



Piuma

Owner manual



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Congratulations on buying an Icaro 2000 hang glider! We are certain that you have made the right choice!

The “PIUMA” is now the most innovative hang glider on the market. It was designed to provide a simple and reliable introduction to the techniques of hang glider flying.

The glider reacts gently and rapidly to the pilot's actions, and it ensures high stability and predictable behaviour. The PIUMA enables pilots to progressively develop their hang glider flying experience.

Icaro 2000 srl is a company that leads the world in the field of hang gliding construction. The results attained in competition and sales put it in first place amongst hang glider manufacturers.

Hang gliders by Icaro 2000 are independently designed and built, using exclusively premium quality raw materials, in the factory premises at Sangiano, in northern Italy.

The success of our gliders stems from the skill and commitment of Manfred Ruhmer, who holds eight World Championship titles (three Cross Country titles, one Speed Gliding title and four Class II titles), it stems from the skill of Christian Ciech (aeronautic engineer, 2 World Championship titles in class 5), as well as from our three decades of experience in hang glider manufacture.

All our hang gliders have German certification, which is acknowledged as being the most stringent in the world as regards the safety parameters demanded from the glider.

You can rest assured that spare parts and service will always be available, no matter where you fly, by means of our worldwide network of distributors. This includes spares for all models, both those in production and earlier designs.

Thank you for choosing our hang gliders and we wish you great flights!

For whatever information or service, please contact the nearest authorized dealer, or the factory direct:

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1. Introduction

Over the last decade hang gliding has become much safer.

Accidents have decreased, due to flight-schools becoming more professional, and certification procedures becoming more demanding. In Switzerland, for example, the insurance risk of hang gliding is the same as for winter sports.

However, hang gliding is an active sport with associated risks. Your safety can be greatly enhanced by following a few simple rules:

1.1 Keep the risks to a minimum

- Attend a professional school.
- Always fly a glider suited to your level of ability. In our opinion you should at least have flown 50 hours with a PIUMA before passing on to a slightly more advanced hang glider.
- Fly only when the weather conditions are appropriate.
- Be aware of adverse weather conditions; caution is a mark of intelligence not of cowardice.
- Remain current. Try to avoid long intervals between one flight and the next so your flying ability will gradually improve.
- A new risk may arise when you fly a new type of glider the first time. The reactions of your new glider may well differ from those of the glider you were used to. In order to keep this risk low, we recommend that you gradually become familiar with your new glider and make your first fly in calm conditions

1.2 Preliminaries

- Study your manual before your first flight. Practice setting up and breaking down your glider as explained in the manual.
- Always follow the same assembly and pre-flight check routine; do not let yourself be distracted during these procedures.

1.3 Assembly check and first flight

- Every hang glider manufactured by ICARO 2000 is test flown at least once before delivery to the customer. However, if you wish, you can request another test flight from your dealer.
- Your dealer should also help you set up your glider for the first time and see you off on your first flight.
- We strongly recommend speed bar wheels, especially for your first flights.

1.4 First flight with your new wing

- Always wait for ideal weather conditions for your first high flight.
- Experiment with roll reversals, slow flight, high speed flight, and stalls at an altitude of at least 350 m.

2. Fundamental Rules

- After major repairs, after remounting the sail, or after a long period of not flying, always choose a site to fly from that you are familiar with, and where it is possible to land immediately after take-off.
- Your glider is delivered to you ready to fly.

Do not make any adjustments that are not described in this manual.

- This Owner's Manual is not a substitute for the experience of an authorized dealer. Any pilot who is in doubt about any aspect of their glider should consult their dealer, or ICARO, for advice.
 - Never fly alone.
 - Before every take-off always do both an assembly check and a pre-flight check.
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- Don't push your luck! Only fly in places suited to hang gliding. It's your responsibility to know the limits of your glider, and the limits of your own experience.
- Don't attempt towing of any kind, unless you have attended a recognized towing school. Always use wheels on your speed bar when towing

3. Certification and General Restrictions

3.1 Certification

- All ICARO 2000 hang gliders have German certification (DHV).
- Icaro glider ratings according to the German DHV:
- **class 1** (beginner pilots) **Mars, Relax, RX2, PIUMA**
- **class 2** (intermediate pilots) – **Laminar EZ, Orbiter**
- **class 2-3** (advanced pilots) - **Orbiter with VG, 12 MastR, 13 MastR,**
- **class 3** (advanced pilots) – **14 MastR, 12.6 Laminar, 13.2 Laminar, 13.7 Laminar, 14.1 Laminar, 14.8 Laminar.**

3.2 Wind Speed

- When the wind speed is stronger than 30 km/h (~ 20 mph) take off becomes increasingly risky. In these conditions, consult with more experienced pilots before taking off.

If in doubt, do not fly.

3.3 Turbulence

- In turbulent conditions, gusts of descending air can suddenly exert strong negative loads on the glider; such negative loads must be avoided.
- Never fly on the downwind side of a mountain or ridge. This could be extremely dangerous, even in just a moderate breeze.

3.4 Aerobatic Flying

- According to DHV, aerobatic flying refers to flights in which the angle of bank exceeds 60 degrees, pitch/dive exceeds 30 degrees, or when the manoeuvres include dynamic stalls, wingover, loops and spins.

AEROBATIC FLIGHT CAN BE FATAL AND IS, THEREFORE, PROHIBITED.

4. Transportation

4.1 By Car

Serious damage can be caused to the glider during car transportation; a well-padded roof rack is necessary to avoid damage. For additional safety and support, we strongly suggest you install a front rack on your vehicle.

There are good racks on the market, expressly designed for glider transport; these can be easily assembled on normal roof racks. Ask your dealer or Icaro 2000 for details.

4.2 By Gondola or Cable Car

To avoid any damage when transporting your glider on the cable car it is advisable to be present to supervise the loading and unloading of the glider.

4.3 By Plane

Your glider needs to be well protected if it is to be transported by plane. Use a wooden crate, or a stiff cardboard tube. Your dealer or ICARO 2000 can supply these. Always let the airline know the dimensions and weight of your glider, well in advance.

4.4 Short Packing

It is best to avoid short packing your glider, because it may cause the formation of a marked crease on the leading edge mylar of both wings.

If, however, you have to short pack your glider, it is important to follow these instructions:

- Write notes as you disassemble so that you know exactly how to reassemble the glider afterwards. Where possible, reposition pins, bolts and washers in their correct positions, maintaining the sequence in which they will be reassembled.
- Undo the sail fastening on the end of the leading edge tube.
- Replace the pin in order not to lose it.
- Press the spring button on the leading edge tube and remove the terminal section.
- Wrap the leading edge tube that you have removed with soft fabric.
- At the outer end of the leading edge tube inside the sail, place a suitable form of protection on the end of the tube to prevent it from damaging the sail (for example, a plastic bottle from which you have removed the top half).
- Fold the wingtips as normal (ie in the same way as when you are folding the outer section of the sail), and fold it back onto the shortened wing. In performing this operation, place a cardboard tube (6-10 cm of diameter) on the sail around which to make the fold. This will prevent or reduce damage to the wing and the internal mylar.

Repeat steps 2-7 for the other wing.

To re-assemble your wing, follow the instructions in reverse order.

The reduction of length, removing the outside leading edge, will be as follows:

PIUMA	S	M	L	Bip
cm / ft	127 / 4.2	143 / 4.7	157 / 5.2	149 / 4.9

When re-assembling the leading edge tube, check that the spring button has popped up and emerged from the tube. Remember to reconnect the compensator cable to the tip, making sure that it is not wound around the wing tip.

5. Assembly and Disassembly

5.1 Assembly

The assembly of the PIUMA can only be made on the A-frame.

This method protects the sail because it never touches the ground; the sail is not damaged by sharp stones or dirt on the ground.

Note: Hang gliders can fly in one direction only. Left and right should be understood as seen from flying position.

Place the glider on the ground

- In a light breeze, place the glider so that the tail is facing into the wind.
- In a moderate breeze, the keel must be perpendicular to the wind

If the ground where you are assembling the glider is not flat, point the nose of the glider towards the top of the slope.

5.1.1 Starting Point

Important: All the circular-section speed bars manufactured by Icaro 2000 are made with complex curves on several planes. The curves in the horizontal plane create the grips. The curves in the vertical plane are designed in such a way so that when the pilot moves laterally in flight, the distance between pilot and speed bar remains roughly constant.

- Open the cover, remove the Velcro fasteners, lift the two downtubes up together and fix the speed bar into position using the push-pins and the locking plates. **Do not forget the locking plates!** (The competition A-Frame does not have these rings).
- Make sure that the camber of the speed bar faces the nose of the glider. When you turn the glider over, the centre of the speed bar touches the ground first (carbon speed bars can only be assembled the right way), before the extremities of the A-frame.
- Turn the glider over and lean it on the A-frame so it stands stably.
- Remove the glider bag and any remaining ties.
- Lift the king-post
- Open the wings completely, keeping the tips close to the ground and leaving the tip covers on.

Fixing the cross-bar

It is important to perform the operation exactly as described in this stage of assembly in order to prevent the possibility of launching without having locked the cross-bar.

It is essential to launch with the hang glider correctly assembled, and in particular with the cross-bar locked. For this reason, the slight possibility of greater wear when inserting battens with the cross-bar locked into position is of no consequence when compared to the grave risks involved in taking off with the cross-bar not locked.

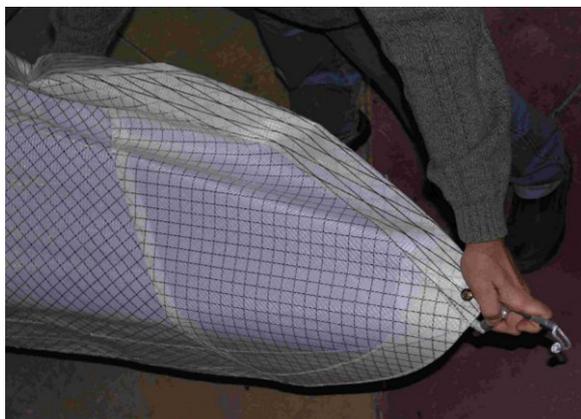
- Ensure that the wings are fully open.
- Pull the bungee on the rear part of the keel until you can grasp the handle.
- Pull the cord until you can reach the small plate with the lock hole, and secure it to the keel bolt by means of the spring button
- Hook the rear king-post cable to the plate on the keel. (If you connect the front cables before fastening the rear cable, this will be impossible).
- Take the shackle that is attached to the front wires and secure it to the nose hook. In order to do this, you need to force the nose slightly downwards using the handle fitted for this purpose.
- Again, if the wind is not too strong, you can extract the terminal part of the keel by means of the spring button and rest the hang glider on the keel end. This makes assembly more practical. However, remember that this position is not very stable (it should not be used if wheels are fitted to the speed bar), and the hang glider may topple over and hit the ground with its wings.

ATTENTION: do not lift the keel if the glider is not tensioned, it may damage the nose bolts and plates.



5.1.3 Mounting the fiberglass tips

- Remove the tip cover and open the wing-tip zipper.
- Insert the thick end of the fibreglass tip through the opening of the sail and into the aluminium hole at the end of the leading edge. Push firmly until you hear it hitting against the stopper (clack!).
- Bend the thin end of the tip toward the trailing edge and, at the same time, position the cup of the tip-lever over it.



- Using the attached cord, push the tip-lever into the sail until it snaps shut against the tip and the sail tightens.

Warning: Keep your fingers clear while closing the lever!

- Close the wing-tip zipper. At this stage, the sail may not be flat but slightly twisted. If so, twist the end of the sail slightly to make it flat. Failing to do this could introduce a subtle turn when flying

Note: during these operations the sail needs to be loose therefore follow the instructions.

5.1.4 Inserting the Battens

- Red-tipped battens go on the left wing, Green on the right one: take them out of the bag and put them on the ground (appropriate side).
- Beginning from the centre of the glider insert battens 1 to 6 (size 14 gliders) or 1 to 5 (size 12 and 13 gliders) of each wing into their pockets and secure them on the trailing edge.

Note: The number of battens may vary according to the model and size of hang glider.

Note: The nose battens can remain in the sail at all times.

5.1.5 Final Steps

- Fit the nose fairing.
 - Assembly is now complete: immediately do the assembly check.

6. Check List

Warning: Before every flight it is imperative to do a systematic check of the glider.

6.1 Assembly Check

Begin at the glider's nose. Go counter-clockwise around the glider through all listed locations, opening and closing zippers where necessary to perform the checks. Finish by checking the center and the control frame.

The following points need to be checked carefully:

Nose

- Nose wire is attached and the hook is properly closed by the spring clip.
- The nuts and bolts on the nose plates are correctly fastened
- The nose fairing is correctly positioned so that it effectively extends the wing's leading edge, and it is correctly fastened by means of the Velcro strips.

Crossbar/Left Leading Edge Junction

- Crossbar/leading edge connection is secured with the nut and bolt.
- Side wire is in perfect condition and in the right direction.
- Crossbar is not damaged.
- Nuts on the two leading edge bolts are secure.

Left Wingtip

- Tip-lever is fully tensioned
- End of the sail is flat.
- The mylar sheet inside the leading edge is correctly positioned, and does not cause any distortion to the wing profile.
- Luff lines and upper wires are clear and not kinked.

Left Wing Battens

- All upper battens are inserted and fixed on the trailing edge.

Rear Keel and Kingpost

- All nuts and bolts on the rear section of the keel are secure.
- Tension plate of the cross-bar is properly secured in place by the spring button.
- Tension strap is in good order.
- Lower rear wires are in perfect condition.
- The kingpost plastic cap is properly positioned on top and the kingpost is straight.
- Upper rear wire is attached to the keel
- Detachable rear section of the keel is inserted properly in the main keel and secured by the spring button.

Right Wing Battens

- see above : "LEFT WING BATTENS "

Right Wingtip

- see above: "Left Wing Tip"

Central Right Wing

- see above: "Central Left Wing"

Central Section

- Hang strap is not damaged and well secured.
- All nuts and bolts on the central plate of the cross-bar are tight.
- The nut and bolt that fix the A-frame to the keel is tight and the bolt is not bent.
- Look inside the sail to make sure the main tubes are all right and all bolts are tight.

A-frame Lower Corners

- Speed bar is properly attached.
- Pushpins and their washers are in place.
- Both socket head bolts which secure the speed bar knuckles are tight and do not protrude from the nylon block.
- The lower wires are not kinked or caught around the control frame.

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6.2 Equipment Check

Harness

- Parachute is in place and the handle is secured.
- Zippers are unobstructed and run freely.
- Hook in and perform a hang check.

To reduce the risk of taking off without having hooked in, it is a good idea to hook the harness to the hang glider before putting on the harness. Today, nearly all harnesses open at the front, and so they are easy to put on even when the harness is attached to the glider. If you have to leave the glider after having hooked in, it is best to take off the harness while leaving it attached to the hang glider. The possibility of being surprised and overturned by a gust of wind while you are waiting at the launch site generally involves less risks than those consequent to taking off without having hooked in.

- Hook in and perform a hang check.
- During the hang check, the centre of the speed-bar deforms about 5 cm (~2 inches) upwards, when compared to its position in flight. Bear this in mind when evaluating your height from the bar; on the ground you should leave a gap of at least 5 cm (~2 inches) in order to have a distance of 10 cm (~4 inches) in flight. This position is generally the one that is most comfortable.
The airfoil section speed-bar does not deform on flat ground because it does not have the "ox-horn curve".

Helmet

- Make sure that the outer shell has not been damaged (take care not to sit on your harness pack when the helmet is inside, which can damage the helmet. It was not designed for this sort of function).
- Strap is fastened.

6.3 Pre-Flight Check

- **HOOKED IN.**
- Strength and direction of the wind are safe.
- Nose angle is correct
- Wings are levelled.
- Take-off area and glider are clear.
- Airspace is clear from other aircraft

7. Disassembly

As with assembling your glider, disassembly must be performed with the glider on the frame.

7.1 On the A-Frame

7.1.1 Starting Point

- Stand the glider with its tail into wind.
- Slightly loosen the crossbar removing the nose plate and fixing it to the tension handle.
- Extract the rear-most section of keel by depressing the spring button and pulling the rear of the section; this section remains attached with a bungee.
- Swing down the free section of the keel, allowing the main part to rest on top of it. This way you can remove the battens easily.

Note: it is suggested to assemble as described in the procedure, seen that it is possible to forget to hook in the cross bar before taking off.



- Remove the battens starting from the extreme part of the wing towards the central part of the wing.
- Unzip the wing-tip zipper, grasp the tip-lever by the cord and pull it towards the outside.



- Holding the lever with one hand, and the tip-wand with the other, pull back the tip-lever, releasing the tip-wand from the cup.
- Rotate again the tip-lever in the inside of the sail and close the zipper. Place the tip-wand with the battens.

7.1.2 Folding the Sail Wingtips

- With one tip-bag in your pocket, stand in front of the leading edge. Take hold of the wingtip, holding it by the wingtip batten lever bolt and pass the fabric under the extremity of the leading edge and upward in front of it. As you are standing in front of the leading edge, the wingtip fabric is between yourself and the leading edge.



- Keeping the extreme part of the sail in this position, take the sail by the trailing edge and raise it upwards until it is tight and from this position roll up the sail starting from the trailing edge.



- Holding the rolled sail, slip the tip-bag over the tip.



- Repeat the same steps for the other side of the wing.

7.1.3 Final Steps

- Put the battens and the fibreglass tips into their bag.
- Return the extremity of the keel to its closed position.
- Remove the nose fairing.
- Unhook the nose wires. To do this you have to pull the nose downwards slightly. Pull the nose ribbon so the nose's hook safety system will open automatically and you can remove the front wire shackle.
- Remove the kingpost cable attached to the keel. To achieve this, it may be necessary to use one hand to pull on the kingpost towards the trailing edge, while with the other hand you unhook the shackle from the keel. Fix the shackle to the sail, at the base of the kingpost.
- Completely release crossbar tension.
- Close the wings. To perform this operation, stand behind the sail and at the centre, grip the trailing edges of both sides of the wing and pull them upwards and towards you.
- This partially closes the wings.
- Complete the wing-closure procedure by manually bringing one and then the other inwards towards the keel. Keep the wing tips close to the ground while moving the wing inwards.
- The sail tends to become trapped between the leading edge and the keel. Pull it upwards and outwards so that the sail is hanging down outside the spars.
- Lower the kingpost, remove its cap and put on the protection.
- Roll up the remainder of the sail and fasten the glider ties. Ensure that where the leading edge cloth meets the uprights, it curves inwards and upwards to prevent damage.



- Put the nose cone under the Velcro tie closest to the nose.
 - Put the glider bag onto the hang glider.
 - Turn the hang glider over and lay it carefully on the ground.
 - Unhook the speed-bar and place the protection over the duntube tips. This protects the sail from damage.
 - While lowering the duntubes, make sure that all the wires pass between the duntubes and are not tangled. Also check that the hang strap is not twisted under the duntubes.
-
-



- Place the downtubes between the leading edges, inside the sail.
- Place the battens and the speedbar into the rear part of the glider cover. To do this, you will have to undo one or more Velcro ties and then refasten them.
- Close the zipper and load the glider onto the car; drive carefully ☺

8. Hints and Tips

The PIUMA has been optimized with handling characteristics and stability as well as the stall characteristics in glide and turnings making the wing more predictable. It has been possible to increase also the speed range, in the minimum speed as well as in the maximum speed, thanks to the improvement of the profile and the geometry of the wing.

Therefore we obtained a hang glider which is adaptable for the beginner pilots, but with a good sink rate and a good glide angle, which is also enjoyable for more experienced pilots.

8.1 Take Off

Till when you have not reached a good experience and knowledge of the flight areas and of the weather variations, always listen to the suggestions of your flight instructor or to those of more experienced pilots.

Never fly alone

Always remember the sequence of the Pre-Flight Check

Taking off with the PIUMA is very predictable and also in presence of small errors it will allow you to take off safely.

Try to take off with a nose angle of about 15 degrees above the slope, and with as much speed as possible (never lower than the stall speed!)

ATTENTION: Never take off with a wet sail, especially if the leading edge is wet seen that the stall speed increases significantly. Always fly with dry sail!

8.2 Flight

The PIUMA is responsive and pleasant to fly throughout the speed range.

Here follow some **suggestions**, hoping that these can help you to face your flights in a more amusing and safe way.

As already stated, this hang glider has been made for beginner pilots but it will surely also enjoy more

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experienced pilots who want to try out a simple and safe wing, without too many performances.

In spite of the excellent characteristics, facility and predictability, of this wing, you must not underestimate the dangerous situations which can be found during the flight. Do not fly too close to the slopes or close to other pilots especially when there is a bit of turbulence.

Furthermore do not bring your hang glider at stall limits when you are near to slopes or near the ground, but always keep a minimum of speed which allows you a constant control of the machine.

If you really want to try to get close to a stall you will have to accompany the speed bar progressively forward, when the wing tends to lower the nose you need to gain speed by pulling the speed bar a bit towards yourself and this way you return into the normal flight. Remember that this manoeuvre and all other new manoeuvres, should be tried only when there is at least 300-400 m between you and the ground and only in calm air conditions – when there is no air turbulence.

Expert pilots will appreciate the ease with which this hang glider can be flown to exploit even the weakest thermals, permitting a style of flight to that of a paraglider. Nonetheless, it has the characteristics and performance of a hang glider, while also being relatively easy to land in locations with limited space.

The Fin

The PIUMA is sold with a fin. This component is not essential for flight, but it gives the hang glider greater directional stability. It is useful particularly for pilots making their first mountain launches and for all pilots trying a towed launch for the first time.

Once a pilot has become accustomed to handling the hang glider, the fin can be removed and the pilot will immediately appreciate the manoeuvrability of the glider. Of course, if he/she prefers, the fin can be left on

8.3 Landing

While you are approaching the landing, your speed will have to allow you a constant control of your hang glider. Therefore you need to keep the wing constantly above the pre-stall speed. After the approach, plan out the final against wind, with a medium-high speed.

When you are near the ground you gently have to reduce the speed and fly parallel to the ground gradually releasing the speedbar. As soon as you feel the wing stalling, you have to stall. With less wind you need to stall more energetically. If the wind speed on the ground is greater than 15 km/h, the final stall does not have to be so energetic. The greater the wind at ground level, the less pronounced your stall will be.

9. Trim

When the glider is assembled, the sail must be placed on the frame in such a way that the tension is perfectly symmetric.

The sail's tension may be modified by adjusting the fibreglass tip lever tension or the pressure exerted on the batten tips at the trailing edge.

On all Icaro's wings you can also adjust wingtip sail tension by means of the plate with multiple holes that permits leading edge tension to be modified.

Unless absolutely necessary, we strongly suggest that you leave the sail tension as when delivered from the factory.

9.1 Turn tendency

9.1.1 Turn tendency with no VG:

- Verify the batten profile using the supplied batten plans.
- Check that the sail tension on the left fibreglass tip is the same as on the right fibreglass tip. If they are different, fix the lever to a different hole in order to restore symmetrical tension.
- Check that the tube holding the fibreglass tips (at the end of the leading edge) is not damaged, and

that the tips are held correctly inside it.

- Check that the sail tension on the left wingtip is equal to that of the right wingtip. If there is a difference, fix the sail at a different hole so that tension is properly balanced.
- Check that the eccentric Nylon caps, holding the above-mentioned tubes, are symmetrical.
- Check that the leading edge and all other tubes are undamaged.

If the glider still has a turn tendency

- Turn the nylon cap not more than 5 mm at a time (measured on circumference of the tube holding the Nylon cup), so that the end of fibreglass tip lowers. Make sure you lower the tip same to the turn direction. i.e. if the glider has a right turn tendency, lower the right tip.

This adjustment should be made as follows:

- Mark the position of the cam with respect to the tube by using a felt-tip pen to make a small mark on the tube.
- Using a crosshead screwdriver, unscrew the screw on the top of the head by about 3 or 4 rotations, so that the cam can rotate freely.

Do not unscrew the screw completely, because otherwise the internal section will slip out, and you will have to remove the sail fastening pin to recover it.



- Then knock the head of the screw gently with a hammer, as if it were a nail, in order to overcome the friction created by the internal section.
- Remove the smaller screw at the side of the tube.



- Using a pair of needle-nose pliers pushed into the two holes in the head of the cam, rotate the cam to the degree desired. In the example described above, the cam will have to be rotated 5 mm clockwise.



It should never be necessary to have to apply a correction greater than 15 mm rotation. If it should be necessary, contact your dealer or Icaro 2000.

To fasten the cam in the new position, screw down the screw on the head of the cam, tightening it well. To ensure safety, you can reposition the smaller screw on the side of the tube. To perform this, you will have to drill a new 1.7 mm hole in the cam, centered on the centre of the hole that is already present in the tube at the wingtip.

9.2 Trim Speed

- It is possible to regulate trim speed by changing the hang point amongst the holes on the keel.



- It is possible to regulate trim speed by changing the hang point amongst the holes on the keel.
- By moving the hang point forward, the glider will fly faster (and vice versa).
- With a higher trim speed, the glider tends to drop the wing less during turns.
- An excessively low trim speed considerably reduces manoeuvrability

IMPORTANT: move the hook-in point forwards or backwards just one hole at a time. The maximum degree of forwards/backwards movement depends on the sail and NOT on the number of holes on the keel. In fact in some models, the same keel is used for different sail sizes, which have different centre points. This is why there are more holes than can actually be used.

10. Maintenance and Periodic Inspections

Every year, or after 100 hours (MANDATORY):

- Replace the side wires.
- Compare your batten profile with the supplied batten plan.

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- Check reflex and dihedral as described in the previous chapter.

Every 2 years:

- Have a complete check performed by an authorized dealer or directly by Icaro 2000.
- Replace all bottom wires.
- Remove the sail and carefully check the frame for bends, dents, corrosion or other damage.
- Check that all bolts are tight and not damaged.

Every 5 years or after 500 hours (MANDATORY):

- The glider should be checked by an authorised dealer or directly by our factory.

This check, performed by qualified personnel, is mandatory in Germany.

- The sail must be replaced if necessary.
- All damaged or worn parts must be replaced.
- Replace all the lower wires

After a crash or heavy landing

- Carefully check the whole glider. Sometimes the impact energy is absorbed by parts of the frame that did not come in contact with the obstacle (commonly called "whip lash" damage).
- Thoroughly check the parts of the glider that were directly affected by the crash. But...

...by way of example, remember the following:

- If the nose hits the ground violently in a landing, this may cause the partial or complete fracture of the leading edge tube, even if the leading edge itself did not hit the ground. Partial damage may be very difficult to see without removing the sail.
 - If control bar strikes the ground violently, for example in a landing in which the pilot has stalled too soon and the glider has descended vertically, damage may be caused to the keel, in the area in contact with the crossbar slider and the top A-frame bolt may also undergo damage. As in the previous case, the absence of visible damage (usually the downtubes do not break) does not mean that there is no damage at all
- Replace damaged parts with exclusively original parts. If you have any doubts about the damaged parts, call an authorized dealer, or our factory. We will be pleased to give you any necessary advice.
 - When replacing spare parts, make sure to note exactly how each component is connected or placed. Never rush a repair job; by taking your time, you are far less likely to make a mistake in re-assembly.

In brief, your glider will last much longer when treated with care.

General Advice:

- The wires must be periodically checked for kinks or broken strands.
- Dirty parts must be rinsed with warm water.
- A wet glider must be dried before storage.
- Don't leave your glider wet for more than one day, because the moisture may give rise to oxidation of the frame and cause the growth of mould on the sail.
- Salt water causes corrosion on all metallic parts. If you land in the sea and survive, you must disassemble the entire glider and wash all tubes, bolts, wires and the sail thoroughly with fresh water.
- If you fly regularly at coastal sites in windy conditions, be aware that evaporated seawater can have the same effect.
- Disassemble your hang glider after a certain number of flights and make a special check for corrosion.

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Spare Parts:

If you need any spare parts, you may contact your Icaro 2000 dealer or our factory directly. If you should ever place an order (by phone, fax or e-mail), keep the following information in mind so we may enhance the quality of our service (fast and accurate) and to avoid ordering the wrong part:

- The exact model of the glider.
- The glider's serial number.
- The name of the part you need or its exact description.
- The reference number of the spare part.

The serial number is located on the adhesive label on the rear part of the keel, close to the cable junction.

The name of the parts may be found on the drawings in this manual or in our website.

The reference number of the parts may be found on the labels on each part or on the drawings in this manual or on the drawings in our website.

11. Technical Data

Recommended pilot + harness weight (Min/Max).

This is the range of pilot + harness (or Trike) weights (hook-in weight) ideal for the respective hang glider.

DHV certification weight (Min/Max).

This figure is the total recommended take-off weight (hang glider + Trike + pilot + equipment).

The minimum weight value is the weight that ensures sufficient pilot control of the glider according to DHV standards.

The maximum value is the maximum weight that can be safely borne by the hang glider and equipment, considering a loading factor of +6/-3 g.

PIUMA	UoM	S	M	L	XL
Wing surface	m ²	13.76	16.04	17.35	20.37
Wing surface with wingtips	m ²	13.86	16.15	17.46	20.74
Nose angle	°	120	120	120	120
Wingspan	m	9.08	9.80	9.96	10.73
Wingspan with wingtips	m	9.24	9.96	10.12	11.11
Aspect ratio		6.0 / 6.2	6.0 / 6.2	5.7 / 5.9	5.7 / 6.0
Double surface	%	30%	30%	30%	30%
Battens (upper + nose always in)	n	12 + 2	12 + 2	12 + 2	14 + 2
Weight (without bag)	kg	19	22	23.5	33.0
Suggested hook-in Pilot Weight (Min/Max)	kg	55 / 75	70 / 90	85 / 120	110 / 180
DHV Certification Weight (Min/Max)	kg	65 / 100	83 / 115	95 / 142	153 / 217
VNE	Km/h	60	60	70	70
Stall speed	Km/h	29	28	26	24
Packed Length	m	4.70	5.10	5.30	5.65
Short Packed Length	m	3.45	3.70	3.75	4.15
CERTIFICATION		01-0402-04	01-0382-02	01-0401-04	01-0461-11

PIUMA Trike	UoM	L	XL Trike (monoposto)
Wing surface	m ²	17.35	20.37
Wing surface with wingtips	m ²	17.46	20.74
Nose angle	°	120	120
Wingspan	m	9.96	10.73
Wingspan with wingtips	m	10.12	11.11
Aspect ratio		5.7 / 5.9	5.7 / 6.0
Double surface	%	30%	30%
Battens (upper + nose always in)	n	12 + 2	14 + 2
Weight (without bag)	kg	25.5	33.0
Suggested Pilot+Trike Weight (Min/Max)	kg	85 / 130	120 / 180
DHV Certification Weight (Min/Max)	kg	95 / 173	153 / 217
VNE	Km/h	70	70
Stall speed	Km/h	26	25
Packed Length	m	5.30	5.65
Short Packed Length	m	3.75	4.15
CERTIFICATION		In progress	01-0461-11

14. Parts list

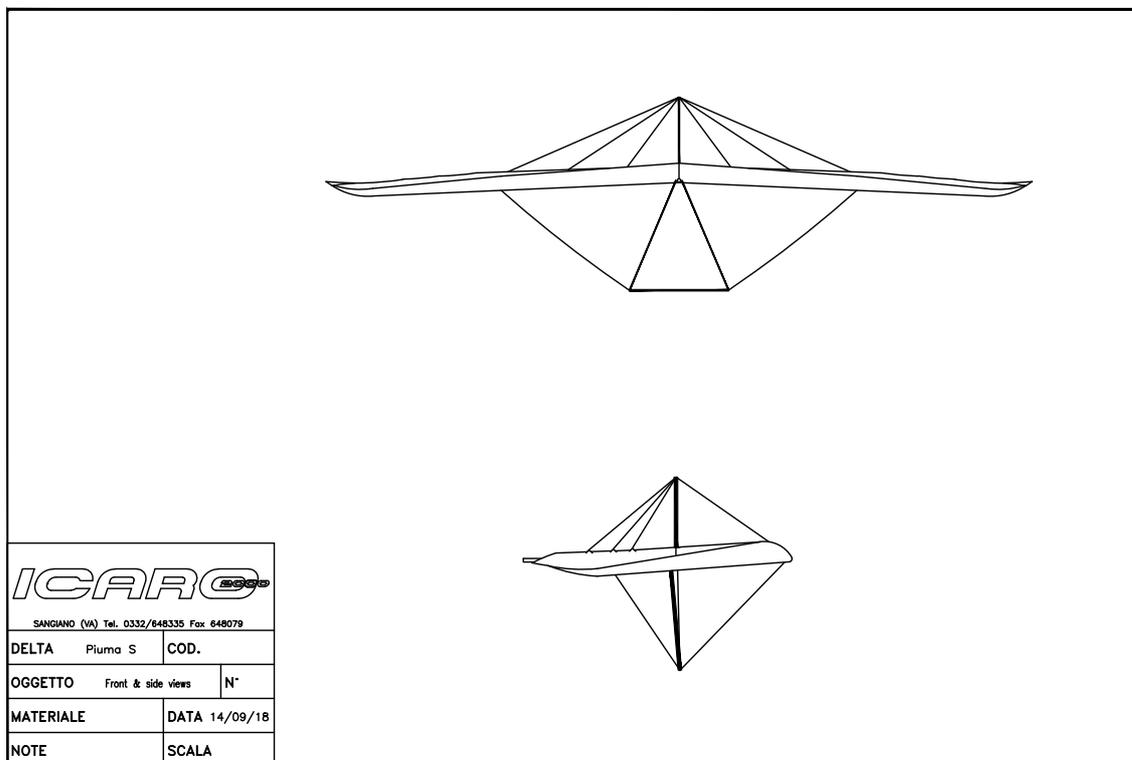
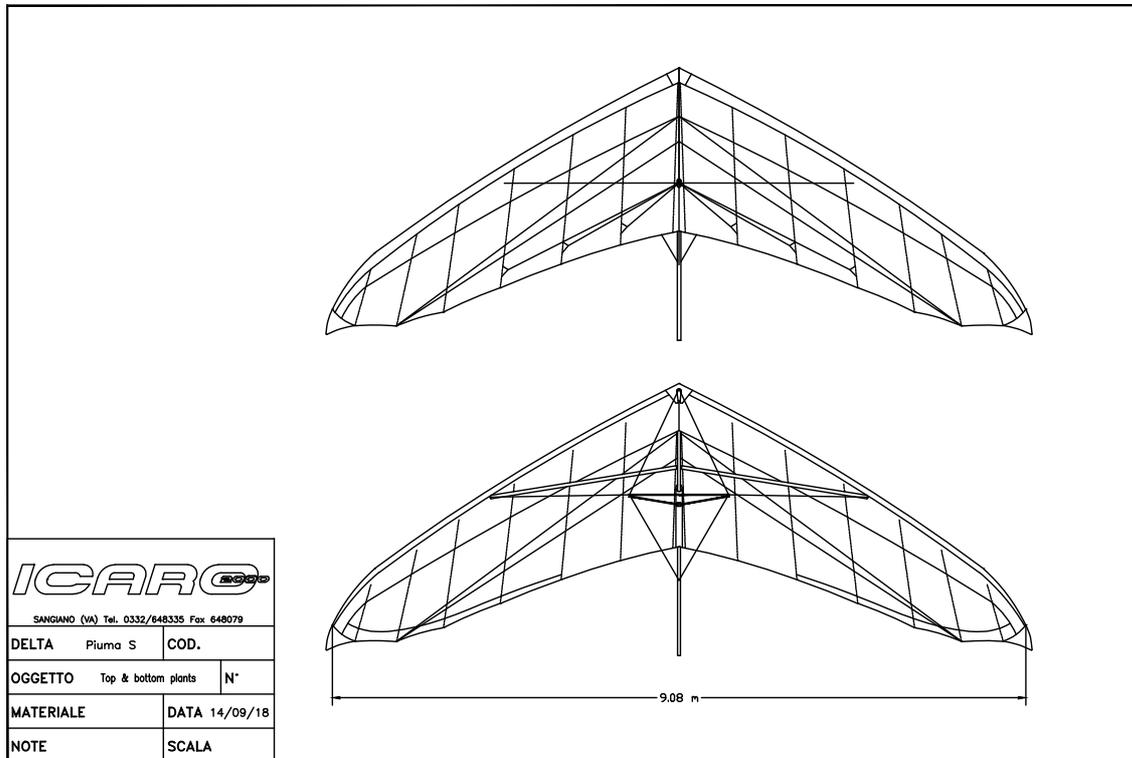
In the following drawings, it is possible to find the name and the code of the parts that form the glider.

ASSEMBLY DRAWINGS

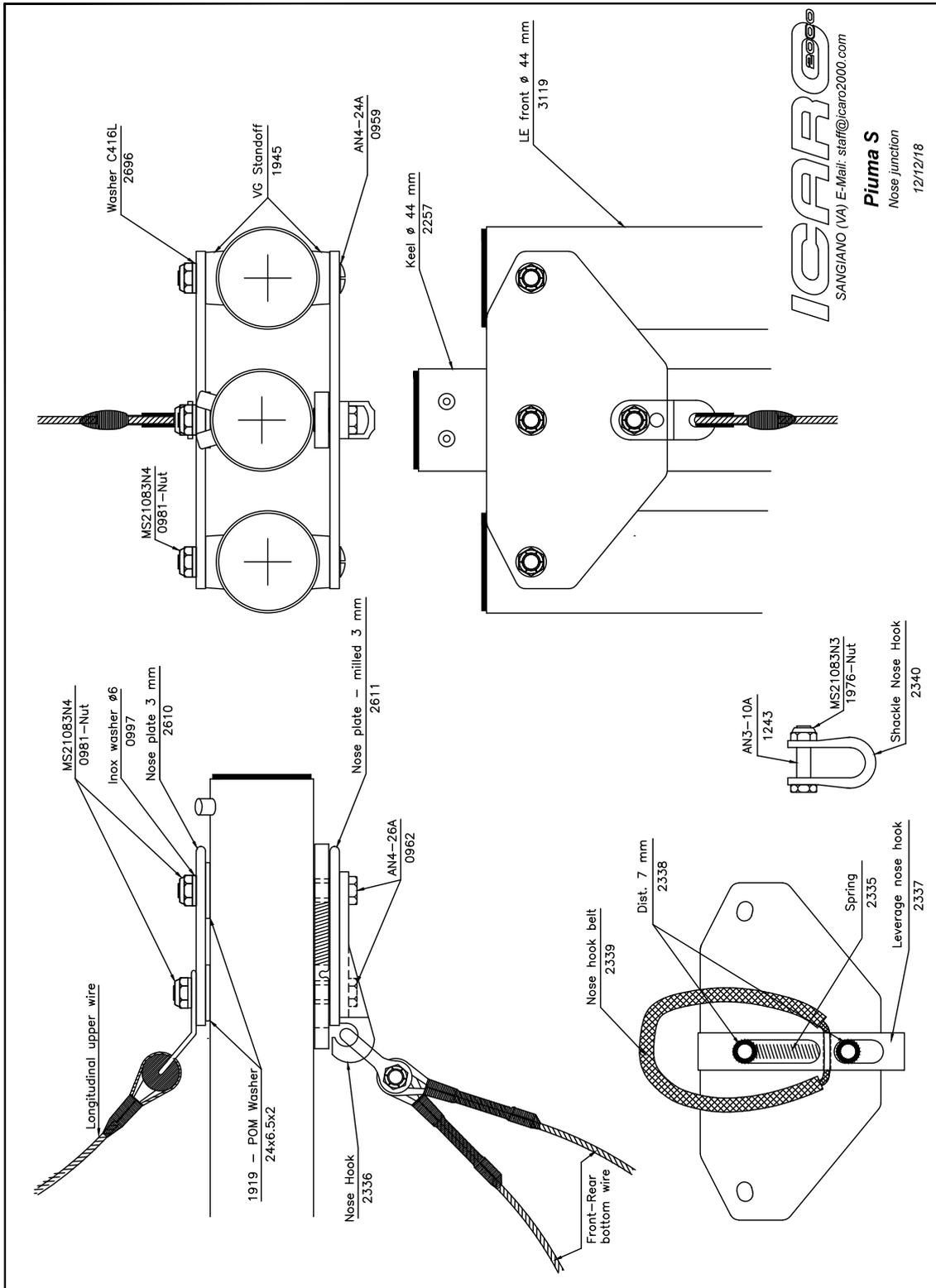
Junction point	Reference drawing name
Keel-Leading edge junction	Nose junction
Central xbars junction	Xbars junction
A-frame-Keel junction	A-frame junct
Leading edge-xbar junction	LE-Xbar junct
Xbar rope fixing point	Rear Keel
A-frame corner	A-frame corner

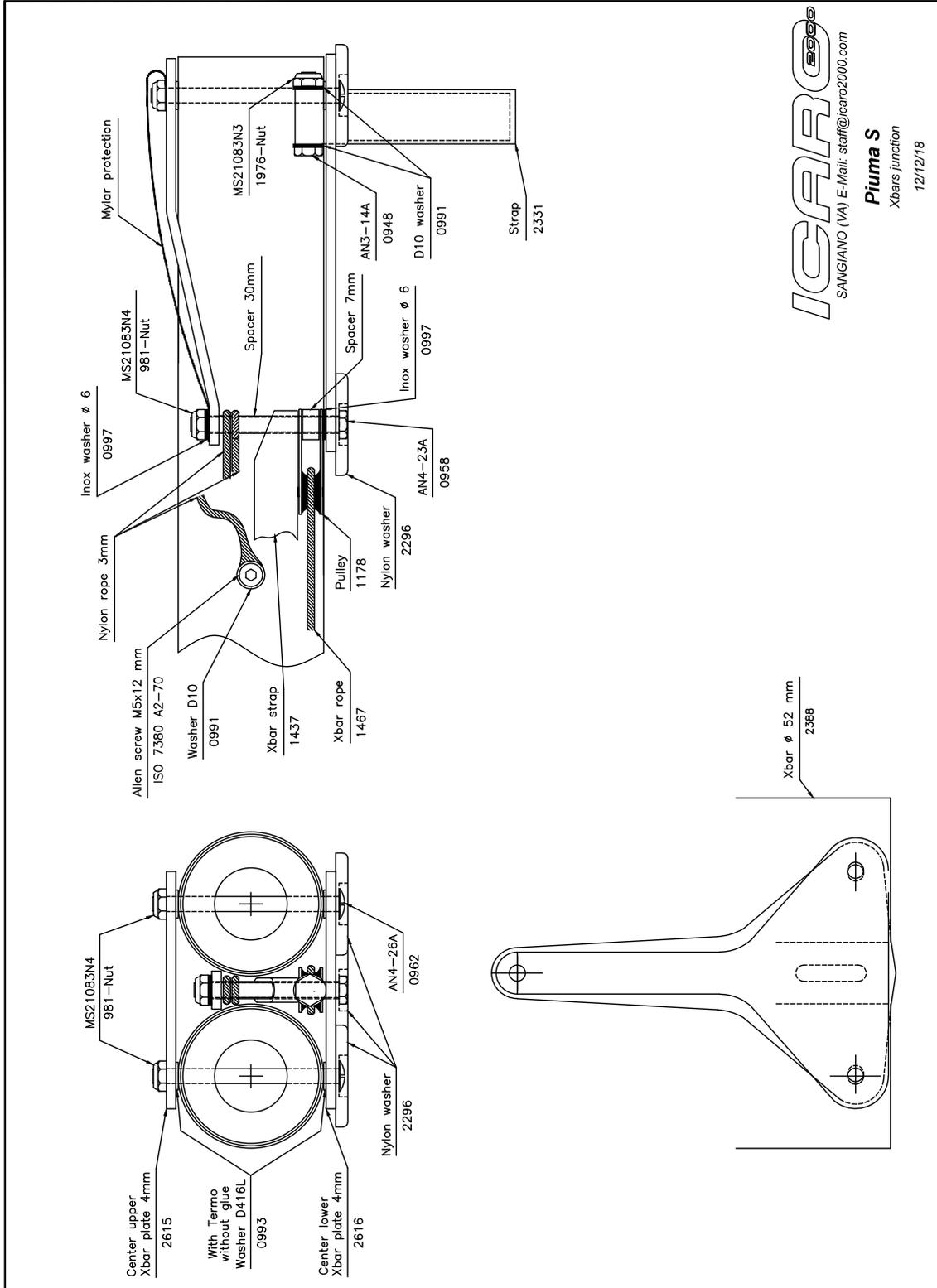


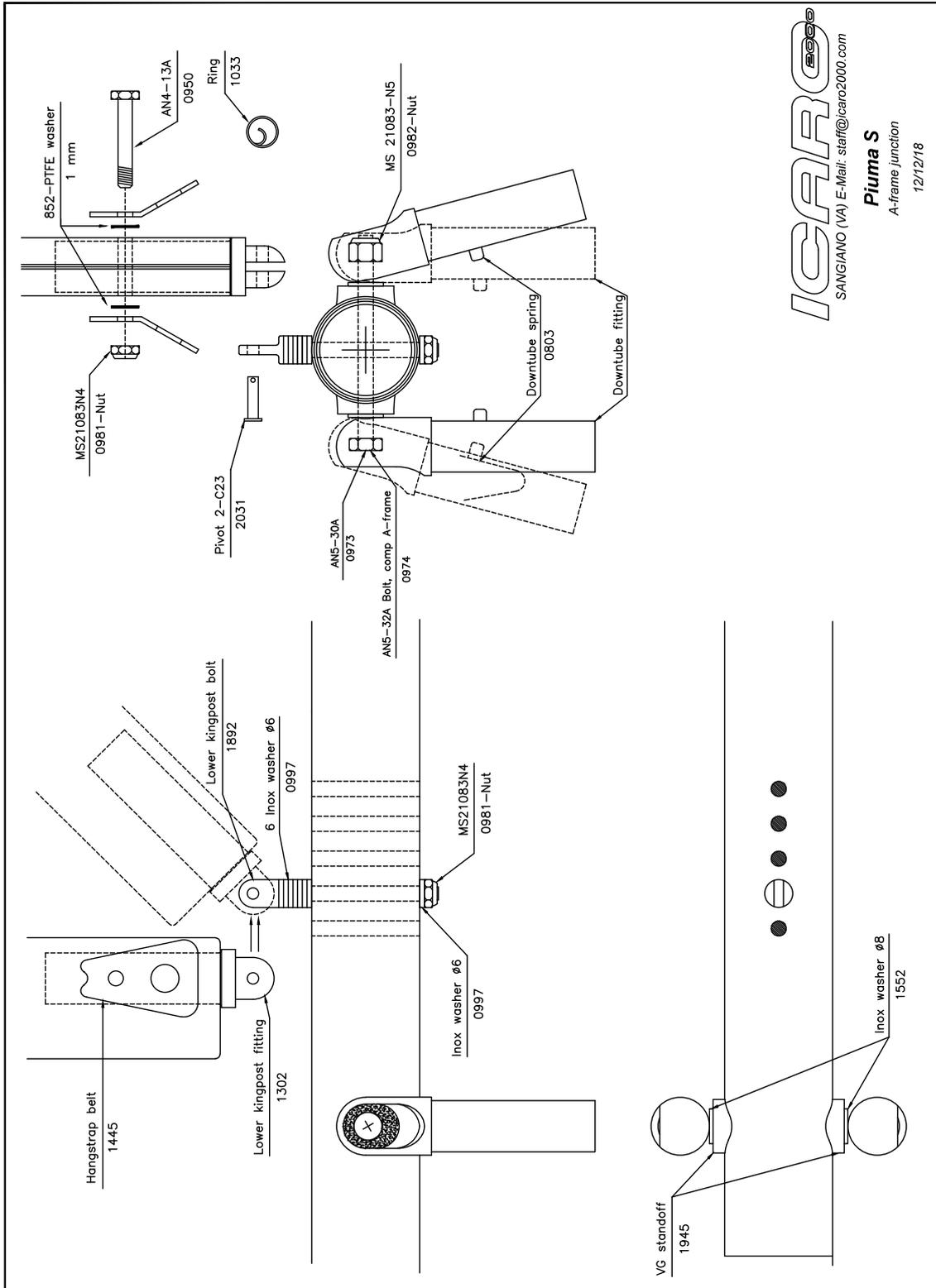
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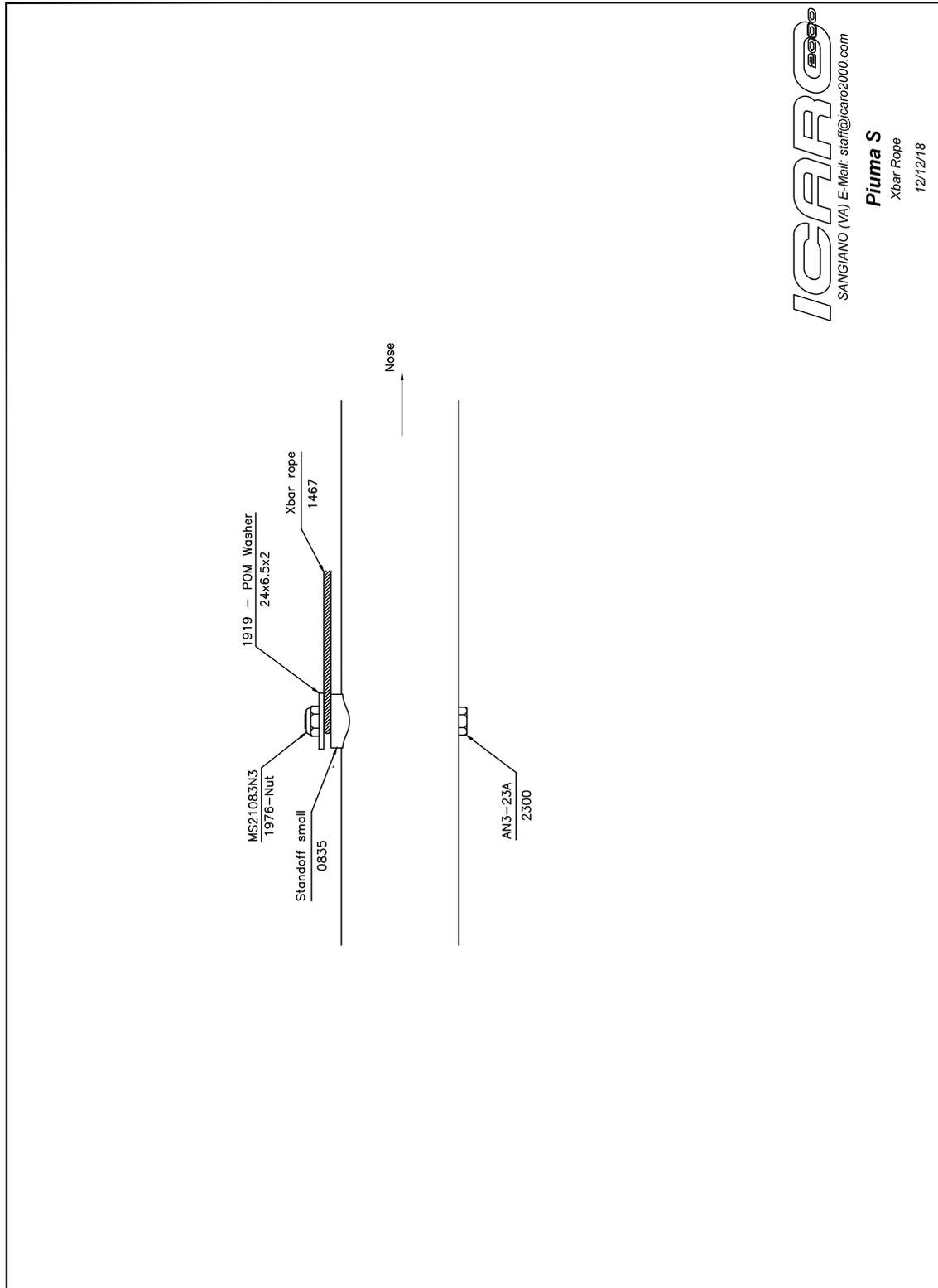


16. Assembly drawings Piuma S



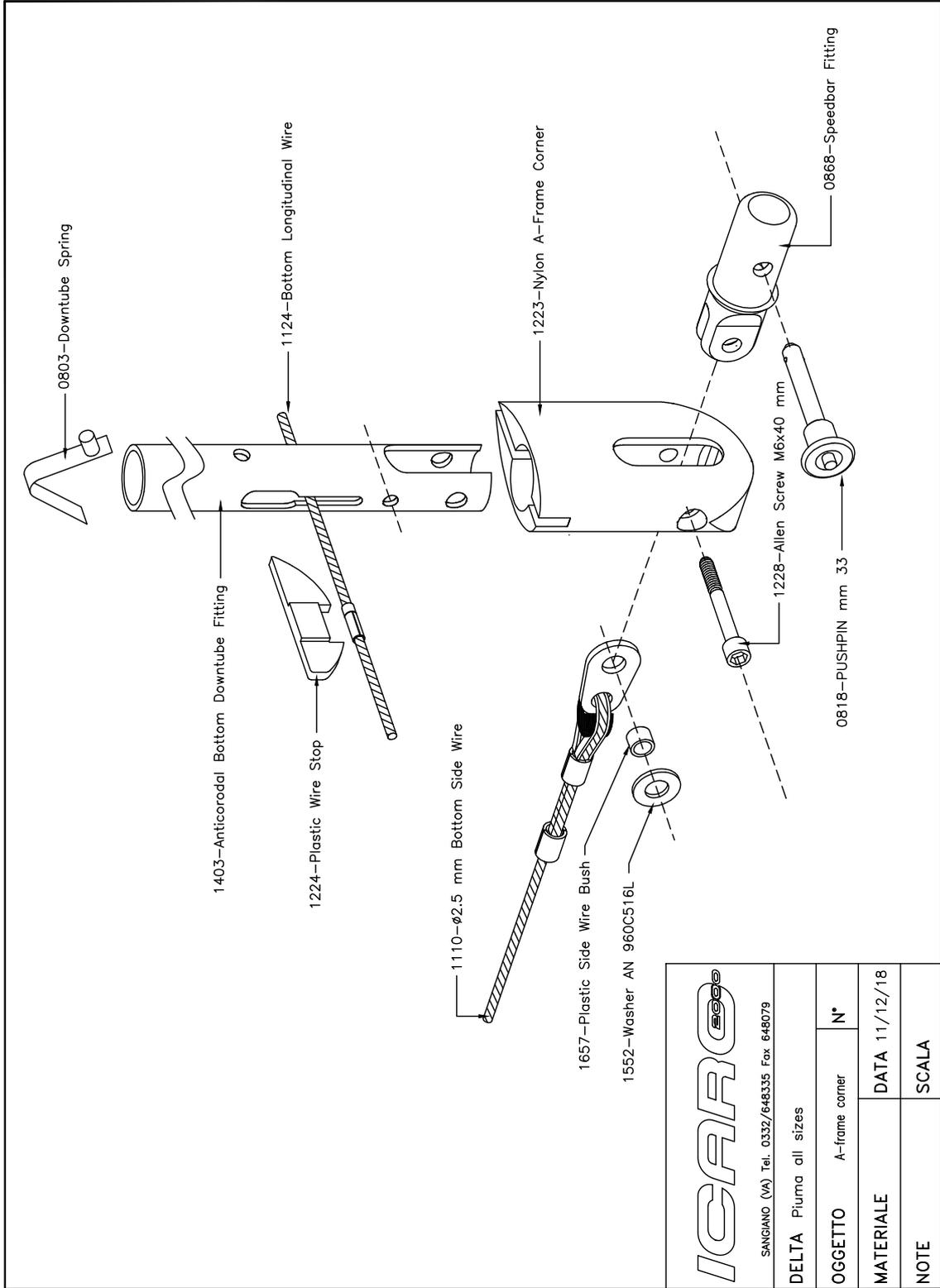






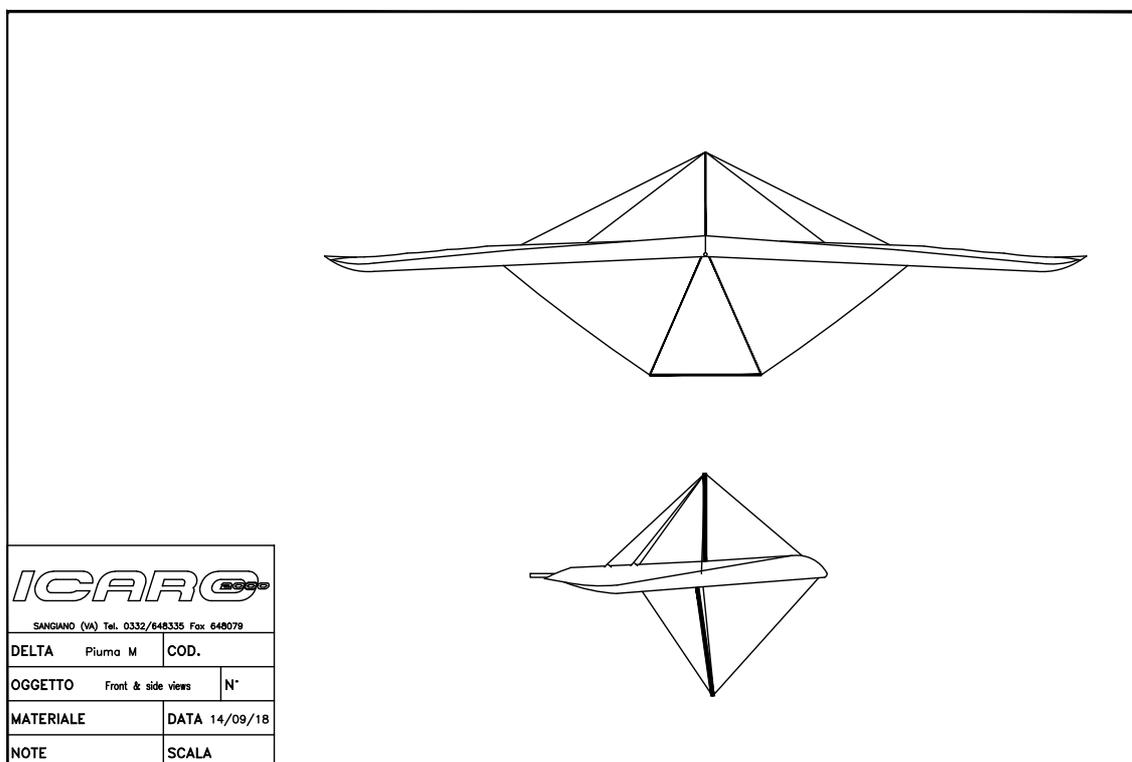
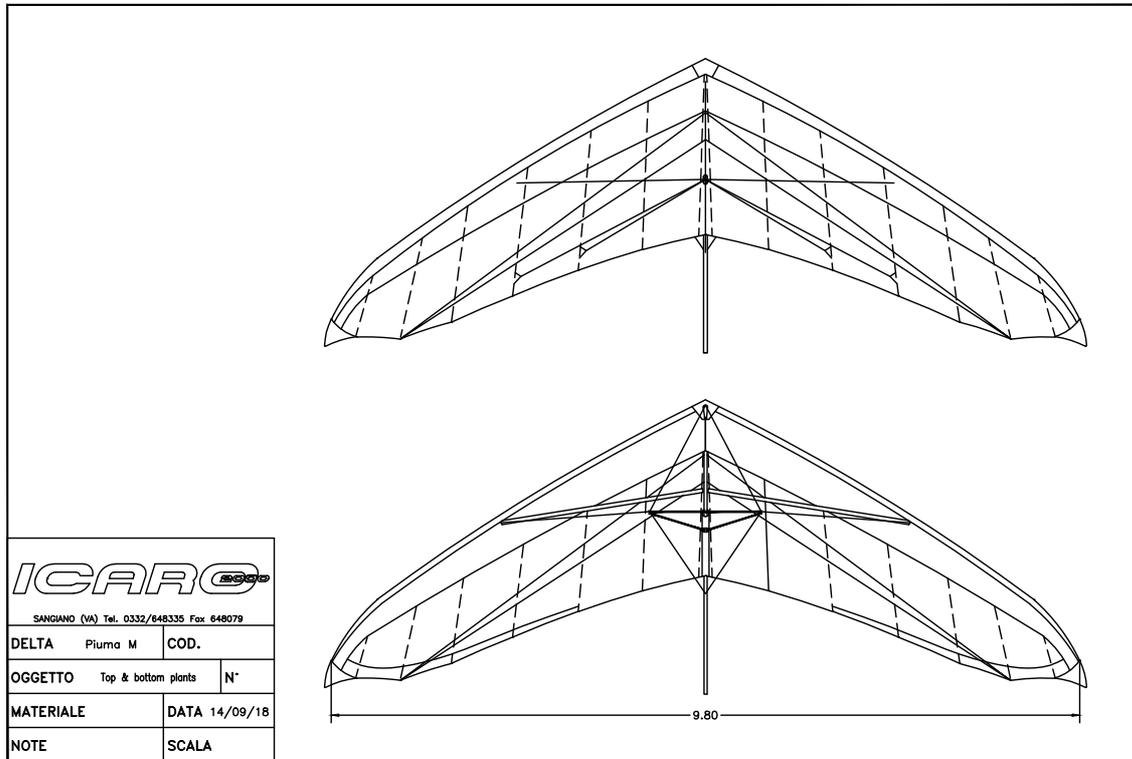
ICARAO
SANGIANO (VA) E-Mail: staff@icaro2000.com

Piuma S
Xbar Rope
12/12/18

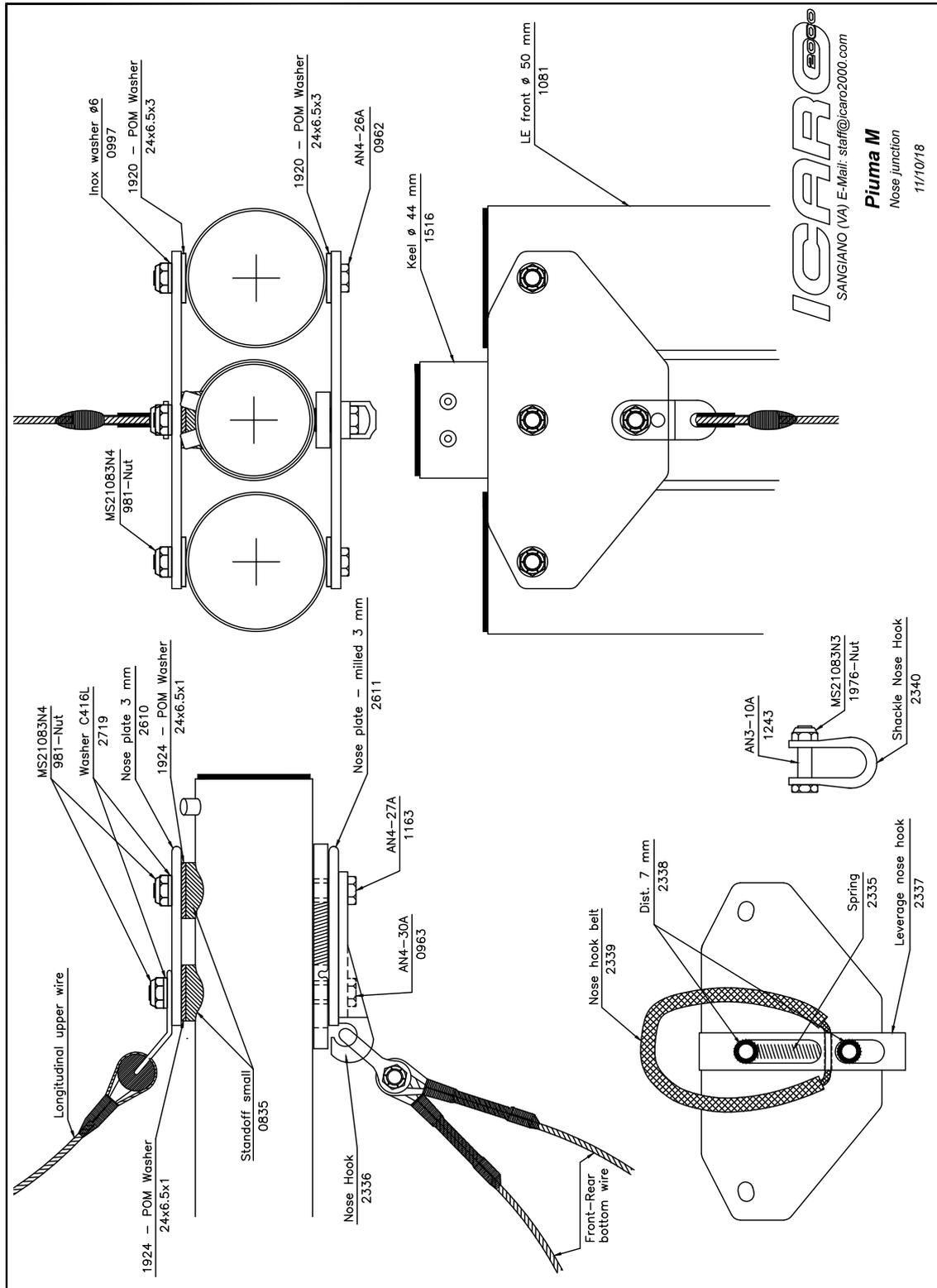


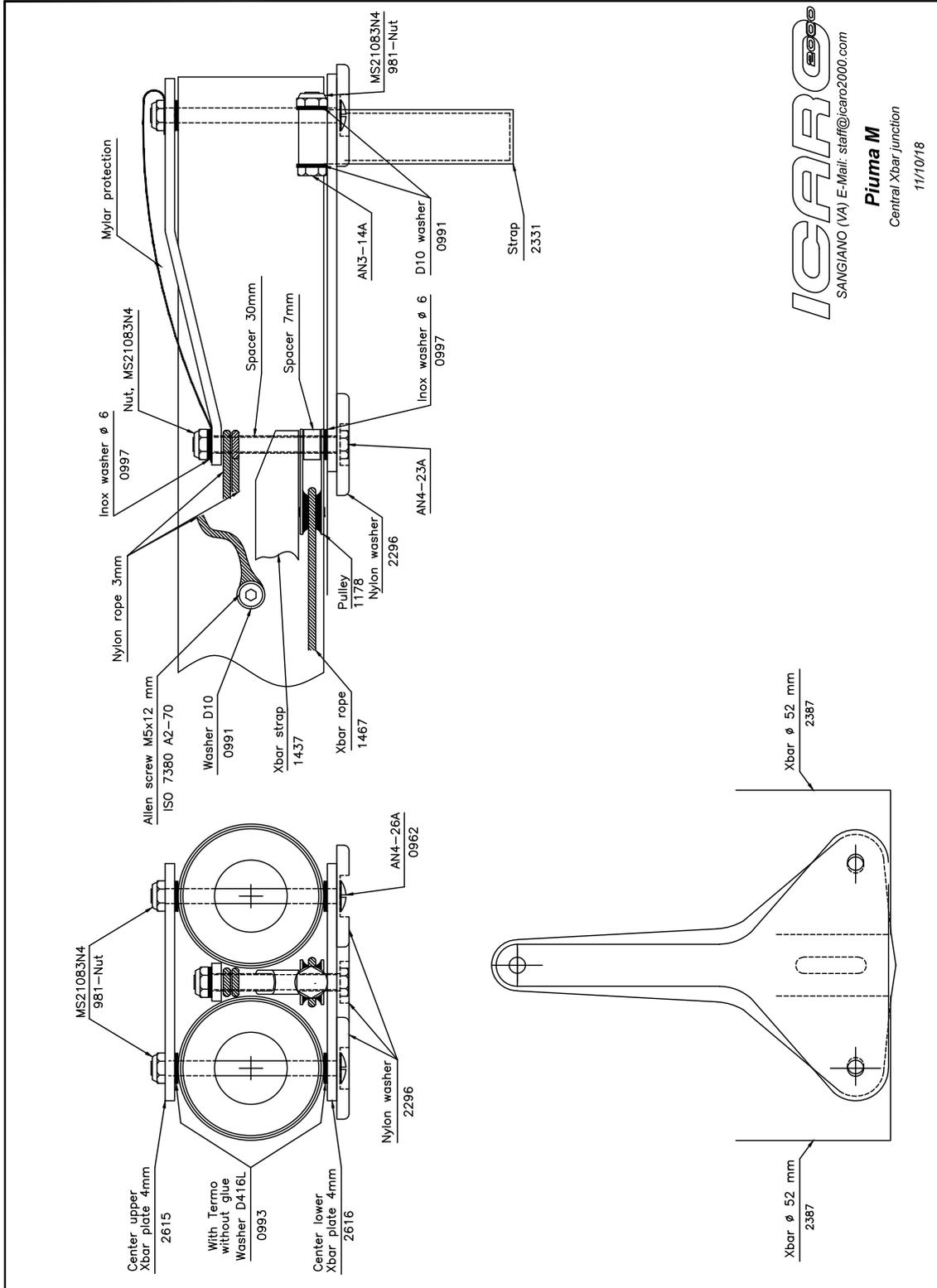
ICARO	
SANGANO (VA) Tel. 0332/648335 Fax 648079	
DELTA Piuma all sizes	
OGGETTO	A-frame corner N*
MATERIALE	DATA 11/12/18
NOTE	SCALA

17. Triptych Piuma M



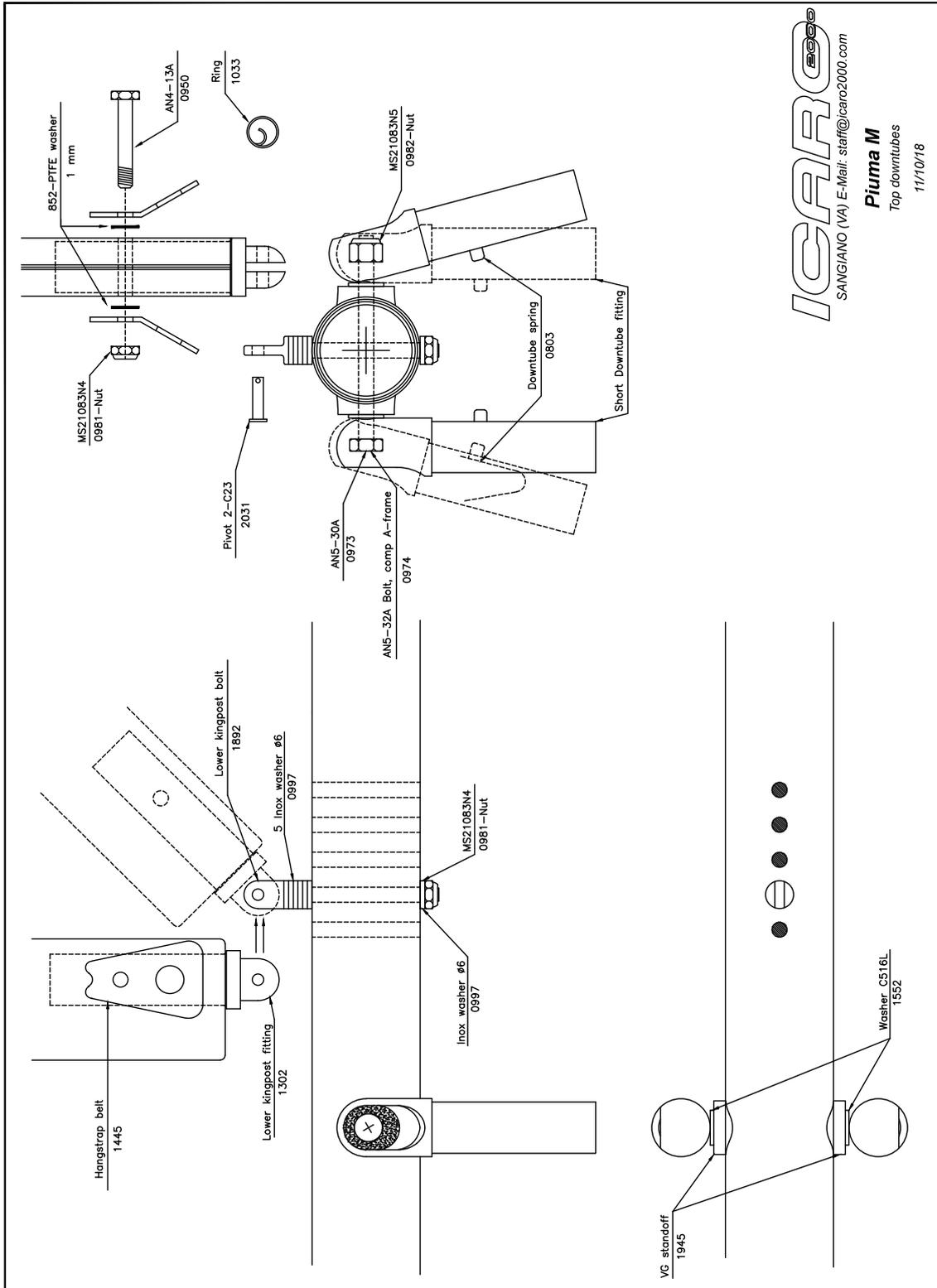
18. Assembly drawings Piuma M

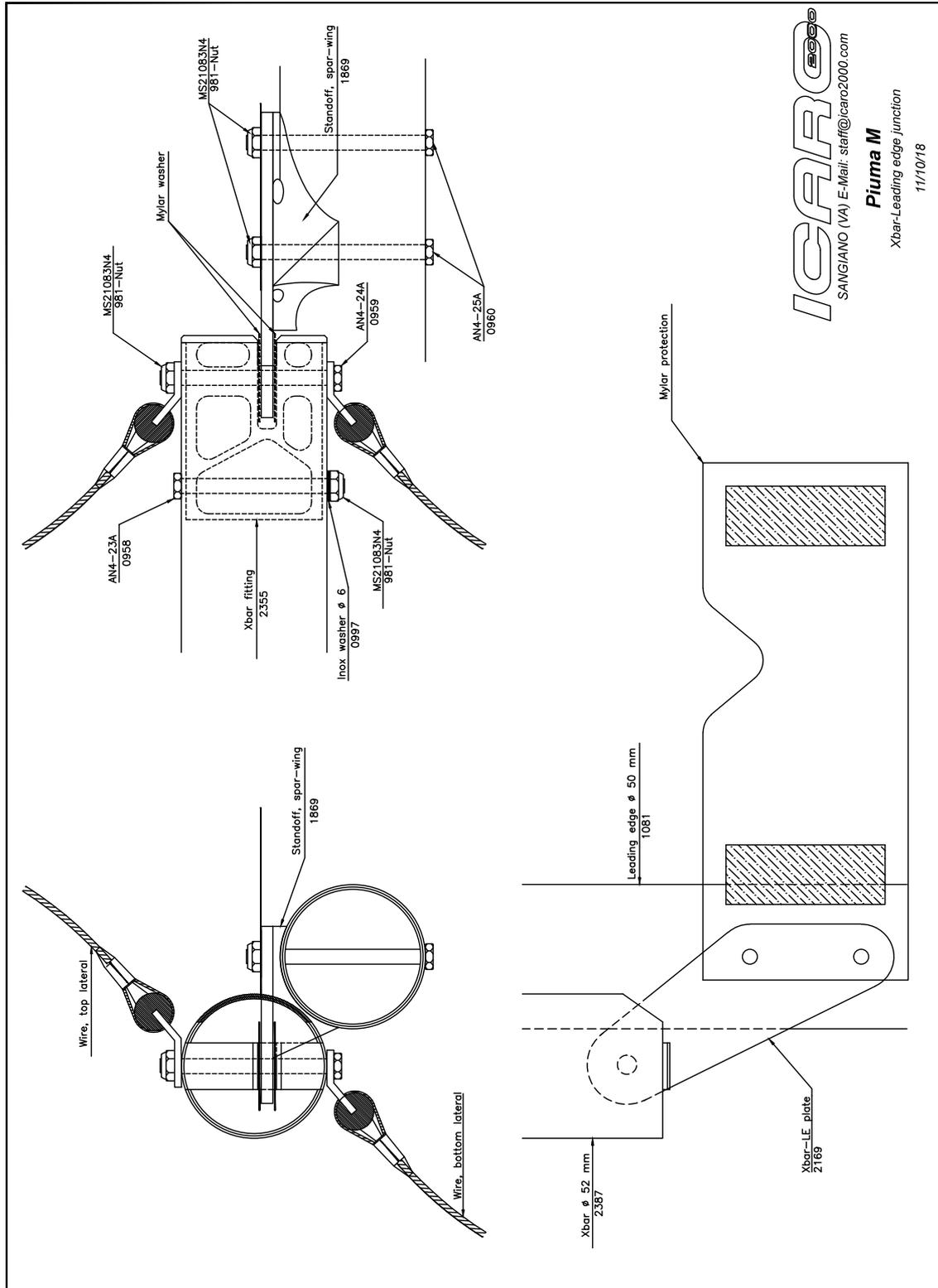


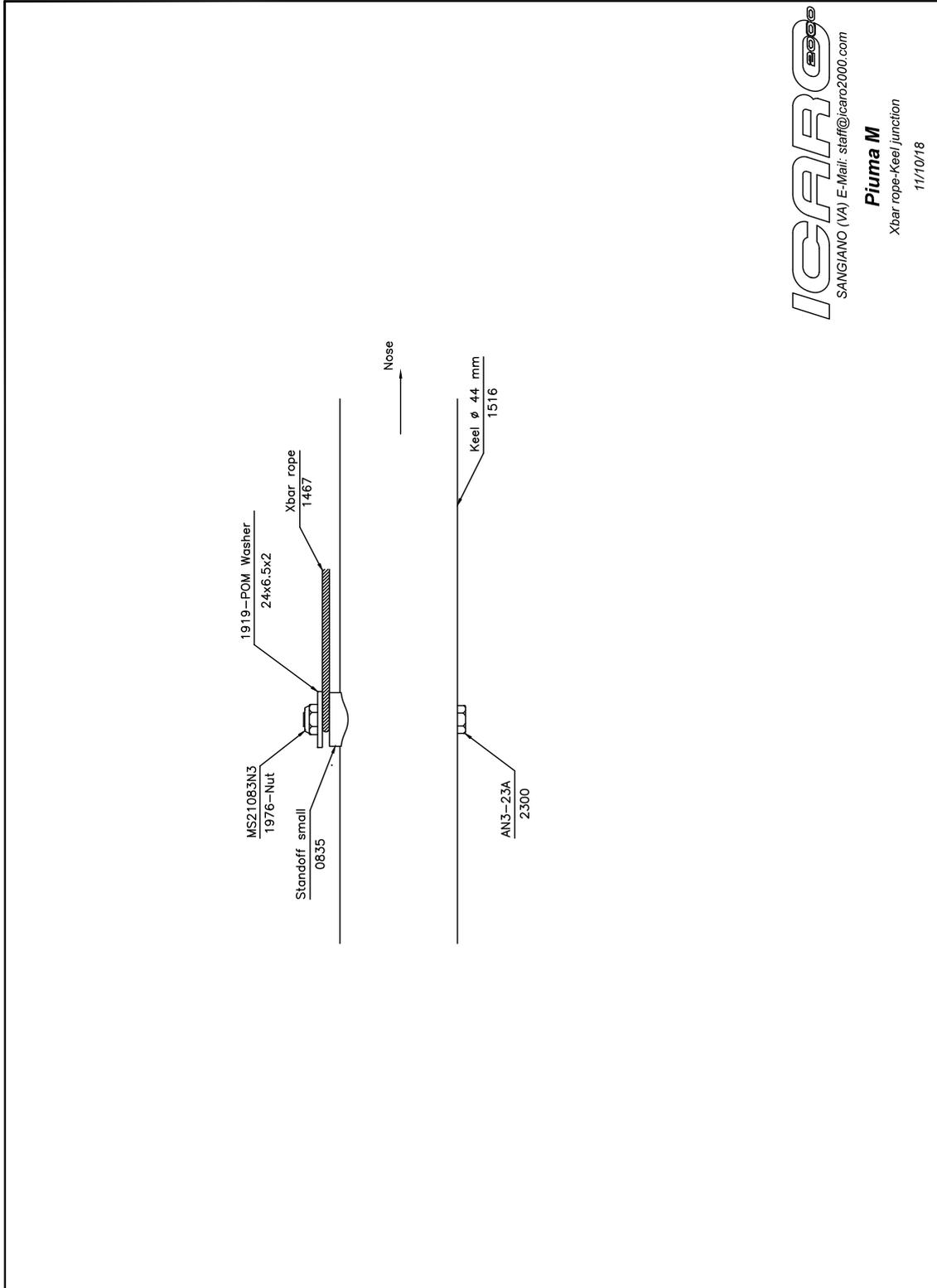


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Piuma M
Central Xbar junction
11/10/18

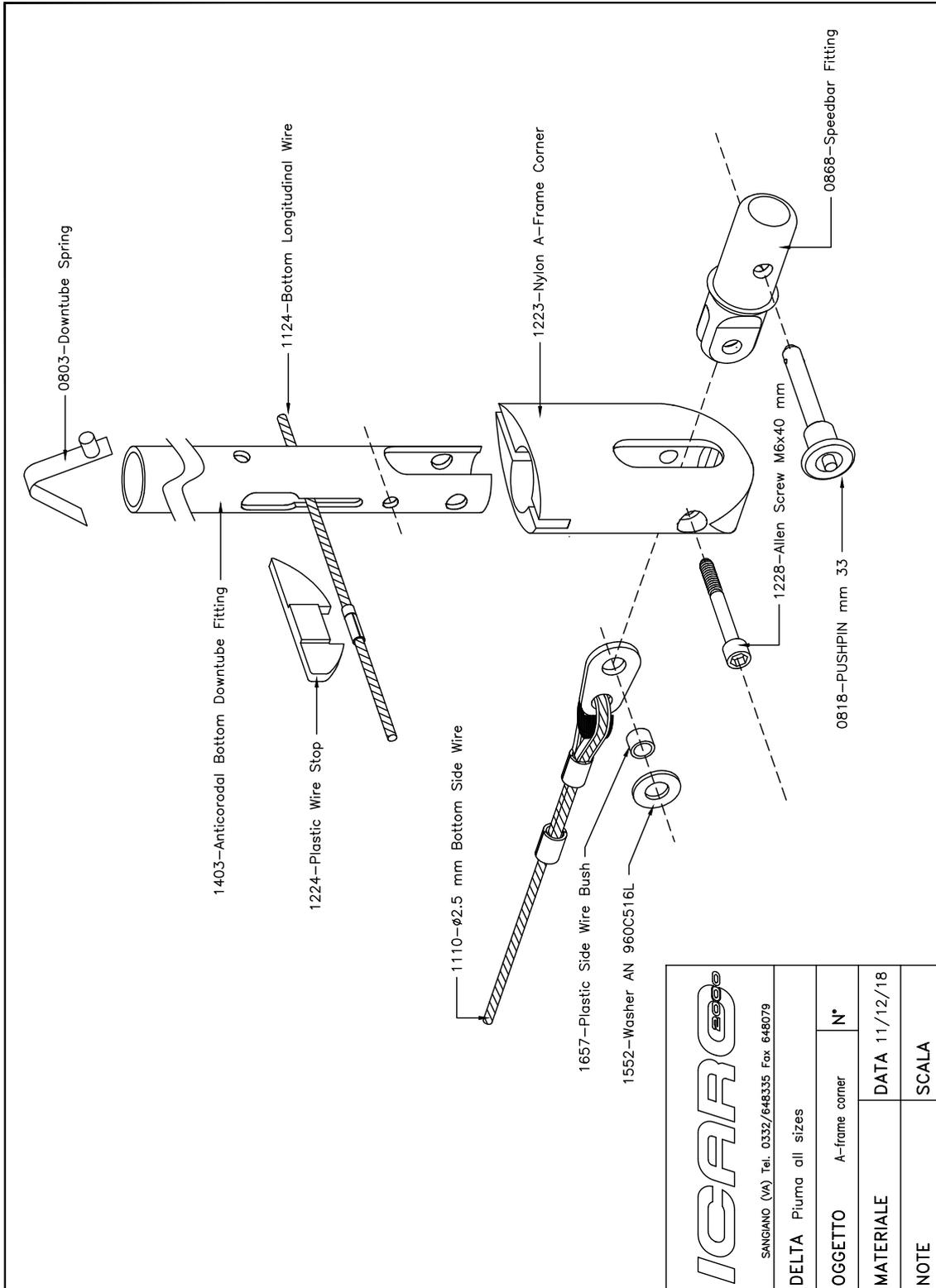






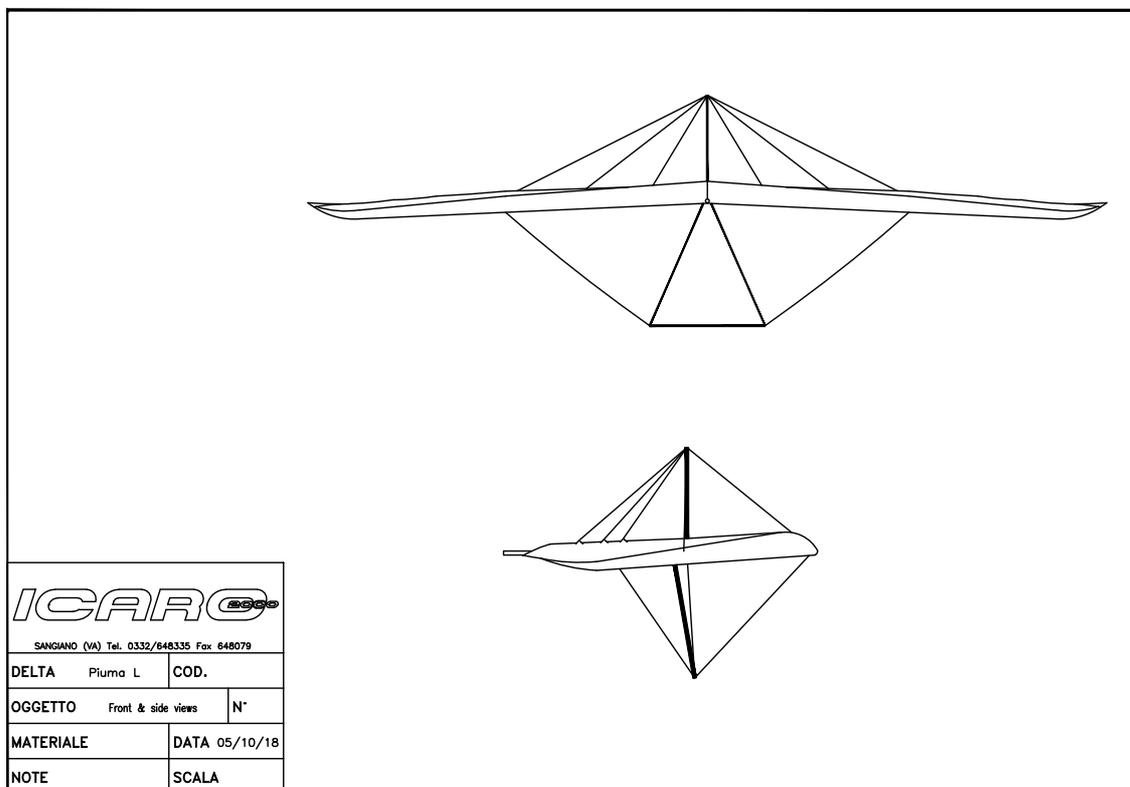
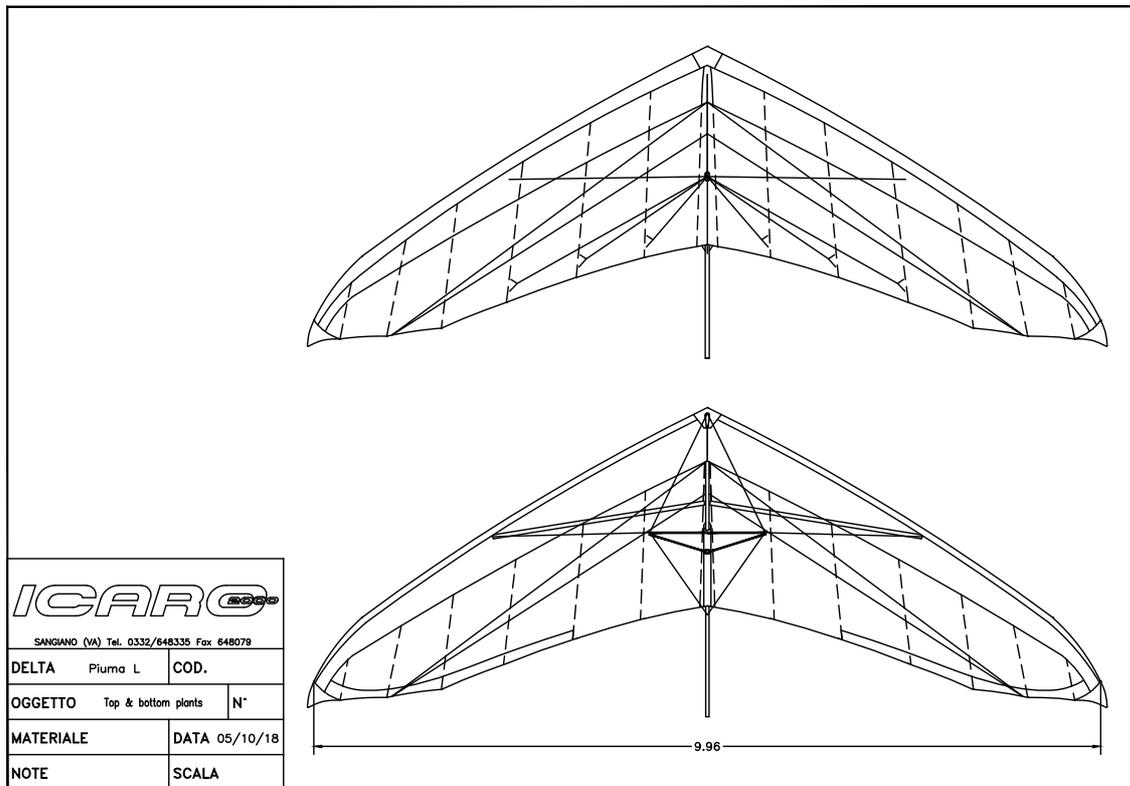
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Piuma M
Xbar rope-Keel junction
11/10/18

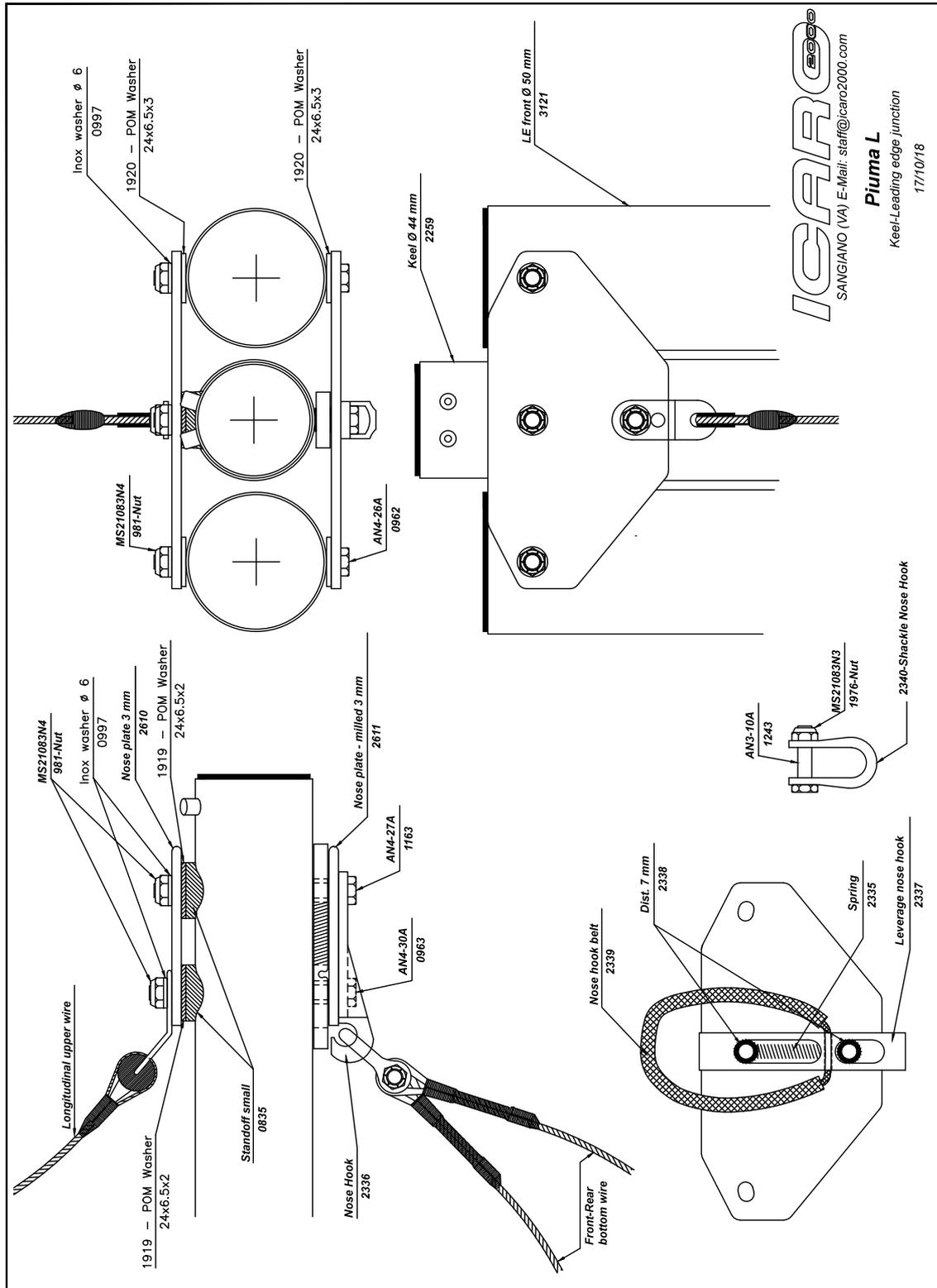


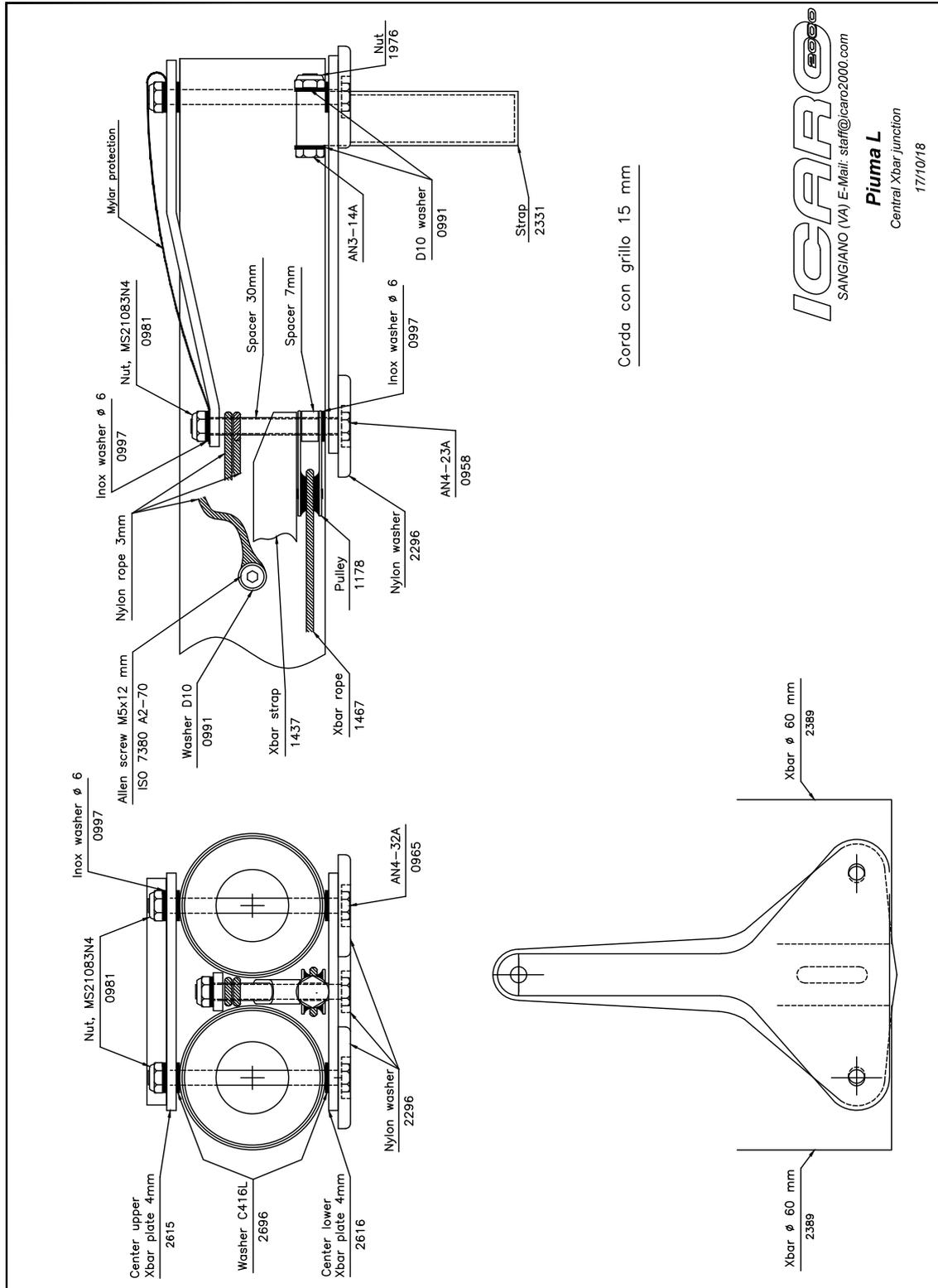
ICARO	
SANGANO (VA) Tel. 0332/648335 Fax 648079	
DELTA Piuma all sizes	
OGGETTO	A-frame corner N*
MATERIALE	DATA 11/12/18
NOTE	SCALA

19. Triptych Piuma L

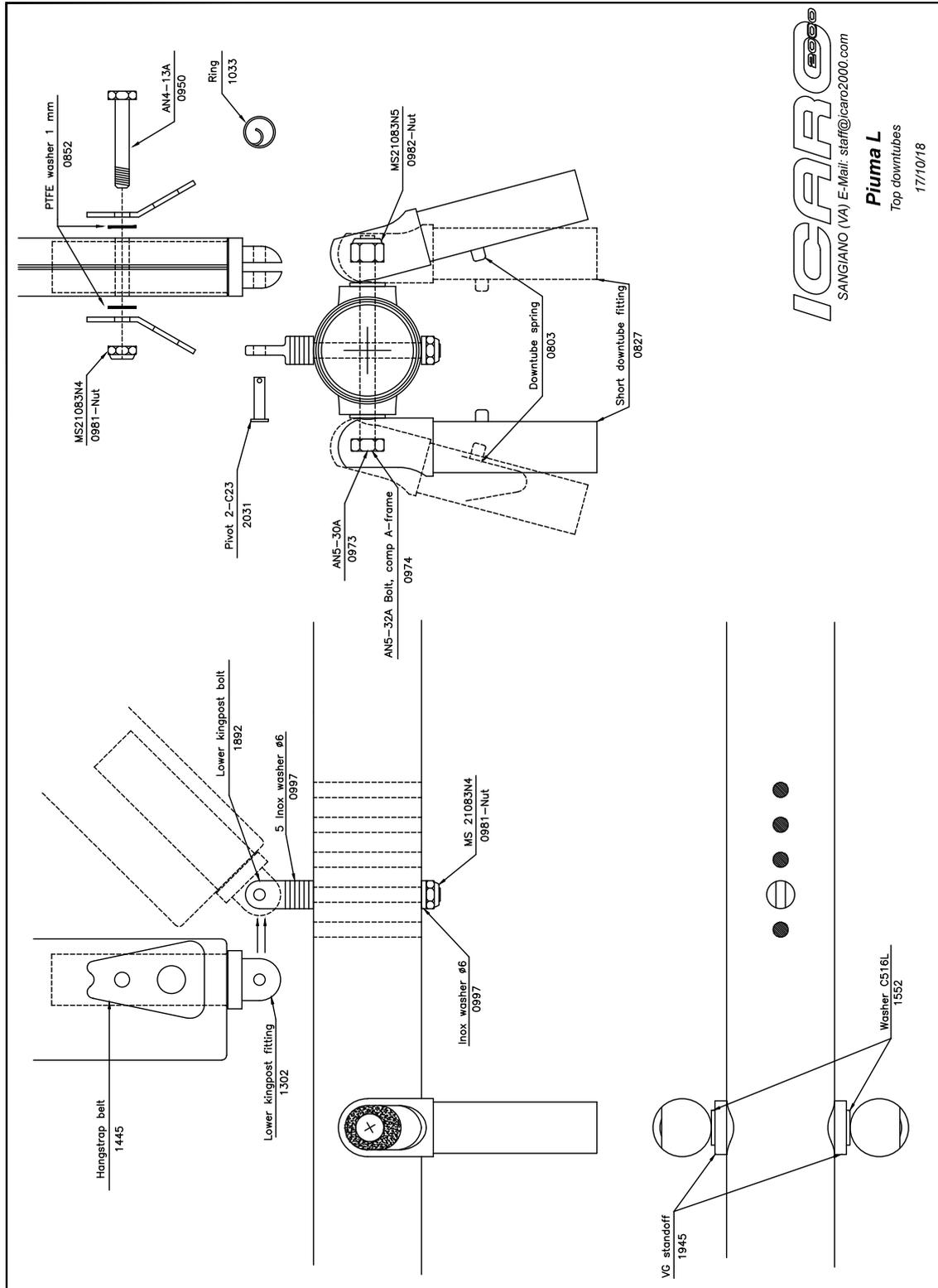


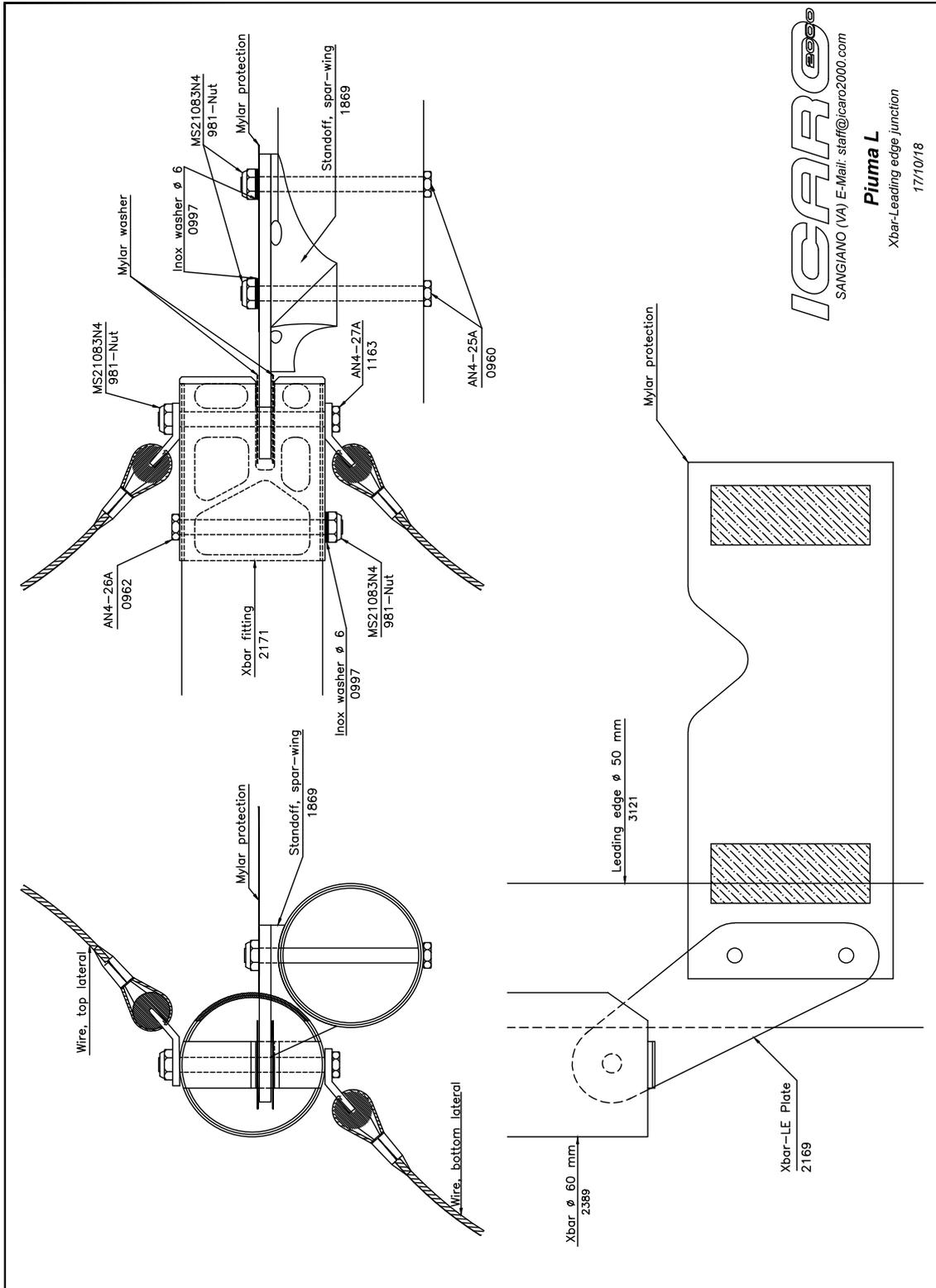
19. Assembly drawings Piuma L

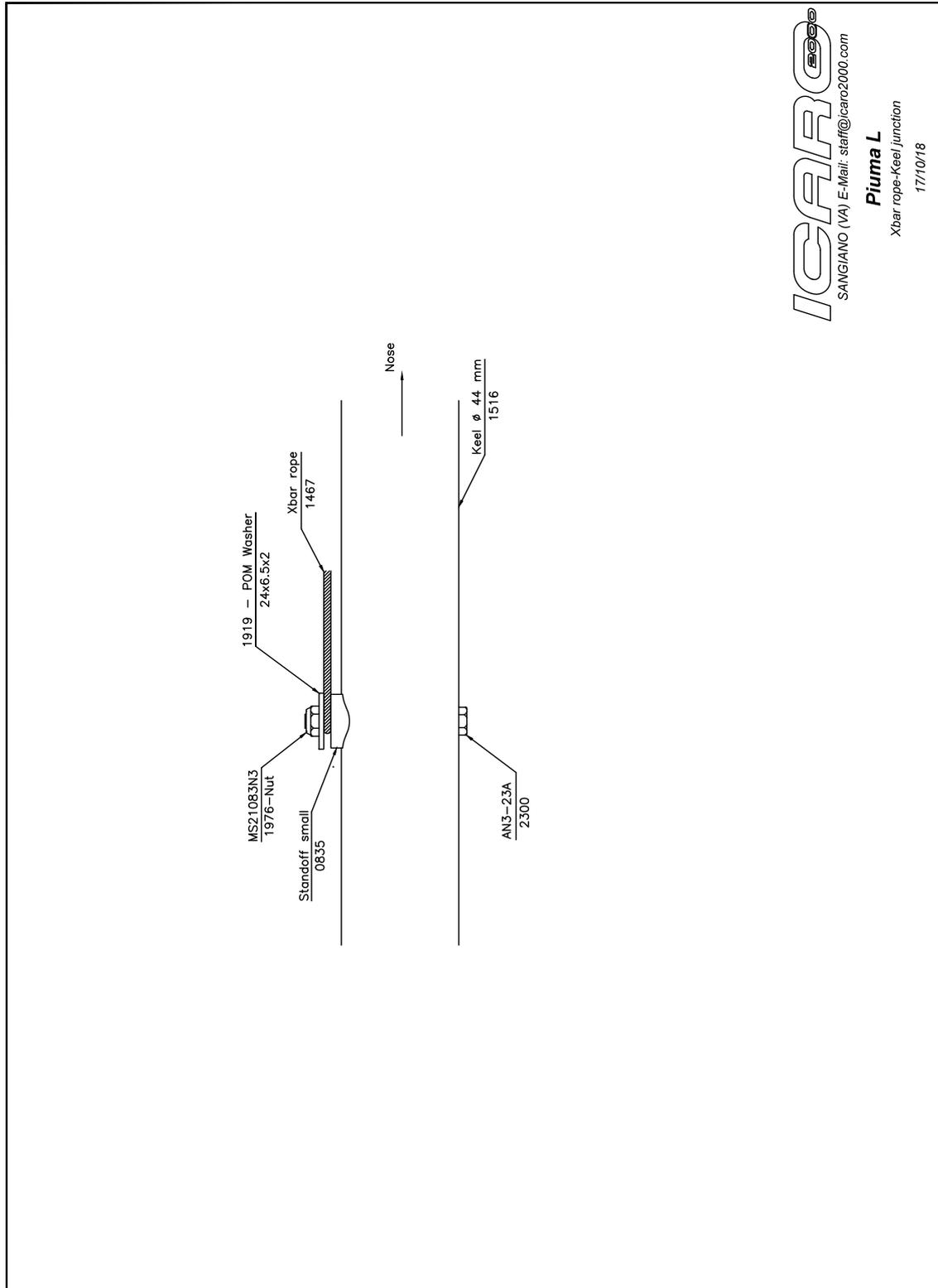




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Piuma L
 Central Xbar junction
 17/10/18







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Piuma L
Xbar rope-Keel Junction
17/10/18

