

User's Guide



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FSW300 Series

Flow Switch

MEGA

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Table of contents	page
0 About this operating manual	4
Device description	
1.1.1 Reed contact - Switching of inductive or capacitive loads	6
1.2 Exclusion of liability	
2 Safety instructions	6
2.1 Qualified personnel	
2.2 Special safety instructions	7
3 Material specifications of wetted components	8
4 Flow switch installation	_
4.1 General installation instructions	
4.2 Flow switch with pipe section	
4.3 Flow switch for direct installation	9
5 Electrical connection	
5.1 General electrical connection information	
5.2 Plug connector EN 175301-803-A	
5.3 Fixed connecting cable	
6 Adjusting the switching unit	
6.1 Type of contact	
6.2 Flow switch Series FSW300	
7 Maintenance and Cleaning	
8 Decommissioning and Disposal	14
9 Technical data	15
9.1 Maximum flow rate of the flow switch	16

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About this operating manual 0

- The operating manual is aimed at specialists and semi-skilled personnel.
- Before each step, read through the relevant advice carefully and keep to the specified order.
- Thoroughly read and understand the information in the section "Safety instructions".

If you have any problems or questions, please contact your supplier or contact us directly at:



One Omega Drive, P.O. Box 4047 Stamford, CT 06907-0047 Tel: (203) 359-1660 e-mail: info@omega.com

Hazard signs and other symbols used:



DANGER! Risk of death due to electric current!

This sign indicates dangers which could lead to serious health defects or to death.



CAUTION! Risk of injury!

This sign indicates dangers that cause personal injuries that can lead to health defects or cause considerable damage to property.



CAUTION! Risk of injury in the case of excessive pressure!

This sign indicates dangers which could arise from excessive pressure in a piece of equipment.



CAUTION! Material damage!

This sign indicates actions which could lead to possible damage to material or environmental damage.



ADHERE TO OPERATING MANUAL!



This symbol indicates important notices, tips or information.



NO DOMESTIC WASTE! The device must not be disposed of together with domestic waste.



A Pay attention to and comply with information that is marked with this symbol.

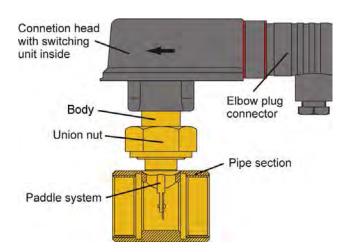
- Follow the specified instructions and steps. Adhere to the given order.
- Check the specified points or notices.
- Reference to another section, document or source.
- Item.

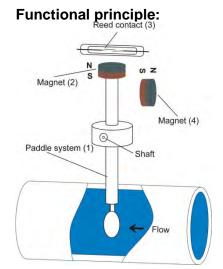
Series FSW300 Device description

1 Device description

OMEGA ENGINEERING INC. flow switches are designed for minimum or maximum monitoring of liquid flows.

Components Flow Switch:





The flow switch consists of a paddle system (1) which has a permanent magnet (2) located at its upper end. A reed contact (3) is positioned outside the flow above this magnet. A second, magnet (4) with opposite polarity is used to create a reset force.

The paddle system is moved once it comes into contact with the flow which is to be monitored. The magnet (2) changes its position in relation to the reed contact (3). The contact opens/closes depending on the contact type (\rightarrow § 6.1).

As soon as the flow is interrupted, the paddle returns to its original position and the reed contact opens/closes depending on the contact type (\rightarrow § 6.1).

1.1 Intended use

OMEGA ENGINEERING INC. flow switches are designed for minimum or maximum monitoring of liquid flows.



Warning! No safety component!

The flow switches of the series FSW300 are not safety components in accordance with Directive 2006/42/EC (Machine Directive).

Never use the FSW300 as a safety component.

The operational safety of the supplied equipment is only guaranteed if it is operated according to its intended use (flow monitoring of liquids). The specified limit values $(\rightarrow \S 9 \text{ "Technical data"})$ should never be exceeded.

It is your responsibility to select a technology which is suitable for your specific application, to install it correctly, to carry out tests and to maintain all the components.

Various device versions are manufactured. The respective type plate displays the version of each device.

Safety instructions Series FSW300

1.1.1 Reed contact - Switching of inductive or capacitive loads

CAUTION! Destruction or damage of reed contact!

Take notice of the max. contact loads mentioned on the specification plate!

The max. contact loads mentioned on the type plate (switching voltage, switching current and switching capacity) refer to pure ohmic loads and may not be exceeded under any circumstances.

High voltage and current peaks can occur, particularly when switching inductive or capacitive loads (e.g. relay coil, capacitors). Even if the overload is brief, this can destroy (welding the contacts) or damage (reduced lifespan) the reed contact.

Only use protection methods which be appropriate and checked.

Protection method when electrical connection of reed contacts:

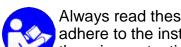
The following protective circuits are basically possible: current limiting resistors, RC circuits, freewheeling diodes, suppression diodes, varistors or a combination of these.

Please verify the effectiveness of the chosen protection method in accordance with the specific loads involved.

1.2 Exclusion of liability

We accept no liability for any damage or malfunctions resulting from incorrect installation, inappropriate use of the device or failure to follow the instructions in this operating manual.

2 **Safety instructions**



Always read these operating instructions carefully prior to installing the FSW300. Always adhere to the instructions contained herein, especially the safety instructions, otherwise there is a potential risk of personal injury and damage to instruments and plants.

Even though OMEGA ENGINEERING INC. provides assistance through personal consultation or the respective literature, it is the responsibility of the customers to determine the suitability of the product for the specific application.

The flow switches are state-of-the-art devices. This concerns switching point accuracy, functioning and safe operation of the device

However, professional and safety conscious conduct of the operator is required to ensure safe operation.

2.1 Qualified personnel



⚠ The personnel entrusted with installing, operating and maintaining the flow switches have to be suitably qualified; the required knowledge can be gained via training courses or appropriate on-the-job instruction. The personnel have to be familiar with the contents of these instructions, which have to be available to them at all times.

The electrical connection should only be carried out by a fully qualified electrician.

Series FSW300 Safety instructions

2.2 Special safety instructions



All work has to be carried out in accordance with existing national regulations on accident prevention and safety at work and with any internal regulations of the operator, even if they are not specified in these instructions.

To avoid damages to the flow switch and the monitored system, only use OMEGA ENGINEERING INC. flow switches for minimum or maximum monitoring of the flow of liquids.

Always follow and adhere to the flow switch installation instructions.

⚠ Never operate the flow switch in systems which have a greater flow rate than the specified max. flow rate (\rightarrow § 9.1). Otherwise it will cause irreparable damage to the flow

Prior to flow switch installation, ensure that all the materials of the flow switch are chemically and mechanically-resistant to the medium which is to be monitored and to all external factors.

Ensure that the medium is free from magnetic particles.

Suitable measures should be taken to prevent the medium from freezing. If the flow switch is to be used in ambient temperatures of <4 °C, do not carry out any operation beforehand with pure water, e.g. a test run. Residual water in the flow switch can result in frost damage.

No greases, oils etc. should be used during the installation of the types FSW305-G, FSW306-G, FSW307-G due to the material resistance.

figure 1 in the max. specified operating pressure is not exceeded.

Never remove a flow switch or its body from a pipe system under pressure.

⚠ If the medium which is to be monitored is very hot, the flow switches or their connection fittings will also become very hot. In this case, neither touch the flow switch nor place any heat-sensitive objects in its vicinity.

Protect the flow switch against external magnetic fields in the immediate vicinity, since these can impair device functioning.

The technical data of special versions (customised versions) can deviate from the details in these instructions. Please observe the details on the type plate.

Caution: Danger of death due to high voltages!

Always de-energize the system before connecting the connector cable.

Lt is prohibited to remove or make type plates or any other information attached to the equipment indecipherable, otherwise all warranties and the responsibility of the manufacturer no longer apply.

3 Material specifications of wetted components

Type Component	FSW301-G, FSW302-G, FSW303-G, FSW304-G	FSWG	FSW305-G, FSW306-G, FSW307-G
Body	2.0401	1.4571	PPO (NORYL GFN3)
Paddle system	2.0401 *3	1.4571	PPO (NORYL GFN3)
Round head rivet	2.0321	1.4303	
Bushings	PPO (NORYL GFN3)	1.4571	PPO (NORYL GFN3)
Axle	1.4571	1.4571	1.4571 / PPO
Pipe section *1	2.0402	1.4571	2.0402
Screw-in insert *2	2.0401	1.4571	1.4571
Seal	NBR	NBR	NBR
V Seal			EPDM / PPO
Magnet	Hard ferrite	Hard ferrite	Hard ferrite

^{*1)} only for flow switch with pipe section

4 Flow switch installation

CAUTION! Material damage!



When soldering the copper pipe fitting (\rightarrow § 4.2) or the threaded nipple (\rightarrow § 4.3), the flow switch (body with paddle mechanism) and the O-ring must be dismounted. Overheating during soldering will damage these components and impair their operation.

Remove the flow switch and the O-ring before you start soldering.

4.1 General installation instructions

- When choosing the installation site, ensure that the specified limit values
 (→ § 9 "Technical data") are not exceeded.
- Select suitable measures to prevent the medium from freezing.

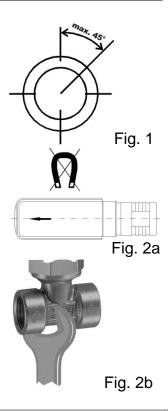
 If the flow switch is to be used in ambient temperatures of <4°C, do not carry out any operation beforehand with pure water, e.g. a test run. Residual water in the flow switch can result in frost damage.
- Firstly, clean the pipe system in which the flow switch is to be installed and remove any magnetic particles, e.g. welding residue.
- The straight in- and outlet pipe (in front of and behind the flow switch) has to be at least 5 x DN.
- The nominal installation position of the flow switch is an "upright standing position" in horizontal pipework.

^{*2)} only for flow switch for direct installation, screw connection

^{*3)} Type FSW301-G (Trimmable paddle) has a stainless steel sleeve (1.4571)

The switches should only be installed in a vertical position, deviation max. 45° (→ Fig. 1).

- Please contact the manufacturer if other installation positions are desired.
- Please make sure that there are no external magnetic fields in the immediate vicinity of the flow switch, since these can impair device functioning (→ Fig. 2a).
- There is an arrow on the flow switch. Ensure that this arrow is parallel with the pipe shaft and is facing in the direction of flow during installation (→ Fig. 2a).
- The brass and stainless steel union nuts 3/4"BSP have a tightening torque of 25...30 Nm.
- When tightening the union nuts, hold the pipe section against the surface provided (→ Fig. 2b).
- The plastic union nuts have a tightening torque of 7...8 Nm.

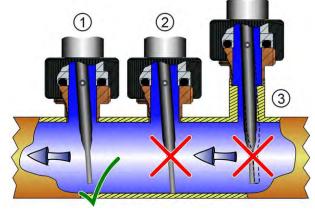


4.2 Flow switch with pipe section

- Install the flow switch pipe section just like a valve in the existing pipe.
- Sealing of the brass or stainless steel pipe sections has to be carried out with either thread sealants (Teflon tape, surface coating, etc.) or via sealing rings on the face of the tube section.

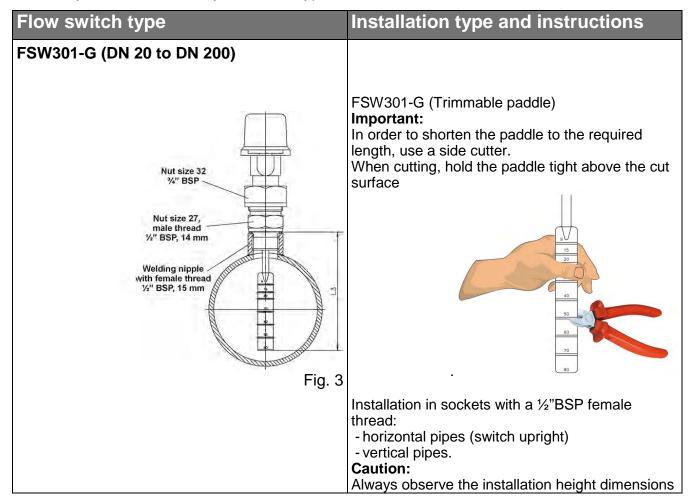
4.3 Flow switch for direct installation

- During flow switch installation, ensure that the paddle does not touch the wall of the pipe
 and can move freely
- ♦ Ensure that the paddle rod does not bear against the inside of the dome ③.



Electrical connection Series FSW300

Carry out installation of your device type as described in the table below.



5 Electrical connection

5.1 General electrical connection information



DANGER! Risk of death due to electric current!

The electrical connection of the FSW300 should only be carried out by a fully qualified electrician.

Always de-energize the system before connecting the wires of the FSW300.



CAUTION! Destruction or damage of reed contact!

The max. contact loads mentioned on the type plate refer to pure ohmic loads and may not be exceeded under any circumstances.

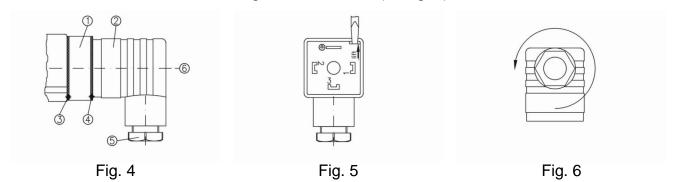
Pay attention to sect. 1.1.1 Reed contact - Switching of inductive or capacitive loads.

Series FSW300 Electrical connection

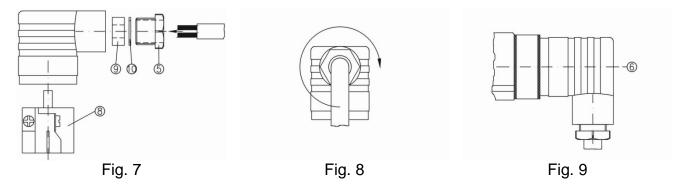
5.2 Plug connector EN 175301-803-A

Use the central screw © M3x35 and disconnect the cable socket ② from the connector ① (→ Fig. 4). Pull the central screw © out of the cable socket ②.

- \diamondsuit Open the core \otimes of the cable socket \oslash with a screwdriver or similar tool (\rightarrow Fig. 5).



- Insert the supply cable through the screwed cable gland \circ , the pressure ring \circ and the rubber insert \circ into the cable socket \circ (\rightarrow Fig. 7).
- Connect the wires as displayed in the connection diagram (→ Fig. 10).
- Press the core ® into the cable socket @ until it locks into place.
- Put the central screw ⑥ in the cable socket ② an tighten the screwed cable gland ⑤ M16x1.5 (→ Fig. 8).
- Plug the cable socket ② on the connector ① and tighten the central screw ⑥ (→ Fig. 9).

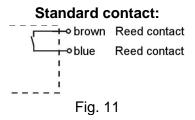


- To guarantee the type of protection IP 65 according to EN 60529, the connecting cable has to have a sheathing diameter of between 4.5 and 10 mm.
- Furthermore, ensure that all seals ③, ④ and ⑨ at the plug connector are inserted correctly.



5.3 Fixed connecting cable

♥ Connect the connecting cable according to the connection diagram (→ Fig. 11):



6 Adjusting the switching unit

6.1 Type of contact

Standard contact:

The switching unit of the control switch enables two types of contact:

1. Normally open contact: "RED" arrow on the switching unit

2. Normally closed contact: "WHITE" or "BLUE" arrow on the switching unit

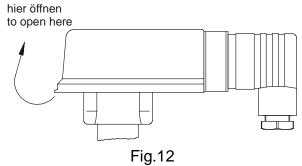
The following table explains the two types of contact:

Type of contact	Setting	Flow rate	Electric contact
Normally open contact	RED arrow	increasing	closing
Normally open contact	KED allow	decreasing	opening
Normally closed contact or	increasing	opening	
	BLUE arrow	decreasing	closing

If not otherwise agreed with the customer, the switching unit is factory set as a normally open contact.

6.2 Flow switch Series FSW300

In order to adjust the switching unit, open the cover of the switching head (→ Fig. 12) (not required for FSW305-G, FSW306-G und FSW307-G)



- Subsequently loosen the locking screw (2.5 hexagon socket screw for the brass and stainless steel version or recessed head screw for the plastic version) and position the switching unit until the red or white arrow are visible at the entry of the switching contact guide for a desired make contact (→ Fig. 13) or break contact (→ Fig. 14) respectively.
- The fine adjustment of the switching point can be carried out on the basis of the arrow length:

 Movement towards the arrow head: Switching point is set to lower flow rate.

 Movement towards the arrow tail: Switching point is set to higher flow rate.
- Carefully retighten the locking screw.
- We recommend you to use lacquer/threadlocker to secure the locking screw of the switching unit after carrying out individual adjustments.

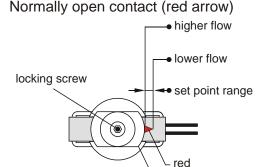
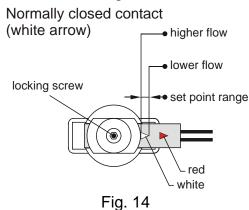


Fig. 13

white



Close the cover until it locks into place (not required for FSW305-G, FSW306-G und FSW307-G).

Adjustment of the switching unit is not required if a desired ex works switching point setting has been agreed with the customer.



IMPORTANT! Observe during fine adjustment. Fine adjustment is not possible with the version FSW301-G. You can only change the contact type by moving the switch unit.

7 Maintenance and Cleaning

Maintenance:

The FSW300 is maintenance-free and cannot be repaired by the user. In case of a defect, the device must be replaced or sent back the manufacturer for repair.



CAUTION! Material damage!

When opening the device, critical parts or components can be damaged.

♦ Open the device carefully (not required for FSW305-G, FSW306-G und FSW307-G).

Cleaning:

Clean the FSW300 with a dry or slightly damp lint-free cloth. Do not use sharp objects or aggressive agents for cleaning

8 Decommissioning and Disposal



CAUTION! Risk of injury!

Never remove a flow switch or its body from a system under pressure.

Make sure that the plant is shut down professionally.

Before disassembly:

Prior to disassembly, ensure that

- ☐ the equipment is switched off and is in a safe and de-energised state.
- ☐ the equipment is depressurised and has cooled down.

Disassembly:

- Remove the electrical connectors.
- Remove the FSW300 using suitable tools.

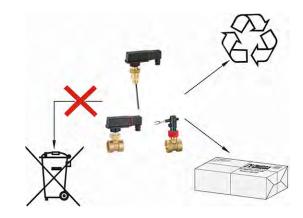
Disposal:



NO HOUSEHOLD WASTE!

The FSW300 consists of various different materials (\rightarrow § 3). It must not be disposed of with household waste.

- Take the FSW300 to your local recycling plant or
- send the FSW300 back to your supplier or to OMEGA ENGINEERING INC..



Series FSW300 Technical data

9 Technical data

The technical data of customised versions may differ from these data in the instructions. Please observe the information specified on the type plate.

Flow switch Series FSW300			
Туре	FSW301-G, FSW302-G, FSW303-G, FSW304-G	FSW305-G, FSW306-G, FSW307-G	
Nominal pressure	PN 25	PN 10 *1)	
Max. medium	110 °C	100 °C	
temperature (the			
medium should never			
freeze)			
Ambient temperature	80 °C	70 °C	
(do not store at <4 °C)			
Max. switching current		1 A	
Max. switching voltage	230 VAC, 48 VDC		
Max. switching capacity	26	6 VA, 20 W	
Protection class		II	
Degree of protection (EN 60730-1)		IP 65	
Max. permanent	<u>—</u>	70 °C	
temperature load of			
the cable			
Connecting cable		1.5 m	
length			
Cable cross-shaped	_	0.5 mm ²	
section			
Tolerance of the		±15 %	
switching point ranges			

^{*1)} Reduced pressure level for devices with copper pipe section. Please observe the details on the type plate!

Technical data Series FSW300

9.1 Maximum flow rate of the flow switch

The max. permissible flow rate can deviate from the specified limit values for customised versions.

The maximum specifications relate to water as the medium and a continuous flow rate.

Flow switch with pipe section			
	Brass/Stainless steel pipe section FSW301-G, FSW302-G, FSW305-G, FSW306-FSW303-G, FSW304-G FSW307-G		
Туре			
Nominal diameter	max. flow rate [I/min]	max. flow rate [I/min]	
DN 8	45	15	
DN 10	60	20	
DN 15	67	30	
DN 15 (external thread)	60	20	
DN 20	120	80	
DN 25	195	130	
DN 32	240	180	
DN 40	400	300	
DN 50	400	350	

Flow switch for direct installation			
Туре	Nominal diameter	max. flow rate [m³/h]	max. flow rate [m³/h]
FSW301-G	DN 100	100	40
(mounting length 111 mm)	DN 150	150	95
	DN 200	200	160

Series FSW300 For your notes

For your notes

For your notes Series FSW300

For your notes

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one** (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

- Purchase Order number under which the product was PURCHASED,
- Model and serial number of the product under warranty, and
- 3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

- Purchase Order number to cover the COST of the repair,
- 2. Model and serial number of the product, and
- Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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