

TRANSPULS SYNERGIC 2700/4000/5000

DIGITAL WELDING MACHINES



PERFECT WELDING



THE DIGITAL REVOLUTION

GENERAL

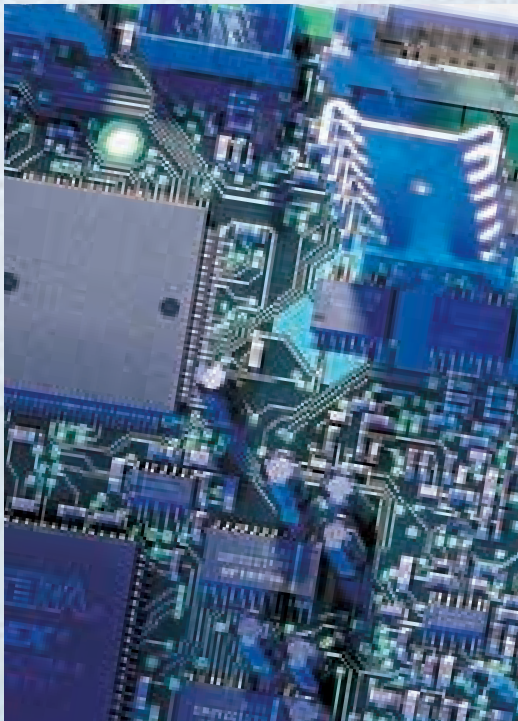
A MILESTONE IN THE HISTORY OF WELDING

In many areas of technology there are daily reports of progress. Of innovations great and small. And then - from time to time - there are real sensations. The entire industry pricks up its ears, all previous benchmarks are thrown to the winds and wholly new standards are set. These are developments that will have an enduring influence on the technology of the industry for years to come. Milestones that will affect the entire system.

This is happening again: The new TPS power-source series from Fronius is a sensation of just this kind. Thoroughly digital - a turning-point in history. Like the changeover from gramophone records to the CD.

TRULY SPECTACULAR: THE NEW TECHNOLOGY; THE NEW QUALITY

The TPS 2700 / 4000 / 5000 are completely digitised, microprocessor-controlled, inverter power sources. An interactive power-source manager is coupled with a digital signal processor, and together they control and monitor the entire operating sequence. The result is a hitherto unique and incomparable precision in the welding process, with exact replicability of all results and superb welding properties. Data about the operational status are available centrally, while the system itself is decentrally organised. This makes for logically structured - and thus convenient - working.



100% digitised control board

UTILISATION



FLEXIBLE AND INDIVIDUAL

Among the typical features of these new machines are their extraordinary flexibility and the ease with which they can be adapted for a huge range of different welding tasks. The reasons may be found in their modular design concept, with all the scope this gives for easy system add-ons.

You see, the revolutionary thing about the new TPS machines is not simply their technology, but their quality and sheer versatility.

THERE'S NOTHING A TRUE PROFESSIONAL CAN'T DO

The new TPS machines are all-round professionals - with an area of application to match. In both the workshop and industrial fields, there is a huge range of uses for this family of products. They are ideal power sources for both manual welding and automated and robot jobs. With regard to materials, they are just right for the classic steel field, of course, as well as for galvanised sheet steel, and chrome/nickel, and have especially good suitability for aluminium.

The TPS 2700 is a portable MIG pulsed-arc machine with an integrated 4-roller drive. Its 270 A of power and lightweight 27 kg make it ideal for mobile use, either out in the field or in the repair workshop.

The TPS 4000/5000 machines, with 400 or 500 A of power, respectively, meet even the most demanding requirements made by industry. They are designed for use in the automobile and component vendor industries, in the fields of apparatus production, chemical engineering, mechanical engineering, rail rolling-stock production, and in shipyards.

All these machines are also multi-process-compatible, meaning that they perform equally sterling service for TIG touchdown ignition and manual electrode welding as when they are used for MIG/MAG welding. As true professionals, you see, they're used to taking on all comers!

TPS 4000, TPS 5000, TPS 2700





THE GOAL: ABSOLUTE PERFECTION

WELDING PROPERTIES

IGNITION: OPTIMISED AND PROGRAMMED

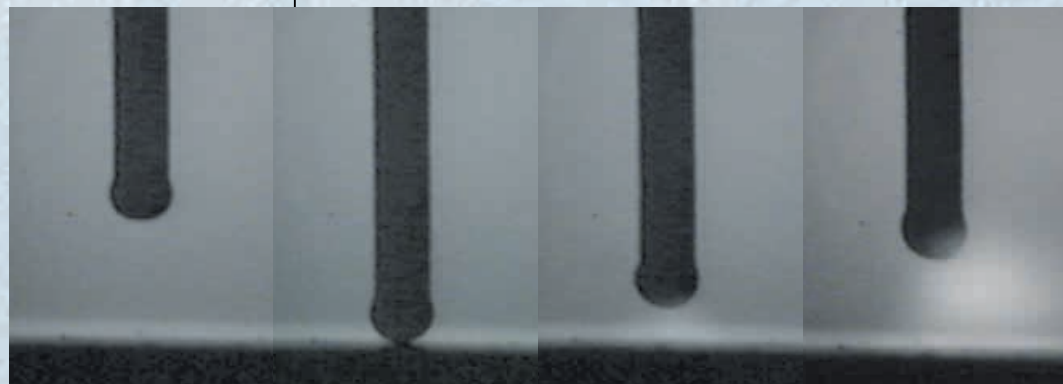
The development of new technology can often be compared to evolution: Even minimal changes can mean maximum improvements. The welding start-up in the TPS 2700/4000/5000 is an excellent example of this.

Years of experience and in-depth know-how underlie the thinking that went into these new products, so the starting position was one of comprehensive expert knowledge. The result is: an ignition cycle that is optimised down to the last detail, that is digitally programmed and is thus always available in the same quality.

Depending on the application, the TPS offers two different ignition methods. The first is a conventional welding start-up. Here the ignition parameters are precisely tuned to the wire diameter and the wire quality. Quiet, jerk-free ignition is the result. In order to ensure precision re-ignition, a controlled current-impulse at the end of the weld run causes the molten globule to be shed from the end of the wire before it can solidify into a ball on the tip.

The second method is a spatter free ignition especially for aluminium. Digital technology in conjunction with the Robacta Drive torch system is what makes such a precise ignition process possible. In this way, the results are 100% reproducible.

And that's an all-time "first"!



Wirefeed forwards

*Wirefeed stop -
short-circuit recognition*

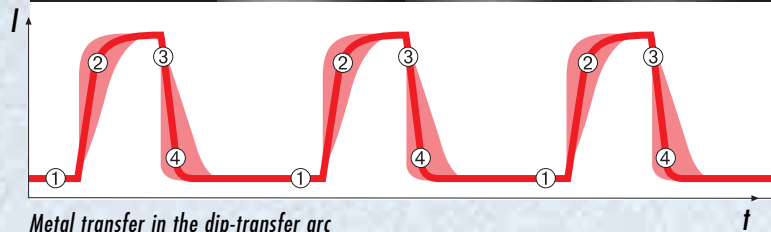
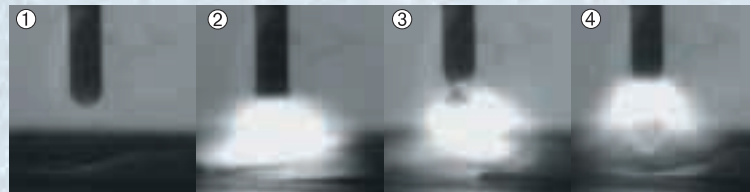
*Wirefeed backwards - pilot arc
is ignited*

*Wirefeed backwards - arc
length is set*

THE MADE-TO-MEASURE ARC

Depending on the welding job to be tackled, different demands will be made of the arc. The more precisely these demands are met, the better the result will be. The new digital inverter power sources now permit absolutely made-to-measure solutions. For pulsed-arc welding, they offer just the right pulse-form for every material. These machines operate with such precision that for each current pulse only a single drop of filler metal is detached. This not only gives you virtually spatter-free welding, but also precision working in the low-power region. You can now weld a 0.8 mm aluminium sheet using a 1.2 mm wire electrode - smoothly and precisely.

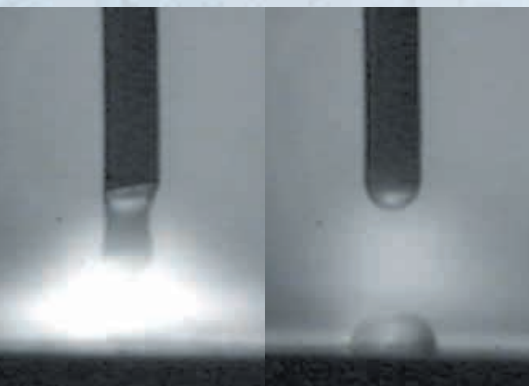
When it comes to arc length regulation, the same rule applies: Maximum perfection. The digital arc length control works with great speed and precision to keep the arc length constant; even when the stick-out is changed, there is hardly any spatter.



Metal transfer in the dip-transfer arc

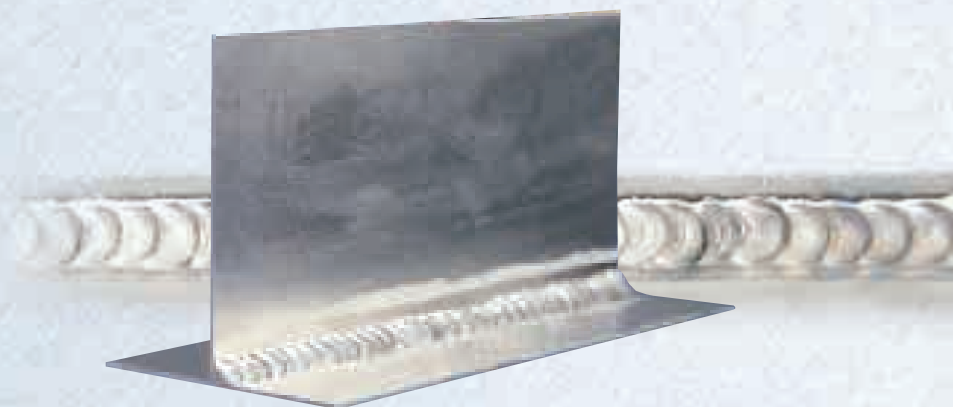


Constant arc length, despite changes in the stick-out



Wirefeed forwards - ignition is complete - pulsed arc starts up

Metal transfer



*Base metal: AlMg 3
Sheet thickness: 0.8 mm
Filler metal: AlMg 5, diam. 1.2 mm
Shielding gas: Argon*



TECHNOLOGY IS A MEANS TO AN END



Without start-up program - fusion defects at beginning of seam



With start-up program - no fusion defects

Another interesting addition to the welding properties: The new TPS machines have a special start-up program for aluminium. The fact that aluminium is a good conductor of heat brings with it the danger of inadequate fusion in the ignition area. Thanks to digitalisation, there is now a very effective way of combating this: In order to start melting the base metal right away, in the start-up phase, the arc is ignited at much higher power. After this high-power ignition, the welding power is reduced again. When the heat runs ahead towards the end of the seam, there is also a risk of drop-through. This is why on the TPS machines, you can immediately lower the current to the crater-fill current. The sequence for this aluminium start-up program is controlled via the torch button.

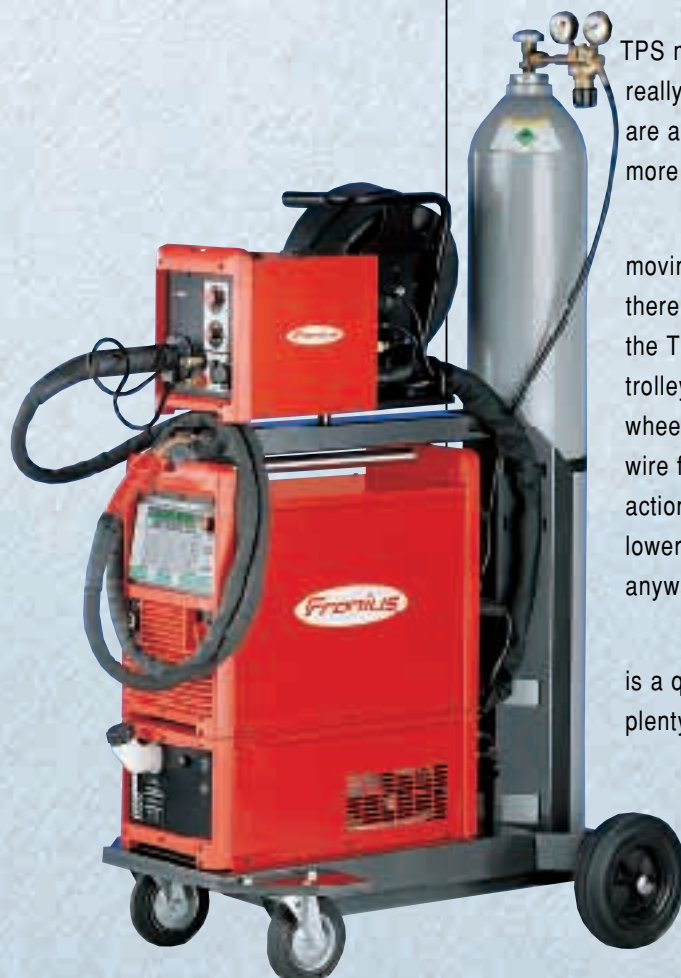
HANDLING

COMPLEX KNOWLEDGE - MADE EASY TO USE

Once you've worked with the new TPS machines, you'll know for a fact: It really can't get any simpler than this. There are a host of improvements to make work more enjoyable for you:

For example when it comes to moving the machines around - here too there are some innovations to report. On the TPS 4000 and TPS 5000, the "PickUp" trolley is fitted with generously sized wheels; above this is a swivel-mounted wire feeder giving you a wide range of action. The gas-cylinder platform is fitted lower down. And the TPS 2700 is portable anyway.

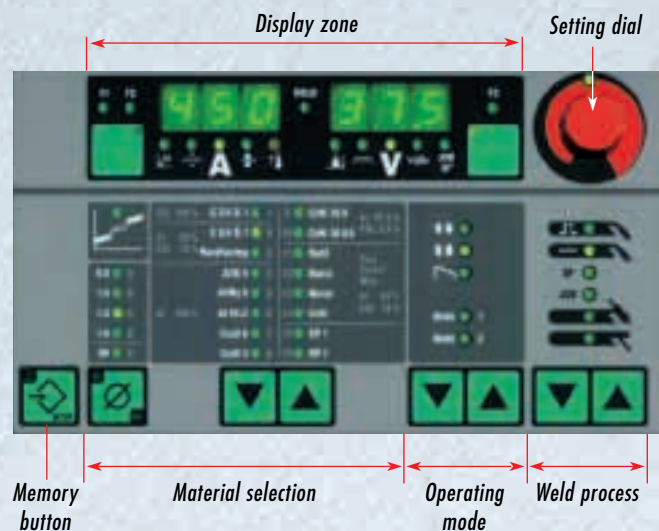
All in all, we can say that convenience is a question of intelligence. And there is plenty of that in these machines!



PickUp trolley

To ease the strain on the man-machine interface as far as possible, an integrated power source manager services, controls and monitors the entire process. Remember that the new digital power sources come with a wealth of expertise already built in. All you need do is set the wire diameter and the type of material, and then you have access to the optimised parameters that are already pre-programmed and stored in the machine. The single-dial operation in synergic mode makes even this little job even easier for you. Even the welding power is progressively adjustable - from minimum to maximum - with just one dial. This is the way to make the very most of leading-edge technology in practice - with comprehensive know-how always on hand at the push of a button.

The technology stands modestly aside, leaving ease of operation in the foreground. And on the subject of operation, the slanted control panel is protected against mechanical damage and the individual controls are systematically arranged to make life even easier for the user.



TransPulsSynergic 2700 – 270 A – 27 kg



EVERYTHING UNDER CONTROL

ONE LOOK TELLS ALL

It's really convenient to be able to keep an eye on all the parameters while you're welding - one look at the control panel tells you all you need to know. In addition to showing command and actual values, the digital TPS machines also give you the following information:



A
HOLD
V



JOB
N°

Welding current and welding voltage with a "Hold" function: Before you begin to weld, read off the standard values for current and voltage on the display. During the welding process all actual values are continuously in view. When the weld run is finished, these values are stored automatically by the "Hold" function.

Standard value for sheet thickness: This makes life much easier, because the correct parameters are automatically recalled when you choose a particular sheet thickness.

A-dimension: This new feature lets you adjust the A-dimension as a free parameter - in each case in connection with a defined welding speed.

Wire speed: The command value is permanently shown on the display

Job mode: Now a series feature of all new machines. This function allows you to store optimised machine settings in the machine and to recall them whenever you want. This makes perfection 100% repeatable!

WELDING "AS YOU LIKE IT"

Imagine you could program your own welding equipment: Maybe you'd prefer a different display mode, or you want to produce a welding program of your very own. Okay, don't waste time thinking about it, just do it! Thanks to digital technology, there are function buttons in the TPS series that you can define for yourself. You can either link various performance programs which can then be opened directly from the Job Master torch, or you



can assign new functions to the F1 and F2 keys (e.g. at the touch of a button you can show the actual motor current of the wire feeder, or adjust the Z-dimension). And that really is unique. When we talk about the digital revolution, we really mean it.

THE CONVENIENT WAY OF WORKING

The new power sources also offer you maximum convenience. Using digital data transmission via the bus-system, for instance, additional remote-control possibilities have been created. No matter what your applications are, at least one member of this broad product range will fit the bill: TR 2000 – a MIG program control unit; TR 4000 – a universal remote-control unit; TR 4000 C – the convenient control unit with extra functions. As on all Fronius machines, the new TPS machines let you continuously adjust the welding power directly from the torch during welding, with the by now familiar Up/Down function.



Apropos of convenient working: Our power sources are now available for the first time with the Job Master, the new torch with an integrated remote control



function. This means that you can call up, change and monitor all parameters directly from the torch. This feature lets you

continuously adjust such values as the current, wire speed and arc length to the task in hand, while you weld.

Another advantage is the digitally controlled motor speed. This allows you to set the wire feed speed continuously from 0 to 22 m/min, precisely and reproducibly. The "4-roller" drive ensures optimum pressure distribution on the filler wire.



Four-roller drive



Integral torch holder on the "PickUp" trolley



AN "ALL-ROUND" SUCCESS

ECONOMY

AN INVESTMENT THAT'S QUICK TO PAY OFF

There are many reasons why each of these TPS machines is a shining example of cost-efficiency. For a start, there is their high electrical efficiency, thanks to the inverter principle. Their low open-circuit power and automatic cooling system cut-out are also important



here. You'll be interested in these points when you think of your total electricity consumption. Not to mention the significant reductions in welding spatter brought about by digitalisation, which in turn means that there is far less reworking to be done. What is more, the machines are all multi-process compatible: MIG, TIG and manual electrode welding - these machines can handle them all.

SAFETY

A MATTER OF COURSE

Need we even say anything on this? Every Fronius machine must pass a maximum number of tests - and this goes for the new machines as well, of course. The following safety features are thus a matter of course; S mark, CE mark to EN 60 974/1 and EN 50 199 including tip-over test, and degree of protection IP 23 (= suitability for use in the field). Furthermore, soiling inside the machine is reduced by a thermostat-controlled fan, as this only runs when needed.



Degree of protection IP23 = suitability for field use

SERVICE

EASY DOES IT

Service friendliness is an important point for welding equipment. And a huge plus-point for the new digital power sources. For a start, servicing is made easier by the straightforward overall design of the machines, comprising only a small number of separate sub-assemblies. It is also supported by the display of error codes, which are then diagnosed using laptops. The laptop is also used for software updates, so that you can keep right up with the state of the art in welding technology without changing your hardware - the digital core of the machine makes this flexible solution possible. Calibration can also be seen in an entirely new light, as with digital technology this can now be carried out just as simply and swiftly.

Any list of these machines' service-friendly features has to include those that retard wear-and-tear right from the outset - like the newly developed strain relief device for the interconnecting cable assemblies, which greatly increases their service life.



OPTIONS

THE MACHINES WITH UNLIMITED POSSIBILITIES

A great deal is possible with the digital power sources. You can adjust your machine to cope with virtually any specific requirement. The TPS 4000 and 5000 have their own wirefeeder, the VR 4000 C - with a broad range of functions, and displays similar to those on the power sources. This is very helpful when the work place is a long way from the power source, as in ship yards, for example.



*VR 4000 C
wirefeeder*

Of interest for robot applications is Robacta Drive, a special speed-controlled robot torch with an additional drive system and an analogue/digital robot interface.

Further options include: Job Master - the digital display and remote control unit right on the handle of your torch, the water cooler FK 4000 R for torch cooling, a special polarity reverser for flux-cored wires, a push/pull control for the torch for use in manual welding, a flow monitor for water flow, interconnecting cables for 5, 10 or 15 metres or in the length of your choice, and extension cables for the remote-control units.

CHECKLIST

Synergic mode
 56 w welding programs for TPS 2700
 80 w welding programs for TPS 4000/5000
 MIG brazing of galvanised light-gauge sheets
 Multi-process – MIG/MAG, TIG and manual electrode
 Start-up program for aluminium
 Burnback pulsing (perfect wire end)
 Up/Down function
 Job memory
 Remote-control interfaces
 Digital data interfaces RS 485 + RS 232
 Automatic fan and cooling unit cut-off
 4-roller drive
 Digital display for:
 Welding current
 Welding voltage
 Arc length
 Wirefeed speed
 Sheet thickness
 a-dimension
 Welding speed
 Job number
 Hold function
 Overtemperature
 Intermediate arc indicator

ARTICLE NUMBERS

4.075.095	Power source	TPS 2700
4.075.100	Power source	TPS 4000
4.075.102	Power source	TPS 5000
4.045.830	Wirefeeder	VR 4000 (2-roller)
4.045.831	Wirefeeder	VR 4000 (4-roller)
4.100.216	Digital display for	VR 4000
4.047.260	Interconnecting	cable 1.2 m
4.047.261	Interconnecting	cable 5 m
4.047.262	Interconnecting	cable 10 m
4.047.277	Interconnecting	cable 20 m
4.045.836	Cooling unit	FK 4000
4.045.837	Cooling unit	FK 4000 R
4.045.839	Trolley	PickUp
4.100.218	Feeder swivel-mount	VR 4000
4.046.079	Remote-control unit	TR 2000
4.046.080	Remote-control unit	TR 4000
4.046.081	Remote-control unit	TR 4000 Comfort
43.0004.0633	Extension cable	10-pin 5 m
43.0004.1017	Extension cable	10-pin 10 m

TECHNICAL DATA

Power source	TPS 2700	TPS 4000	TPS 5000
Mains voltage	3x400 V	3x400 V	3x400 V
Mains fuse slow	16 A	35 A	35 A
Primary continuous current (100 % d.c.)	4.8 kVA	10.3 kVA	15.1 kVA
Cos phi 1 (270 A / 400 A / 500 A)	0.99	0.99	0.99
Efficiency	90 %	89 %	88 %
Welding current range (continuous)	3 - 270 A	3 - 400 A	3 - 500 A
Welding current at 10 min/40°C 35 % d.c.	270 A	400 A	500 A
10 min/40°C 60 % d.c.	200 A	350 A	450 A
10 min/40°C 100 % d.c.	160 A	250 A	360 A
Open-circuit voltage	50 V	70 V	70 V
Operating voltage	14.2 - 27.5 V	14.2 - 34.0 V	14.2 - 39.0 V
Degree of protection	IP 23	IP 23	IP 23
Type of cooling	AF	AF	AF
Insulation category	B	F	F
Dimensions l/w/h mm	625/290/480	625/290/480	625/290/480
Weight	27 kg	37 kg	38 kg



Cooling unit	FK 4000	FK 4000 R
Mains voltage	400 V	400 V
Mains frequency	50 Hz	50/60 Hz
Current input	0.5 A	0.5 A / 0.6 A
Cooling capacity at Q = 1 l/min	+20°C / 1600 W	+20°C / 2000 W
Cooling capacity at Q = max	+20°C / 1600 W	+20°C / 2350 W
Max. throughput	1.6 l/min.	3.5 l/min.
Max. pump pressure	5 bar	4 bar
Pump	Swing-armature pump	Centrifugal pump
Coolant volume	5.5 l	5.5 l
Weight (without coolant)	14.1 kg	16.3 kg
Degree of protection	IP 23	IP 23
Dimensions (l/w/h)	625x290x230 mm	625x290x230 mm

Wirefeeder	VR 4000/VR 4000 C
Rated motor voltage	42 V DC
Rated motor current	3.2 A
Wire diameter	0.8 - 1.6 mm
Wire feed speed	0 - 22 m/min
Degree of protection	IP 23
Dimensions l/w/h mm	630/285/410
Weight	15 kg



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