and 14 seconds.

For most applications a dwell time of about 10 seconds gives satisfactory results.

VI.C.4 - GROUNDING OF THE ELECTRONICS UNIT'S EARTH TRACES

The earth for the electronics unit can be connected to ground via the jumper J22 (just below the rotating switch I1). Depending on the quality of the earth at the installation site, it may or may not be best to connect the earth and electronics 0V traces to the ground line. In listening to the sensor signal via headset, you can determine whether or not you should connect to ground.

VI.D - SENSOR INPUT REFERENCE LEVEL ADJUSTMENTS

MECASON uses a purely relative measurement in its monitoring. The base of the measurement used for monitoring is a reference level established by the person installing the unit and considered to reflect the normal operating condition of the machine.

Note: Before making the reference level adjustment, assure that the lubrication of the part to be surveyed is optimised.

We suggest using the level 20% on the front panel as the reference level. This level is high enough to detect a defective sensor with a minimum level limit and low enough to allow an effective indication of an insufficient lubrication and/or a possible mechanical degradation with alarm levels 1 and 2 placed between 20% and 90%.

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The reference level adjustment is made with two successive levels of amplification. First, for each sensor input individually with the potentiometers RV1 to RV8. And second, a general amplification adjustment for all inputs at once uses the potentiometer RV9. To assure the passage of healthy sensor signal to the second level of amplification, the adjustment of the individual input gain should be made so as to maintain the highest gain possible.

To adjust each sensor input proceed as follows:

BEFORE ADJUSTING THE INPUTS

- Check that the rotating switch I1 is set at position "M" (Measure),
- Power-up the machine(s) monitored by the MECASON unit to be adjusted.
- Before plugging in the headset, which would stop the sensor scanning, confirm that the scanning covers all sensor inputs with sensors connected and only those with sensors. Should this not be the case, regroup the sensor connections so as to leave no gaps from the first to the last input used and/or reposition the jumpers (U21,22,23) as described in paragraph C1.
- Pull lightly on each sensor cable so as to confirm that the wires a firmly held in the terminal blocks. Check at the same time that the polarity of the sensor wires is correct (signal above, ground below for each pair). **An inverted polarity can damage the circuit !!**

YOU ARE NOW READY TO ADJUST THE REFERENCE LEVELS !

INPUT REFERENCE LEVEL ADJUSTMENT

NOTE: All potentiometers used are type 22 turns and logarithmic.

- Plug in the headset to block the automatic input scanning and using the input active LEDs for orientation, step manually with the button marked  until input 1.is activated.

-Starting from input 1, listen to each of the inputs briefly to assure that the noise heard is of mechanical origin (if the volume at the headset is too high or low adjust the volume with the potentiometer RV10 position G). If you are not sure of the noise's origin, shut down the machine and listen as the machine slows so as to confirm the sources of the noises heard. Check the sensor connection or installation on the machine if you are still in doubt. Once convinced that all noises heard are predominantly mechanical, select again input 1.

-NOTE: During final factory inspection the potentiometers RV1 to RV8 are adjusted to 18 turns

- Using the potentiometer RV9 (amplification general, position E) adjust the level for input 1 to about 50%.

  Step manually with the button marked  to determine which input has the lowest reading.

- Choose the input with the lowest reading and adjust the level to 20 % using RV9 only.

- Activating manually each of the remaining sensor inputs, adjust each to 20% using only the corresponding individual gain potentiometer RV1 to RV8.

YOUR *MECASON* IS NOW READY TO MONITOR!

Unplug the headset and check one last time with the automatic scanning that all levels show 20%. Using the potentiometers RV1 to RV8 only retouch the inputs showing slight deviations.

Attention: If you are forced to change the adjustment of the potentiometer RV9 to have 20% for any input, you must re-adjust all remaining inputs with RV1 to RV8 !

Never forget to unplug the headphone !! If the headphone is plugged, alarms are quiet!

VI.E - ALARM LEVEL SETTINGS

The alarm levels can be shown on the front panel indicator. Simply select the desired alarm with the rotating switch I1 (position H)
The switch positions are as follows:

Function	Switch position	Corresponding potentiometer
Measure	M	-
Defective sensor	1	RV14
Alarm N°1	2	RV15
Alarm N°2	3	RV13

For a reference level of 20%, we suggest the following alarm settings (ball bearing monitoring):

Defective sensor 10%,
Alarm N°1 50%, increase factor 2,5 (50/20)
Alarm N°2 80%, increase factor 4,0 (80/20)

At the factory final inspection the above mentioned levels are pre-set. To set other levels proceed as follows:

- Select the alarm level to be set with the switch I1
- Adjust the desired level with the corresponding potentiometer (see table above)

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VI.F - ALARM OUTPUTS

MECASON in its standard configuration has one set of 3 relays for all sensors attached (position J13, J14, J15). The potential free contacts can be used to pass alarms to a control centre, a tele-transmission system, programmable logic controller and /or local visual or acoustic alarm devices.

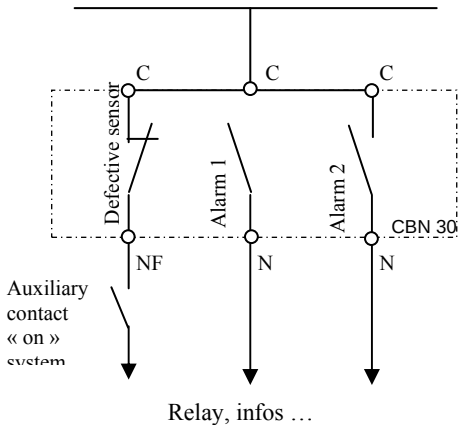
Each relay output features connection configurations in positive or negative security, with a triple terminal strip (Common, T and R).

Terminal	Alarm
J13	Defective sensor
J14	Alarm N°1
J15	Alarm N°2

Please consult the technical specifications for the maximum allowable current and voltage values for these relay outputs.

To prevent the alarm output "defective sensor" from being tripped in the event that the machine monitored is shutdown, an additional relay exterior to the electronic unit is necessary. This relay must be configured to block the alarm output when the machine is not operating. The optional cards **MARD 30**, **31, 33** or **34** .can also be used to prevent a false alarm in the case of machine stops.

Without optional MARD card:



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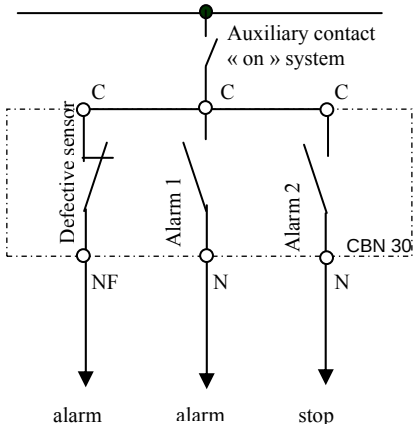

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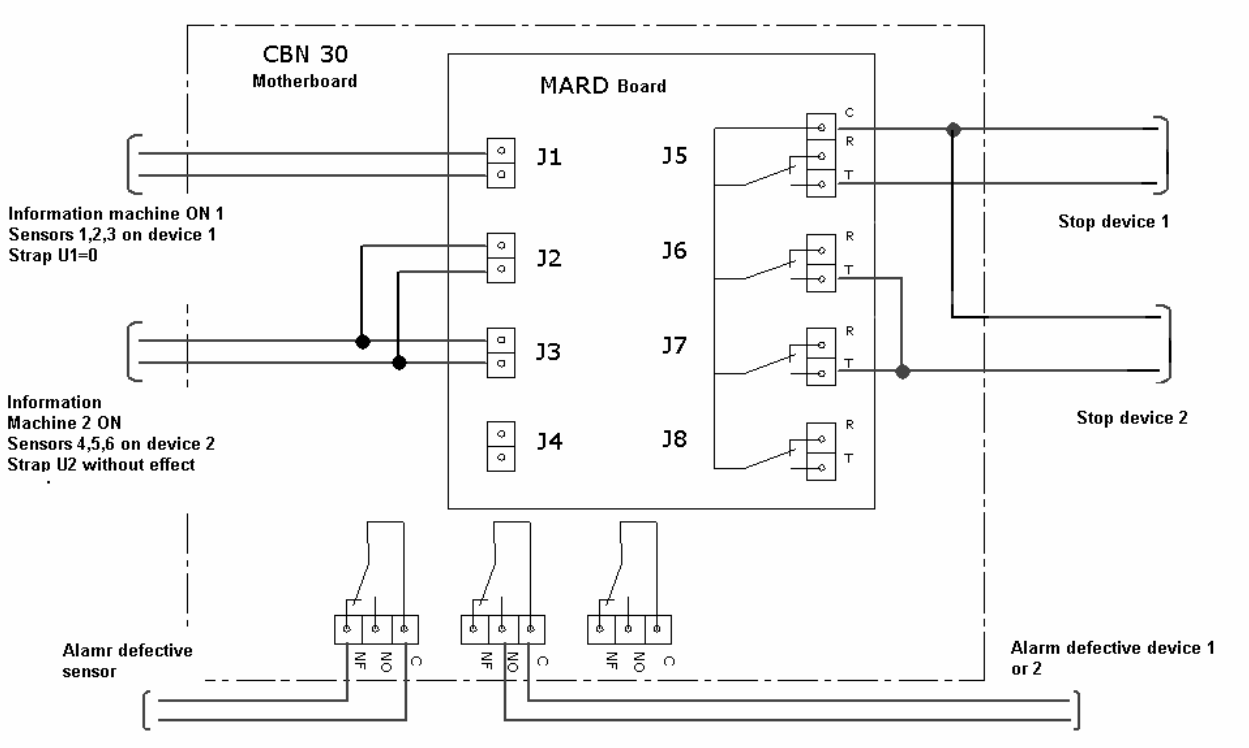
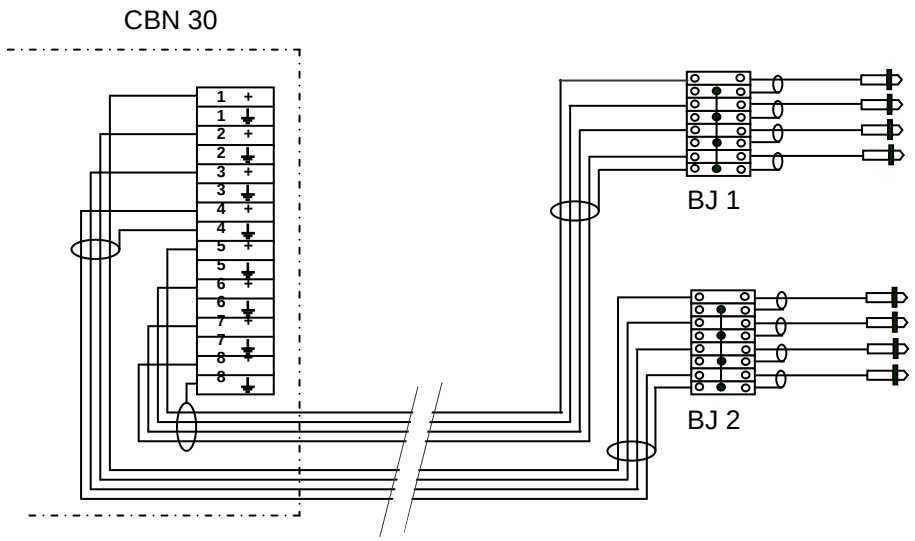
Relay with MARD card : Example 2, 3 sensors machine



CONNECTING WITH CONNECTION BOX AND MULTICONDUCTIVE CABLE



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VII - ACQUISITION, DEMULTIPLEXAGE BY a PROGRAMMABLE AUTOMAT OF THE 4-20 mA MEASUREMENT DELIVREE BY the MECASONMARD CARDS

Objective:

The follow-up of the sensors connected to the MECASON is done by cyclic examination. A 4-20 mA Signal is delivered by MARD card, it is proportional to the bar graph display, discontinuous and stopped according to the rate/rhythm of examination. To allow the automat to exploit the measurement signal, it must be programmed. The programming principles are presented in the following lines.

VII.A - Measure

In order to have a recoverable reference mark on the loop which makes it possible to identify the way measured at the moment "T", the output signal of MARD card is forced to 0 mA according to a one 0,5 second crenel. From this crenel and selected time of examination (4 to 15 sec.), it is possible to identify the listened way and to validate measurement according to the principle of the diagram below (Example with 4 activated inputs).

VII.B - The Automat

The automat can be an industrial automat PLC (Telemechanic, April, Siemens etc). Equipped with a CPU, it must be able to detect the 0,5 second crenel and manage all its other usual functions at the same time.

On the automat side only one analogue input 4-20 mA per MECASON case is necessary. For the input 0-5V a 250 Ohms resistance (P > 0,5 W) must be installed between the poles + and - input. (In all cases, the total resistance of the loop should not exceed 500 ohms)

VII.C - Alarms

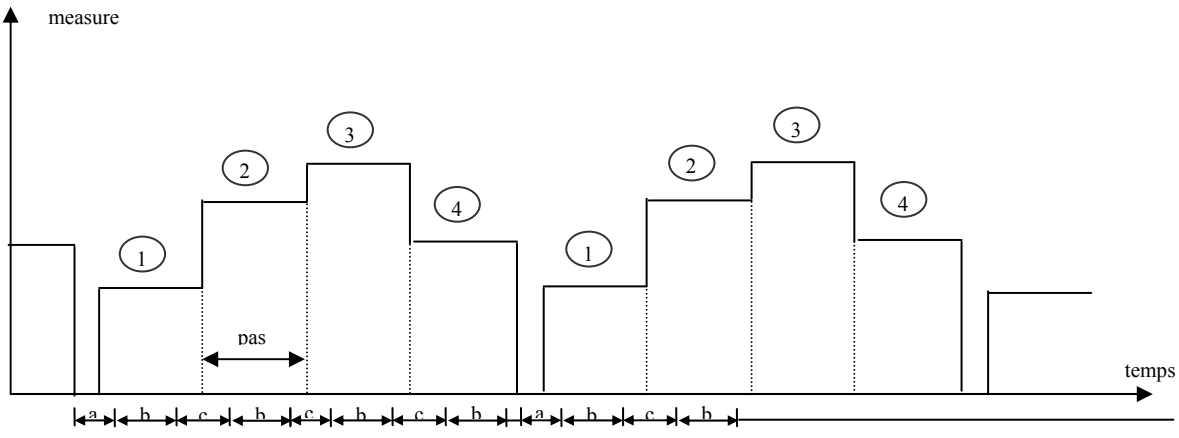
VII.C.1 - Thresholds

If you connect MECASON box to an analogue input of your automat, it can be logical not to use its alarms and to provide this function within the automat. The programmed alarm thresholds can be common to all the points of measurement as on MECASON (defect sensor: 10% of scale, alarm 1: 50%, alarm 2: 80%) or individualized according to your experiment and machine characteristics. You can also create evolutionary thresholds according to, for example, the speed rotation or the load. You will carry out one (or more) curved of proportional(s) alarm to the corresponding curve of "normal" values.

VII.C.2 - Marking time

In MECASON electronic boxes, the alarm outputs are time-lag in order to avoid false alarm due to shocks or other temporary and accidental parasitic phenomena. Standard marking times are 3 seconds.

These functions of marking time can be fulfilled in the automat by catching several measurements of this length of time and the requirement to be beyond of the threshold for all values. If you still fear false alarm, the automat can be programmed to set off the alarm only after one-second measurement cycle.



a=wait, b= validation/mesure, c=step-b

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VII.D - History

It is often interesting to know how the signal evolved/moved before release an alarm. With a history (recording of the values of measurement) it is possible to know if the alarm threshold were crossed brutally (case of a breakage) or gradually (rather a degradation of lubrication or mechanics). It can be also interesting to compare the evolutions of the various sensors of the same machine.

VIII - PROCEDURE OF TEST/CONTROLE

Like any device providing a function of security, it is desirable to control periodically the correct operation of chain MECASON. The operation must be carried out machine in service.

- General operation: The system is self-monitored by the relay "defect sensor". To check that while disconnecting a sensor, or while stopping the machine, the relay returns at rest.

- Quality of the signal: Listen to the quality of the signal with the headphonet; to check if you recognize the noise of the machine clearly. In case of doubt, you can strike the metal part of the body of the sensor with a screwdriver or any other metal tool. You must perceive a Net noise. The bar-graph must react.

- Operation of relays on high thresholds: The Simplest is to cause the swing of the relays by lowering the threshold values. **The headphone must be disconnected.**

+ turn the I1 switch on the S2 position

+ check first of all if the adjustment of the threshold

+ put the threshold lower to 10%

+ High alarm n° 1 must start

+ turn the I1 switch on the S3 position

+ check first of all if the adjustment of threshold were with the good value

+ lower the threshold to 14 or 16%

+ High alarm n°2 must start

+ restore the threshold values S2 and S3

+ replace I1 in position M

+ Reset alarms (button R). The check operation is finished

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IX - INTERPRETATIONS: LEVEL CHANGES AND ALARMS

	Symptoms	Analysis	When,... action
1	level dropping	Most probably a result of machine run-in.	Listen to sensor signal with headset. Re-adjust the individual reference level so as to allow a common alarm level limit
2	Level risen slightly (+ 30 to + 50%).	Change in machines operating condition or possible approaching insufficient lubrication. Keep in mind that a worn ball bearing can produce levels15 to 40 times higher than the same well greased ball bearing in good condition	Apply grease to bearing Wait for any further level increase.
3	Level continues to rise and the Alarm 1 has been tripped	Most probably an insufficient lubrication.	- Apply grease, top off oil level - Check for contaminants in the bearing housing, - Inspect the machine for other obvious external problem sources in the machines direct vicinity.
4	In spite of application of lubricants, the alarm level rests constant See § 6 and 6b below.	The lubrication was not the cause of the alarm. The ball bearing is most likely showing signs of wear.	If the machinery is complex vibrations measurement may be justified. If the machine is simple, divide the level by 2 using the corresponding individual input gain adjustment potentiometers RV1 to RV8. Do not forget to note this adjustment! With wear, a ball bearing tends to need more and more frequent grease applications
5	After grease application the alarm 1 is tripped again in the following weeks.	Possible grease destruction or loss due to temperature peaks	Apply grease again
6	After grease application the alarm 1 is tripped before the standard greasing interval has completely lapsed.	The ball bearing is slightly worn and now has a shorter greasing interval.	Apply grease with the alarm 1 condition. The greasing interval will continue to shorten with the passage of time until an application of grease no longer can prevent an increase in the noise level
6 b	After an application of grease the level drops then regains its previous level in the following hour	The ball bearing is most likely in poor mechanical condition assuming that the bearing does not have too much play (see §9 below).	Follow and further level developments
7	In spite of assuring proper lubrication and having verified the non-existence of external causes (fixation, other machines,...) the measured level continues to rise progressively.	You are witnessing the slow deterioration in the bearings mechanical condition.	Level factor 3 over new is not alarming but certainly serious. We suggest re-adjusting the gain of the input (as in §4) to halve the level. Note the date of the adjustment. If the time between double-increases shortens consistently, change the bearing or at least take a diagnostic vibrations measurement to establish the bearing's condition.
8	Alarm level 2 is tripped before being able to react to alarm level 1	Sign of mechanical breakage (ruptured cage etc.) or radical changes in the lubrication of the bearing (grease destruction, absence of oil, contamination etc°.	Listen to the sensor signal with the headset to have an idea of the type of problem. Where source is not obvious after having assured proper lubrication, arrange a vibrations measurement immediately or shut down the machine and open the bearing housing

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9	Significant, repetitive and rapid fluctuations of noise levels.	- Poor connection sensor/electronics unit - Machine in question.	Listen to the signal with the headset. If you hear static in the line you have a loose or corroded sensor connection, the sensor is not in firm contact with the machine, or the sensor/ cable connection has been damaged. We had the opportunity to notice such phenomenons on bearings working with an excessive clearance (C3 clearance roll bearing without adjustable system). There are two possible solutions : reducing the clearance, place a preload. using a higther performance grease (we can help you in this choice).
10	After grease application the noise level increases.	Most probably a de-stabilised cage	Easily recognisable with headset. Should disappear after a couple minutes. Apply grease more slowly the next time.

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X - NOTES FOR SPECIFIC INSTALLATIONS ON SKILIFTS IMPLEMENTATION

The installation of a MECASON system on the winch of a ski lift, carrier or cable car must be particularly studied and looked after because of particular constraints, several constraining factors, namely:

- Variable speed engines: Fed, either under variable tension, or under variable frequency, the cables and engines generate particularly disturbing electromagnetic fields because of harmonics delivered by the variator's thyristors.

- Variable Speed: The machine will emit very fluctuating noises as well in level as in frequencies. It will be necessary to carry out the adjustments with the noisiest mode, in general at maximum speed.

- Mechanical Vibrations: The reducer can generate significant vibrations at very low frequencies which can damage electronic circuits.

These characteristics force to take particular precautions:

- **Place the sensors the further possible** from the relectric power cables and the engine terminals boxes (put them preferably on opposite sides).

- **absolutely** avoid making cables of the sensors walk close to the engine's power supplying cables.

- If you must install the MECASON box on a vibrating element like the reducer, isolated it from the support by antivibrations studs (We can provide some to you in the adapted flexibility characteristics).

- Listen well the signals emitted by all the sensors. In case of doubt, do not hesitate to question us!

We suggest you bring in service the MECASON in the same time as the first tests at fallback speed. Make a first provisional adjustment with 2,5 m/s for example; you will remake it to 5 m/s. That will enable you to detect certain possible defects of design or assembly

INTERPRETATIONS OF ALARMS

For the traditional industrial machines, the most alarms prove to correspond to lubrication insufficiencies.

It is useless to inject the 20 or 30 grams of grease as indicated on the plates of the engines. A supplement of 3 or 4 blows of pump is enough!

On roller bearings equipped engines (NXxxx reference) in increased slack version (C3), you are likely to meet more often this phenomenon. In this case, it would seem that solutions exist consisting in using greases with higher performances.

If you have an alarm having from the installed sensor on the flask of the engine, tachometric side generator, do not forget to listen to this one. Its bearings are able to generate a sufficiently powerful signal to cause an alarm.

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