

- Angle Beam Probes
- Integrated Wedge Probes
- Immersion Probes
- Wedges
- Probe Accessories

OLYMPUS NDT

Olympus Corporation is an international company operating in industrial, medical and consumer markets, specializing in optics, electronics and precision engineering. Olympus instruments contribute to the quality of products and add to the safety of infrastructure and facilities.

Olympus is a world-leading manufacturer of innovative nondestructive testing and measurement instruments that are used in industrial and research applications ranging from aerospace, power generation, petrochemical, civil infrastructure and automotive to consumer products. Leading edge testing technologies include ultrasound, ultrasound phased array, eddy current, eddy current array, microscopy, optical metrology, and X-ray fluorescence. Its products include flaw detectors, thickness gages, industrial NDT systems and scanners, videoscopes, borescopes, high-speed video cameras, microscopes, portable x-ray analyzers, probes, and various accessories.

Olympus is based in Waltham, Massachusetts, USA, and has sales and service centers in all principal industrial locations worldwide. Visit www.olympus-ims.com for applications and sales assistance.

Harisonic Transducers

Harisonic ultrasonic transducers are available in thousands of different frequencies, element diameters, and connector sizes. With more than 40 years experience, Olympus has developed a wide spectrum of transducers for both standard and specialized NDT applications.

Tel: 781-419-3900 • 800-225-8330 in North America

Fax: 781-419-3980

info@olympus-ossa.com

www.olympus-ims.com

Part Numbering System Legend

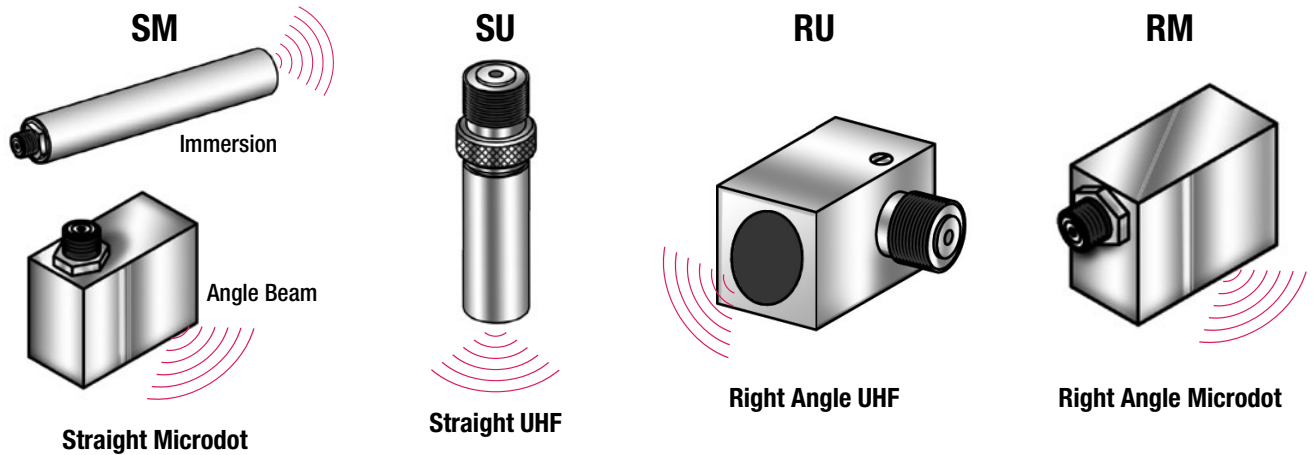
Example Part Number:

I3-0508-S-SU

Transducer Type & Case	Frequency	Size in 16ths of an Inch	Series	Connector Type & Location
	00 = 0.5 MHz	02 = 0.125 in. / 3 mm	Type S	-SM = Straight Microdot
	01 = 1.0 MHz	03 = 0.187 in. / 5 mm	Type P	-RM = Right Angle Microdot
	02 = 2.25 MHz	04 = 0.25 in. / 6 mm	Type R	-SU = Straight UHF
	03 = 3.5 MHz	06 = 0.375 in. / 10 mm	(see page 2)	-RU = Right Angle UHF
	05 = 5.0 MHz	08 = 0.50 in. / 13 mm		
	07 = 7.5 MHz	10 = 0.625 in. / 16 mm		
	10 = 10 MHz	12 = 0.75 in. / 19 mm		
	15 = 15 MHz	16 = 1.00 in. / 25 mm		
	20 = 20 MHz	18 = 1.125 in. / 29 mm		
	25 = 25 MHz			

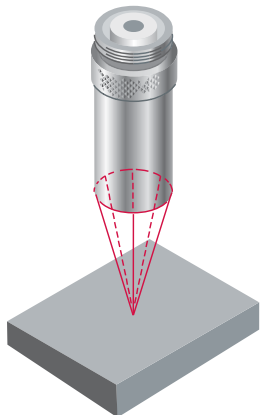
Part Number Configuration

Connector Style

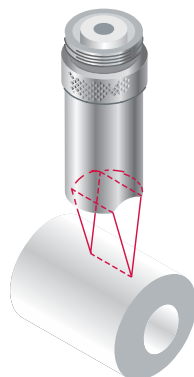


Focus Type (Immersion Transducers)

F Spherical Focus



CF Cylindrical Focus



Part Number Example I3-0308-R-SU-F2.50IN

Transducer Selection Criteria

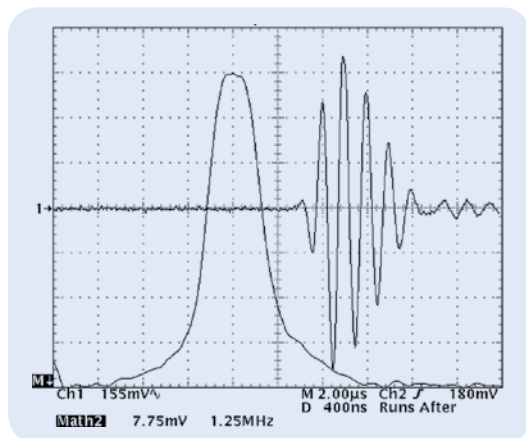
The transducer is one of the most critical components of any ultrasonic system. A great deal of attention should be paid to selecting the proper transducer for the application.

The performance of the system as a whole is of great importance. Variations in instrument characteristics and settings as well as material properties and coupling conditions play a major role in system performance.

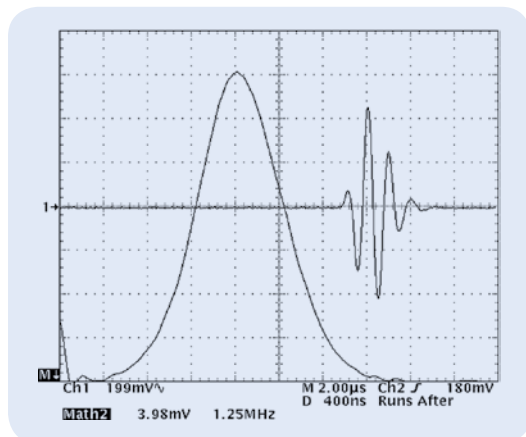
We have developed three different series of transducers to respond to the need for variety. Each series has its own unique characteristics.

Transducer configuration also has an impact on system performance. Consideration should be given to the use of focused transducers, transducers with wear surfaces that are appropriate for the test material, and the choice of the appropriate frequency and element diameter.

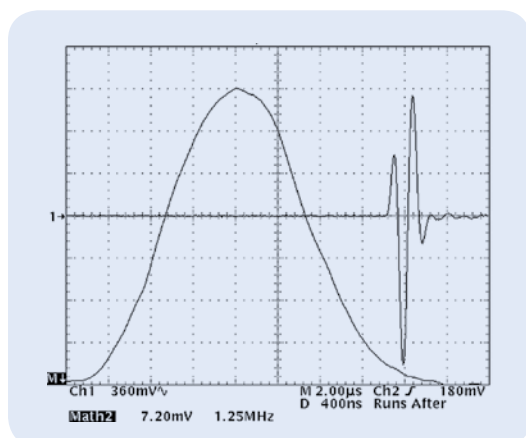
The summaries below provide a general description of the performance characteristics of each transducer series. While these guidelines are quite useful, each application is unique and performance will be dependent on electronics, cabling, and transducer configuration, frequency, and element diameter.



HARISONIC "P" type transducers are narrowband, lightly damped, tuned transducers. They have high-energy output and penetrating power, but have limited resolving power.



HARISONIC "S" type transducers are mediumband, medium damped, tuned transducers. They are used for general purpose flaw detection, and represent a compromise between high sensitivity and high resolution.

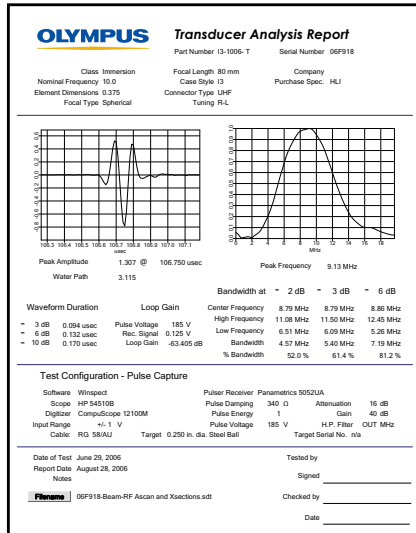


HARISONIC "R" type transducers are broadband, highly damped, tuned transducers. They are used for high resolution, near and far surface flaw detection, and thickness gaging applications.

Test and Documentation

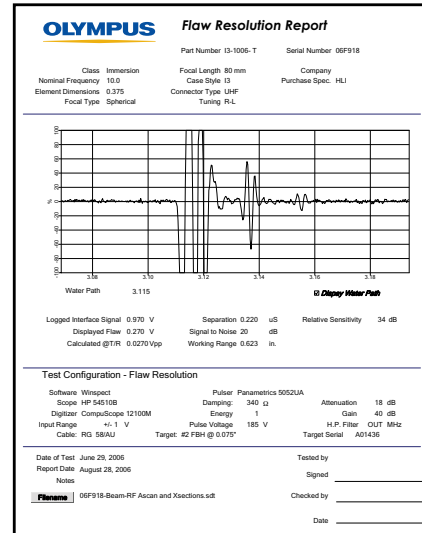
All Olympus NDT transducers undergo a strict testing regime before they are deemed acceptable for use in the field. All tests are done in accordance with the ASTM E1065 Standard Guide for Evaluating Characteristics of Ultrasonic Search Units. As part of the test and documentation process, all transducers will automatically be shipped with a Real Time Waveform Spectrum (RTWFS)

or Pulse Characterization and are given the option of further documentation at the time of order. In addition, optional flaw/resolution tests, axial beam profile and transverse beam profiles can also be done on certain types of transducers. Please consult us with any special testing requirements.



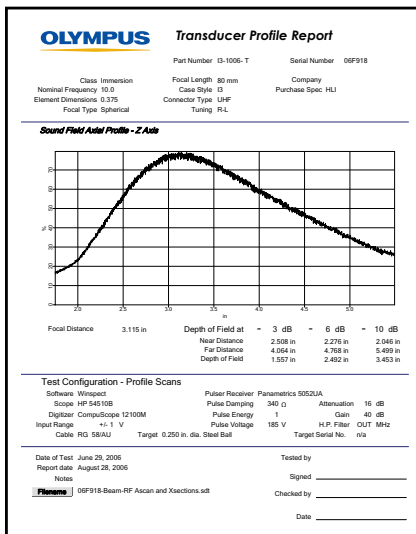
Transducer Analysis Report (Pulse Characterization)

The Transducer Pulse Characterization data sheet is our standard documentation, and is provided with every Harisonic® transducer, free of charge. The RF Waveform and Frequency Spectrum information is recorded and stored in our database, for future reference. Important parameters such as Peak and Center Frequency, Bandwidth, Pulse Voltage and Loop Gain are measured per ASTM E1065 guidelines.



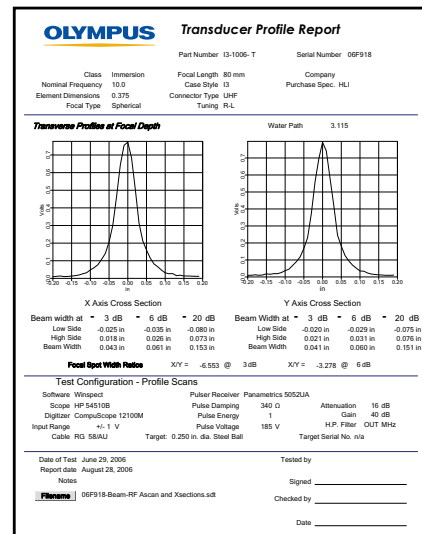
Flaw Resolution Test

The optional Flaw Resolution Test certifies the resolving power of Harisonic® transducers. This test is typically performed on immersion type transducers, with the target being specified by the customer. Near or far surface resolution can be measured.



Axial (On-Axis) Beam Profile

The optional Axial or On-Axis Beam Profile is typically done on immersion type transducers, and provides critical information about the transducer's sound field. This test is performed with the transducer face starting close to the target and then moving away along the Z-axis. Pulse echo amplitude vs. distance, focal length, and depth of field are measured.



Transverse Beam Profiles

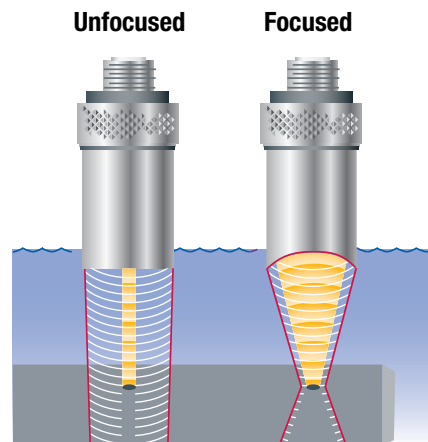
The optional Transverse Beam Profiles are typically done on immersion transducers, and provide critical information on the transducer's sound field. This test is performed at the measured focal length, along the X and Y axes. Beam width and symmetry are measured.

Immersion Transducers

Immersion transducers are specifically designed to test parts partially or wholly immersed in water, which allows a uniform and fast coupling technique for rapid scanning of parts. Focusing lens can be added to increase transducer sensitivity and performance in a particular area of a part. Immersion transducers can be focused either spherically or cylindrically upon request within the allowable focal range for a given frequency and element size.

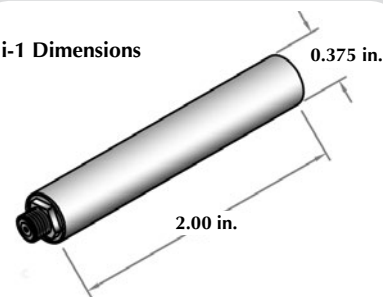
i-1 and i-2 Style Housings

0.25 in. (6 mm) diameter elements with 0.375 in. (10 mm) housings for difficult to reach fillet or bore areas are available with straight Microdot (I-1) or straight UHF (I-2) connectors and 303 stainless steel housings.

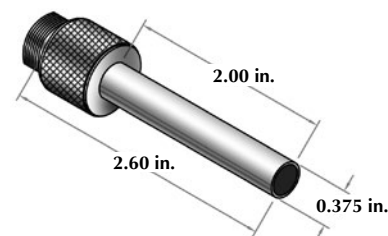


			Type S-Standard General Purpose	Type R-High Resolution	Focus (in)	
Frequency (MHz)	Element Dia. (in.)	(mm)	Part Number	Part Number	Min.	Max.
Type I-1						
2.25	0.25	6	i1-0204-S-SM	i1-0204-R-SM	0.35	0.45
3.5	0.25	6	i1-0304-S-SM	i1-0304-R-SM	0.39	0.70
5.0	0.25	6	i1-0504-S-SM	i1-0504-R-SM	0.43	1.00
10	0.25	6	i1-1004-S-SM	i1-1004-R-SM	0.46	2.10
15	0.25	6	i1-1504-S-SM	i1-1504-R-SM	0.50	3.15
20	0.25	6	i1-2004-S-SM	i1-2004-R-SM	0.50	4.20
25	0.25	6	i1-2504-S-SM	i1-2504-R-SM	0.50	5.25
Type I-2						
2.25	0.25	6	i2-0204-S-SU	i2-0204-R-SU	0.35	0.45
3.5	0.25	6	i2-0304-S-SU	i2-0304-R-SU	0.39	0.70
5.0	0.25	6	i2-0504-S-SU	i2-0504-R-SU	0.43	1.00
10	0.25	6	i2-1004-S-SU	i2-1004-R-SU	0.46	2.10
15	0.25	6	i2-1504-S-SU	i2-1504-R-SU	0.50	3.15
20	0.25	6	i2-2004-S-SU	i2-2004-R-SU	0.50	4.20
25	0.25	6	i2-2504-S-SU	i2-2504-R-SU	0.50	5.25

i-1 Dimensions



i-2 Dimensions



*List of Part and Item Numbers on page 13 reflect the most commonly ordered items.
If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

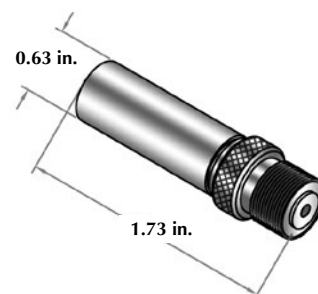
Immersion Transducers

i-3 Style Housing

0.25 in. (6mm), 0.375 in. (10 mm) and 0.50 in. (13 mm) element diameters in 0.63 in. (16 mm) housings with straight UHF connectors and 303 stainless steel case housings. If a focus is required, select a focal length between min. and max.



i-3 Dimensions



Frequency (MHz)	Element Dia. (in.) (mm)		Type P Penetration Power	Type S-Standard General Purpose	Type R High Resolution	Point Target Focus (in.)	
			Part Number	Part Number	Part Number	Min.	Max.
1.0	0.50	13	i3-0108-P-SU	i3-0108-S-SU	—	0.60	0.80
2.25	0.25	6	i3-0204-P-SU	i3-0204-S-SU	i3-0240-R-SU	0.35	0.45
	0.375	10	i3-0206-P-SU	i3-0206-S-SU	i3-0206-R-SU	0.50	1.06
	0.50	13	i3-0208-P-SU	i3-0208-S-SU	i3-0208-R-SU	0.80	1.90
3.5	0.25	6	i3-0304-P-SU	i3-0304-S-SU	i3-0304-R-SU	0.39	0.70
	0.375	10	i3-0306-P-SU	i3-0306-S-SU	i3-0306-R-SU	0.60	1.65
	0.50	13	i3-0308-P-SU	i3-0308-S-SU	i3-0308-R-SU	0.83	2.95
5.0	0.25	6	i3-0504-P-SU	i3-0504-S-SU	i3-0504-R-SU	0.43	1.00
	0.375	10	i3-0506-P-SU	i3-0506-S-SU	i3-0506-R-SU	0.60	2.35
	0.50	13	i3-0508-P-SU	i3-0508-S-SU	i3-0508-R-SU	0.75	4.20
7.5	0.50	13	—	—	i3-0708-R-SU	0.75	6.30
10	0.25	6	i3-1004-P-SU	i3-1004-S-SU	i3-1004-R-SU	0.46	2.10
	0.375	10	i3-1006-P-SU	i3-1006-S-SU	i3-1006-R-SU	0.60	4.75
	0.50	13	i3-1008-P-SU	i3-1008-S-SU	i3-1008-R-SU	0.75	8.40
15	0.25	6	—	i3-1504-S-SU	i3-1504-R-SU	0.50	3.15
	0.375	10	—	i3-1506-S-SU	i3-1506-R-SU	0.60	4.75
20	0.25	6	—	i3-2004-S-SU	i3-2004-R-SU	0.50	4.20
25	0.25	6	—	i3-2504-S-SU	i3-2504-R-SU	0.50	5.25
	0.375	10	—	—	i3-2506-R-SU	0.60	12.10

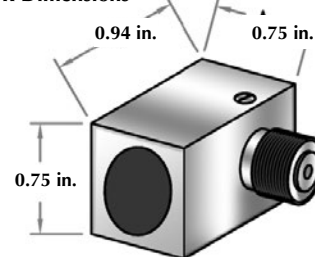
*List of Part and Item Numbers on page 13 reflect the most commonly ordered items. If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

i-R Style Housings



0.50 in. (10 mm) element diameters in 0.75 in. (19 mm) x 0.75 in. (19 mm) rectangular housings with side mount (right angle), UHF connectors, and 303 stainless steel case housings are available.

i-R Dimensions



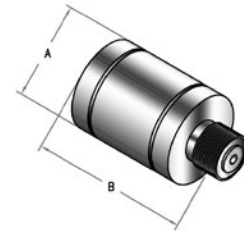
Frequency (MHz)	Element Dia. (in.) (mm)		Type P Penetration Power	Type S-Standard, General Purpose	Type R High Resolution	Point Target Focus (in.)	
			Part Number	Part Number	Part Number	Min.	Max.
0.5	0.50	13	iR-0008-P-RU	—	—	0.40	0.43
1.0	0.50	13	iR-0108-P-RU	iR-0108-S-RU	—	0.60	0.80
2.25	0.50	13	iR-0208-P-RU	iR-0208-S-RU	iR-0208-R-RU	0.80	1.90
3.5	0.50	13	iR-0308-P-RU	iR-0308-S-RU	iR-0308-R-RU	0.83	2.95
5.0	0.50	13	iR-0508-P-RU	iR-0508-S-RU	iR-0508-R-RU	0.75	4.20
10	0.50	13	—	iR-1008-S-RU	iR-1008-R-RU	0.75	8.40

*List of Part and Item Numbers on page 13 reflect the most commonly ordered items. If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

Immersion Transducers

i-4, i-7 and i-8 Style Housings

Various element and case sizes with straight UHF connectors and 303 stainless steel case housings are available.



Styles i-4, i-7, and i-8

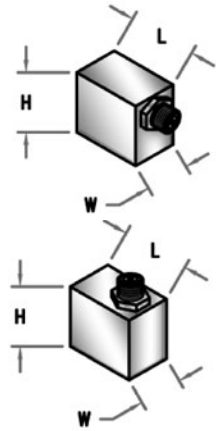
Element Dia. (in.)	A	B
0.50, 0.625	0.748	1.375
0.75	1.00	1.375
1.00, 1.125	1.25	1.375

Frequency (MHz)	Element Dia (in. mm)		Type P Penetration Power	Type S-Standard, General Purpose	Type R High Resolution	Focus (in.)	
			Part Number	Part Number	Part Number	Min.	Max.
0.50	0.75	19	i7-0012-P-SU	—	—	0.78	0.93
	1.00	25	i8-0016-P-SU	i8-0016-S-SU	—	1.25	1.65
	1.125	29	i8-0018-P-SU	i8-0018-S-SU	—	1.50	2.10
1.0	0.50	13	i4-0108-P-SU	i4-0108-S-SU	i4-0108-R-SU	0.60	0.80
	0.625	16	i4-0110-P-SU	i4-0110-S-SU	i4-0110-R-SU	0.70	1.34
	0.75	19	i7-0112-P-SU	i7-0112-S-SU	i7-0112-R-SU	1.00	1.90
	1.00	25	i8-0116-P-SU	i8-0116-S-SU	i8-0116-R-SU	1.63	3.38
	1.125	29	i8-0118-P-SU	i8-0118-S-SU	i8-0118-R-SU	1.90	4.30
2.25	0.375	10	i4-0206-P-SU	i4-0206-S-SU	i4-0206-R-SU	0.55	1.00
	0.50	13	i4-0208-P-SU	i4-0208-S-SU	i4-0208-R-SU	0.80	1.90
	0.625	16	i4-0210-P-SU	i4-0210-S-SU	i4-0210-R-SU	0.90	3.00
	0.75	19	i7-0212-P-SU	i7-0212-S-SU	i7-0212-R-SU	1.00	4.30
	1.00	25	i8-0216-P-SU	i8-0216-S-SU	i8-0216-R-SU	1.88	7.60
	1.125	29	i8-0218-P-SU	i8-0218-S-SU	i8-0218-R-SU	2.15	9.50
3.5	0.375	10	i4-0306-P-SU	i4-0306-S-SU	i4-0306-R-SU	0.60	1.60
	0.50	13	i4-0308-P-SU	i4-0308-S-SU	i4-0308-R-SU	0.83	3.00
	0.625	16	i4-0310-P-SU	i4-0310-S-SU	i4-0310-R-SU	0.90	4.70
	0.75	19	i7-0312-P-SU	i7-0312-S-SU	i7-0312-R-SU	1.00	6.65
	1.00	25	—	i8-0316-S-SU	—	1.95	11.25
	1.125	29	—	i8-0318-S-SU	—	2.20	15.30
5.0	0.375	10	i4-0506-P-SU	i4-0506-S-SU	i4-0506-R-SU	0.55	2.40
	0.50	13	i4-0508-P-SU	i4-0508-S-SU	i4-0508-R-SU	0.60	4.30
	0.625	16	i4-0510-P-SU	i4-0510-S-SU	i4-0510-R-SU	0.68	6.73
	0.75	19	i7-0512-P-SU	i7-0512-S-SU	i7-0512-R-SU	1.00	2.0
	1.00	25	i8-0516-P-SU	i8-0516-S-SU	i8-0516-R-SU	1.95	14.40
	1.125	29	i8-0518-P-SU	i8-0518-S-SU	i8-0518-R-SU	2.40	21.80
7.5	0.375	10	—	i4-0306-S-SU	—	0.60	1.60
	0.50	13	—	i4-0308-S-SU	—	0.83	3.00
	0.625	16	—	i4-0310-S-SU	—	0.90	4.70
10	0.375	10	—	i4-1006-S-SU	i4-1006-R-SU	0.60	4.75
	0.50	13	—	i4-1008-S-SU	i4-1008-R-SU	0.75	8.40
	0.625	16	—	i4-1010-S-SU	i4-1010-R-SU	0.85	13.40
	0.75	19	i7-1012-P-SU	i7-1012-S-SU	i7-1012-R-SU	1.00	15.37
15	0.375	10	—	i4-1506-S-SU	i4-1506-R-SU	0.60	7.10
	0.50	13	—	i4-1508-S-SU	i4-1508-R-SU	0.75	11.75
20	0.375	10	—	i4-2006-S-SU	i4-2006-R-SU	0.55	9.60

*List of Part and Item Numbers on page 13 reflect the most commonly ordered items. If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

Sub-Miniature and Ultra-Miniature Angle Beam Transducers

The sub-miniature (HS-225) and ultra-miniature (HS-877) angle beam transducers are supplied in frequencies from 2.25 to 10 MHz with angles from 45° through 90°. Epoxy housings prevent the transducer from causing scratches to the test surface. These transducers are ideal for inspection of small diameter welded tubes and applications where the requirement is for a shear-wave transducer with a very small footprint. Depending on the type selected, either top or side mounted, Microdot connectors are available. When ordering, please specify part number, frequency, angle, material to be inspected, and connector location.



Transducer Housing Dimensions

Sub-Miniature:
0.375 in. L x 0.425 in. H x 0.325 in. W

Ultra-Miniature:
0.375 in. L x 0.375 in. H x 0.250 in. W

Size	Frequency (MHz)	Material	Connector	Angle XX = Specify Angle
0.120 in. x 0.250 in. 3 mm x 6 mm	2.25	Aluminum	Straight	HS-225-2-XX-AL-SM
	2.25	Aluminum	Right Angle	HS-225-2-XX-AL-RM
	2.25	Steel	Straight	HS-225-2-XX-ST-SM
	2.25	Steel	Right Angle	HS-225-2-XX-ST-RM
	5.0	Aluminum	Straight	HS-225-5-XX-AL-SM
	5.0	Aluminum	Right Angle	HS-225-5-XX-AL-RM
	5.0	Steel	Straight	HS-225-5-XX-ST-SM
	5.0	Steel	Right Angle	HS-225-5-XX-ST-RM
	10	Aluminum	Straight	HS-225-10-XX-AL-SM
	10	Aluminum	Right Angle	HS-225-10-XX-AL-RM
	10	Steel	Straight	HS-225-10-XX-ST-SM
	10	Steel	Right Angle	HS-225-10-XX-ST-RM
0.187 in. x 0.187 in. 5 mm x 5 mm	2.25	Aluminum	Straight	HS-877-2-XX-AL-SM
	2.25	Aluminum	Right Angle	HS-877-2-XX-AL-RM
	2.25	Steel	Straight	HS-877-2-XX-ST-SM
	2.25	Steel	Right Angle	HS-877-2-XX-ST-RM
	5.0	Aluminum	Straight	HS-877-5-XX-AL-SM
	5.0	Aluminum	Right Angle	HS-877-5-XX-AL-RM
	5.0	Steel	Straight	HS-877-5-XX-ST-SM
	5.0	Steel	Right Angle	HS-877-5-XX-ST-RM
	10	Aluminum	Straight	HS-877-10-XX-AL-SM
	10	Aluminum	Right Angle	HS-877-10-XX-AL-RM
	10	Steel	Straight	HS-877-10-XX-ST-SM
	10	Steel	Right Angle	HS-877-10-XX-ST-RM

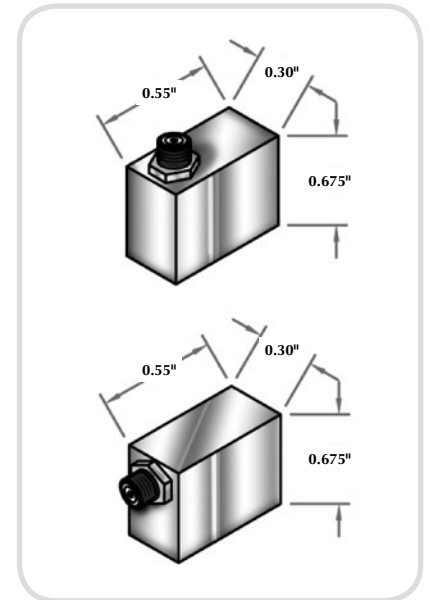
Specify material to be inspected.

*List of Part and Item Numbers on page 13 reflect the most commonly ordered items. If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

Integral Angle Beam Transducers

Miniature potted angle beam transducers provide an excellent balance between size and performance by utilizing integral angle beam shear wave wedges. Overall size and footprint are reduced compared to a screw-in style transducer and wedge with little or no sacrifice in performance. Epoxy housings prevent test surface scratching caused by the transducer.

Connectors are available in either top (straight) or side (right angle) mount depending on application requirements. Four standard shear wave angles of 45°, 60°, 70°, and 90° or custom angles are available upon request.



Size	Frequency (MHz)	Material	Connector	Angle XX = Angle 45, 60, 70 or 90
0.187 in. x 0.187 in. 5 mm x 5 mm	2.25	Aluminum	Straight	PAB-0203-XX-AL-SM
	2.25	Aluminum	Right Angle	PAB-0203-XX-AL-RM
	2.25	Steel	Straight	PAB-0203-XX-ST-SM
	2.25	Steel	Right Angle	PAB-0203-XX-ST-RM
	5.0	Aluminum	Straight	PAB-0503-XX-AL-SM
	5.0	Aluminum	Right Angle	PAB-0503-XX-AL-RM
	5.0	Steel	Straight	PAB-0503-XX-ST-SM
	5.0	Steel	Right Angle	PAB-0503-XX-ST-RM
	10	Aluminum	Straight	PAB-1003-XX-AL-SM
	10	Aluminum	Right Angle	PAB-1003-XX-AL-RM
	10	Steel	Straight	PAB-1003-XX-ST-SM
	10	Steel	Right Angle	PAB-1003-XX-ST-RM
0.250 in. x 0.250 in. 6 mm x 6 mm	2.25	Aluminum	Straight	PAB-0204-XX-AL-SM
	2.25	Aluminum	Right Angle	PAB-0204-XX-AL-RM
	2.25	Steel	Straight	PAB-0204-XX-ST-SM
	2.25	Steel	Right Angle	PAB-0204-XX-ST-RM
	5.0	Aluminum	Straight	PAB-0504-XX-AL-SM
	5.0	Aluminum	Right Angle	PAB-0504-XX-AL-RM
	5.0	Steel	Straight	PAB-0504-XX-ST-SM
	5.0	Steel	Right Angle	PAB-0504-XX-ST-RM
	10	Aluminum	Straight	PAB-1004-XX-AL-SM
	10	Aluminum	Right Angle	PAB-1004-XX-AL-RM
	10	Steel	Straight	PAB-1004-XX-ST-SM
	10	Steel	Right Angle	PAB-1004-XX-ST-RM

*List of Part and Item Numbers on page 13 reflect the most commonly ordered items. If an Item Number required is not listed, please contact a sales representative with the Part Number to order.

Roller Transducers

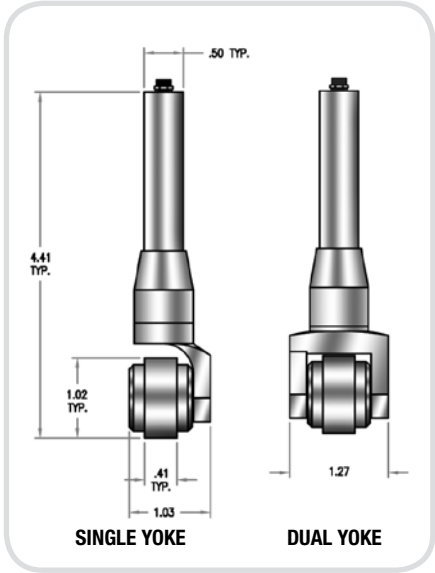
Roller transducers are used in testing metallic or non-metallic materials for bonding/segregation in CFRP/GRP including Kevlar, rubber friction materials, and high density products such as glass, wood, concrete, and metallic and plastic weldments. This series includes roller and contact type transducers at 0.5 MHz and 1.25 MHz. Contact units are available in 5, 10, and 15 mm diameters, while the roller transducers incorporate a 5 mm crystal giving a 10 mm footprint through the replaceable tire. Both styles are fitted with axial mounted Microdot connectors (other connectors available on request). The roller transducer can be ordered with either a single or dual yoke design.

Roller Transducers						
Frequency (MHz)	Size		Yoke	Wheel Diameter		Part Number
	in.	mm		in.	mm	
1.25	0.187	5	Single	1.0	25	RT-0105-16SY
1.25	0.187	5	Dual	1.0	25	RT-0105-16DY
0.50	0.187	5	Single	1.0	25	RT-0005-SY
0.50	0.187	5	Dual	1.0	25	RT-0005-DY

Spare Tires

Part Number	Wheel Diameter	
RT-16-10T	1.0 in.	25 mm

Roller transducers are used in through transmission mode for fast linear scans of parts without the need for an immersion setup. Roller transducers are typically used in applications looking for de-laminations in multilayer materials. Both single or dual yoke designs feature a removable and replaceable tire.



Pencil Transducers

These high frequency, focused delay line transducers are compatible with any ultrasonic instrument capable of displaying a return echo at depths as low as 0.010 in. in steel. The typical range is approximately from 0.010 in. to 0.250 in. in steel. The 0.060 in. circular contact face enables readings to be taken on curved surfaces. Typical applications for these transducers include the inspection of turbine blades, small diameter tubing and concave areas in small parts. Both transducers utilize replaceable delay tips. For best performance, a short cable (such as BCM-74-6) should be used. These models, indicated by a part number ending with an “L”, incorporate PowerLink™ Technology to assure optimal performance when used with a Sonic ultrasonic instrument.

The HC-876 ultrasonic transducer operates at high frequency (20 MHz) with a broad bandwidth and small contact surface. Its chief application is thickness measuring of critical components such as jet engine blades(0.004 in. to 0.300 in. / 0.102 mm to 7.62 mm). It is fitted with a Microdot connector.



HC-876-RA-L Right Angle Type

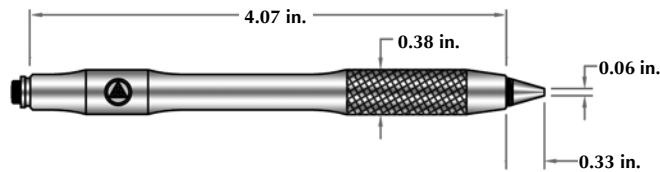


HC-398-RDL Straight Pencil Type

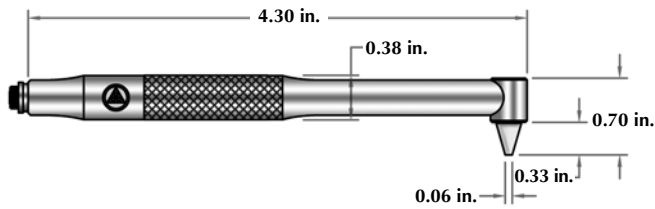
Replaceable Delay Line

Frequency (MHz)	Nominal Element Size		Part Number	
			Straight Handle	Right Angle Handle
10	0.125	3	HC-398-RDL-L	HC-398-RA-RDL-L
Replacement Tips (10 μs)			HAX-398	HAX-398

HC-398-RDL-L Straight Pencil Type



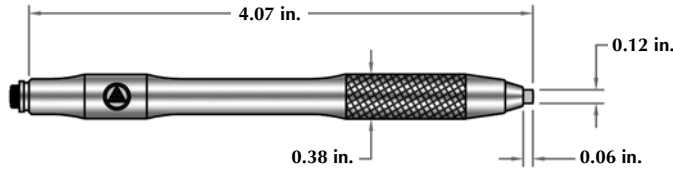
HC-398-RA-RDL-L Right Angle Type



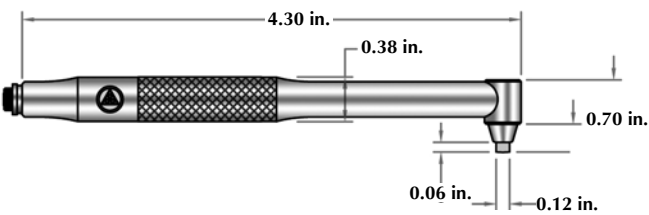
Permanent Delay Line

Frequency (MHz)	Nominal Element Size		Part Number	
			Straight Handle	Right Angle Handle
20	0.125	3	HC-876-L	HC-876*, HC-876-RA-L
Permanent Tip Delay (3.6 μs)			*Not PowerLink compatible.	

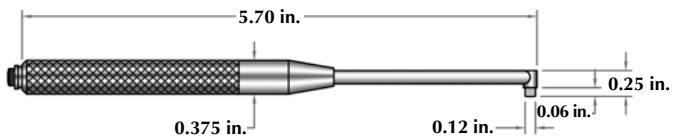
HC-876-L Straight Pencil Type



HC-876-RA-L Right Angle Type



HC-876 Right Angle Type



Special Transducers

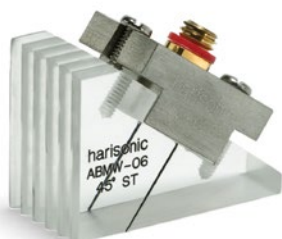
In addition to the transducers listed in this catalog, Olympus NDT continues to manufacture past “standard” Harisonic transducers upon request. This includes many of the past Harisonic contact, angle beam, dual & other lines. Below are some examples of these transducers recently supplied by Olympus NDT.



Miniature Screw-In Angle Beam Transducers and Wedges (ABT and ABTW Series)



Thickness Gaging Transducers (G, GR, and GD Series)



Miniature Angle Beam Transducers and Wedges (ABM and ABMW Series)



Standard Angle Beam Transducers (AB Series)



General Purpose, Rugged, and Fingertip Contact Transducers (CR, CRW, and CM Series)



Spectrum PowerLink™ Contact Transducers



Wheel Search Units



Dual Element Contact Transducers (MD, DI Series)

Technical Notes

Near Field Distances of Flat Transducers in Water

The near field values in this table have been determined using the following equation:

$$N = \frac{D^2}{4\lambda} \left[1 - \left(\frac{\lambda}{D} \right)^2 \right]$$

The minimum and maximum practical focal lengths have been calculated by considering the acoustic and mechanical limitations of each configuration. These limitations are a function of transducer frequency, element diameter, and case dimensions. There may be exceptions to the limits listed in the table.

Table 1 – Near Field Distance of Flat Transducers in Water				
Frequency (MHz)	Element Diameter (inches)	N (inches)	Focal Length (PTF)**	
			Min (inches)	Max (inches)
0.5	1.50	4.757	2.15	3.80
	1.125	2.661	1.50	2.10
	1.00	2.095	1.25	1.65
	0.75	1.164	0.78	0.93
1.0	1.50	9.559	2.50	7.65
	1.125	5.366	1.90	4.30
	1.00	4.235	1.625	3.38
	0.75	2.372	1.00	1.90
	0.50	1.043	0.60	0.80
2.25	1.50	21.534	2.70	14.50
	1.125	12.099	2.15	9.50
	1.00	9.554	1.875	7.60
	0.75	5.364	1.00	4.30
	0.50	2.374	0.80	1.90
	0.375	1.329	0.50	1.06
3.5	0.25	0.584	0.35	0.45
	1.00	14.868	1.95	11.5
	0.75	8.350	1.00	6.65
	0.50	3.699	0.83	2.95
	0.375	2.073	0.60	1.65
	0.25	0.914	0.385	0.70
5.0	1.00	21.243	1.95	14.40‡
	0.75	11.932	1.00	9.50
	0.50	5.287	0.75	4.20
	0.375	2.965	0.60	2.35
	0.25	1.309	0.43	1.00
7.5	0.75	17.900	1.00	12.75‡
	0.50	7.933	0.75	6.30‡
	1.00	42.490	2.00	20.00‡
10	0.75	23.868	1.00	15.375‡
	0.50	10.579	0.75	8.40‡
	0.375	5.934	0.60	4.75‡
	0.25	2.622	0.46	2.10
15	0.50	15.870	0.75	11.75‡
	0.375	8.902	0.60	7.10‡
	0.25	3.935	0.50	3.15‡
20	0.25	5.247	0.50	4.20‡
	0.125	1.290	0.25	1.00‡
25	0.25	6.559	0.50	5.25‡

** Harmonic Immersion Transducers can be focused between the Minimum and Maximum Point Target Focal (PTF) distance limits listed in Table 1. Please consult Olympus before ordering a transducer focused outside these limits.

‡ Consideration should be given to attenuation effects which increase linearity and with the square of frequency and the square of bandwidth. In applications where long water paths are required the effects of frequency dependent attenuation should be checked per ASTM E 1065 Annex A7. It is advisable to consider the effects of frequency dependent attenuation if the focal distance equals or exceeds the following values:

Table 2 – Acoustic Properties of Materials					
Material	Longitudinal Velocity		Shear Velocity		Acoustic Impedance (Kg/m ² s x 10 ⁶)
	(in./s)*	(m/s)	(in./s)*	(m/s)	
Acrylic resin (Perspex)	0.107	2,730	0.056	1,430	3.22
Aluminum	0.249	6,320	0.123	3,130	17.06
Beryllium	0.508	12,900	0.350	8,880	23.50
Brass, naval	0.174	4,430	0.083	2,120	37.30
Cadmium	0.109	2,780	0.059	1,500	24.02
Columbium	0.194	4,920	0.083	2,100	42.16
Copper	0.183	4,660	0.089	2,260	41.61
Glycerine	0.076	1,920	—	—	2.42
Gold	0.128	3,240	0.047	1,200	62.60
Inconel	0.29	5,820	0.119	3,020	49.47
Iron	0.232	5,900	0.127	3,230	45.43
Iron, cast					
(slow)	0.138	3,500	0.087	2,200	25.00
(fast)	0.220	5,600	0.126	3,220	40.00
Lead	0.085	2,160	0.028	700	24.49
Manganese	0.183	4,660	0.093	2,350	34.44
Mercury	0.057	1,450	—	—	19.66
Molybdenum	0.246	6,250	0.132	3,350	63.75
Motor Oil (SAE 20 or 30)	0.069	1,740	—	—	1.51
Nickel, pure	0.222	5,630	0.117	2,960	49.99
Platinum	0.156	3,960	0.066	1,670	84.74
Polyamide, (nylon, Perlon)					
(slow)	0.087	2,200	0.043	1,100	0.40
(fast)	0.102	2,600	0.047	1,200	3.10
Polystyrene	0.092	2,340	—	—	2.47
Polyvinylchloride, PVC, hard	0.094	2,395	0.042	1,060	3.35
Silver	0.142	3,600	0.063	1,590	37.76
Steel, 1020	0.232	5,890	0.128	3,240	45.63
Steel, 4340	0.230	5,850	0.128	3,240	45.63
Steel, 302	0.223	5,660	0.123	3,120	45.45
Austenitic stainless Steel, 347	0.226	5,740	0.122	3,090	45.40
Austenitic stainless Tin	0.131	3,320	0.066	1,670	24.20
Titanium, Ti 150A	0.240	6,100	0.123	3,120	27.69
Tungsten	0.204	5,180	0.113	2,870	99.72
Uranium	0.133	3,370	0.078	1,980	63.02
Water (20°C)	0.058	1,480	—	—	1.48
Zinc	0.164	4,170	0.095	2,410	29.61
Zirconium	0.183	4,650	0.089	2,250	30.13

* Conversion Factor: 1 m/s = 3.937 x 10⁻⁵ in/μs

Source: Nondestructive Testing Handbook 2nd Edition Volume 7
Ultrasonic Testing ASNT 1991 ed Paul McIntire

Harisonic Ultrasonic Transducers • Part and Item Numbers*

March 2011

Part	Item Number	Part	Item Number	Part	Item Number	Part	Item Number
HAX-398	U8770179	i2-2504-R-SU	U8517207	i4-0306-R-SU	U8517102	i8-0216-S-SU	U8517188
HC-398-RA-RDL-L	U8530028	i2-2504-S-SU	U8517209	i4-0306-S-SU	U8517103	i8-0218-P-SU	U8517190
HC-398-RDL-L	U8530029	i3-0108-P-SU	U8517027	i4-0306-S-SU	U8517103	i8-0218-R-SU	U8517191
HC-876	U8530030	i3-0108-S-SU	U8517028	i4-0308-P-SU	U8517105	i8-0218-S-SU	U8517192
HC-876-L	U8530031	i3-0204-P-SU	U8517030	i4-0308-R-SU	U8517106	i8-0516-P-SU	U8517194
HC-876-RA-L	U8530032	i3-0204-R-SU	U8517031	i4-0308-S-SU	U8517107	i8-0516-R-SU	U8517284
HS-225-2-60-ST-RM	U8430041	i3-0204-S-SU	U8517032	i4-0308-S-SU	U8517107	i8-0516-S-SU	U8517195
HS-225-2-70-AL-RM	U8503051	i3-0206-P-SU	U8517034	i4-0310-P-SU	U8517109	i8-0518-P-SU	U8517197
HS-225-2-70-ST-RM	U8430040	i3-0206-R-SU	U8517035	i4-0310-R-SU	U8517110	i8-0518-R-SU	U8517198
HS-225-2-90-ST-RM	U8435043	i3-0206-S-SU	U8517036	i4-0310-S-SU	U8517111	i8-0518-S-SU	U8517199
HS-225-5-45-AL-RM	U8503124	i3-0208-P-SU	U8517038	i4-0310-S-SU	U8517111	iR-0008-P-RU	U8518044
HS-225-5-45-AL-SM	U8503134	i3-0208-R-SU	U8517039	i4-0506-P-SU	U8517113	iR-0108-P-RU	U8518046
HS-225-5-60-AL-RM	U8503053	i3-0208-S-SU	U8517040	i4-0506-R-SU	U8517114	iR-0108-S-RU	U8518048
HS-225-5-60-AL-SM	U8503054	i3-0304-P-SU	U8517042	i4-0506-S-SU	U8517115	iR-0208-P-RU	U8518050
HS-225-5-60-ST-RM	U8435041	i3-0304-R-SU	U8517043	i4-0508-P-SU	U8517116	iR-0208-R-RU	U8518051
HS-225-5-70-AL-RM	U8503123	i3-0304-S-SU	U8517044	i4-0508-R-SU	U8517117	iR-0208-S-RU	U8518052
HS-225-5-70-AL-SM	U8503056	i3-0306-P-SU	U8517046	i4-0508-S-SU	U8517118	iR-0308-P-RU	U8518054
HS-225-5-70-ST-RM	U8435040	i3-0306-R-SU	U8517047	i4-0510-P-SU	U8517120	iR-0308-R-RU	U8518055
HS-877-10-45-AL-SM	U8503058	i3-0306-S-SU	U8517048	i4-0510-R-SU	U8517121	iR-0308-S-RU	U8518056
HS-877-10-45-ST-RM	U8503104	i3-0308-P-SU	U8517049	i4-0510-S-SU	U8517122	iR-0508-R-RU	U8518057
HS-877-10-45-ST-SM	U8435044	i3-0308-R-SU	U8517233	i4-1006-R-SU	U8517133	iR-0508-S-RU	U8518058
HS-877-10-60-AL-SM	U8503126	i3-0308-S-SU	U8517050	i4-1006-S-SU	U8517134	iR-1008-R-RU	U8518061
HS-877-10-60-ST-SM	U8435045	i3-0504-P-SU	U8517052	i4-1008-R-SU	U8517136	iR-1008-S-RU	U8518062
HS-877-10-70-AL-SM	U8503164	i3-0504-R-SU	U8517053	i4-1008-S-SU	U8517137	PAB-0204-60-AL-RM	U8503183
HS-877-10-90-ST-RM	U8503062	i3-0504-S-SU	U8517054	i4-1010-R-SU	U8517139	PAB-0204-90-ST-RM	U8503076
HS-877-2-90-ST-RM	U8503066	i3-0506-P-SU	U8517056	i4-1010-S-SU	U8517140	PAB-0503-45-AL-RM	U8503077
HS-877-5-45-AL-SM	U8503067	i3-0506-R-SU	U8517057	i4-1506-R-SU	U8517142	PAB-0503-45-AL-SM	U8503078
HS-877-5-45-ST-RM	U8503127	i3-0506-S-SU	U8517058	i4-1506-S-SU	U8517143	PAB-0503-45-ST-RM	U8503079
HS-877-5-45-ST-SM	U8503068	i3-0508-P-SU	U8517060	i4-1508-R-SU	U8517145	PAB-0503-45-ST-SM	U8503080
HS-877-5-60-AL-SM	U8503070	i3-0508-R-SU	U8517061	i4-1508-S-SU	U8517146	PAB-0503-60-AL-RM	U8503081
HS-877-5-60-ST-SM	U8503120	i3-0508-S-SU	U8517063	i4-2006-R-SU	U8517148	PAB-0503-70-AL-SM	U8503086
HS-877-5-70-AL-SM	U8503122	i3-0708-R-SU	U8517220	i4-2006-S-SU	U8517149	PAB-0503-70-ST-RM	U8503087
HS-877-5-90-ST-RM	U8503073	i3-1004-R-SU	U8517066	i7-0012-P-SU	U8517150	PAB-0503-70-ST-SM	U8503088
HS-877-5-90-ST-SM	U8503074	i3-1004-S-SU	U8517067	i7-0112-P-SU	U8517152	PAB-0503-90-ST-RM	U8503167
i1-0204-R-SM	U8518002	i3-1006-R-SU	U8517069	i7-0112-R-SU	U8520004	PAB-0504-45-AL-RM	U8503107
i1-0204-S-SM	U8518003	i3-1006-S-SU	U8517070	i7-0112-S-SU	U8517153	PAB-0504-45-AL-SM	U8503106
i1-0304-R-SM	U8518006	i3-1008-R-SU	U8517073	i7-0212-P-SU	U8517155	PAB-0504-45-ST-RM	U8430039
i1-0304-S-SM	U8518007	i3-1008-S-SU	U8517074	i7-0212-R-SU	U8517156	PAB-0504-45-ST-SM	U8503089
i1-0504-R-SM	U8518010	i3-1504-R-SU	U8517076	i7-0212-S-SU	U8517157	PAB-0504-60-AL-RM	U8503109
i1-0504-S-SM	U8518011	i3-1504-S-SU	U8517077	i7-0312-P-SU	U8517159	PAB-0504-60-AL-SM	U8503110
i1-1004-R-SM	U8518014	i3-1506-R-SU	U8517079	i7-0312-R-SU	U8517160	PAB-0504-60-ST-RM	U8503163
i1-1004-S-SM	U8518015	i3-2004-R-SU	U8517080	i7-0312-S-SU	U8517161	PAB-0504-60-ST-SM	U8503090
i1-1504-R-SM	U8518017	i3-2004-S-SU	U8517081	i7-0512-P-SU	U8517163	PAB-0504-70-AL-RM	U8503091
i1-1504-S-SM	U8518018	i3-2504-R-SU	U8519002	i7-0512-R-SU	U8517165	PAB-0504-70-ST-RM	U8503092
i1-2004-R-SM	U8518020	i3-2506-R-SU	U8519011	i7-0512-S-SU	U8517167	PAB-0504-70-ST-SM	U8503093
i1-2004-S-SM	U8518021	i4-0108-P-SU	U8517083	i7-1012-P-SU	U8517169	PAB-0504-90-ST-RM	U8503094
i1-2504-R-SM	U8517204	i4-0108-R-SU	U8517084	i7-1012-R-SU	U8517170	PAB-1003-60-AL-SM	U8502019
i1-2504-S-SM	U8517205	i4-0108-S-SU	U8420054	i7-1012-S-SU	U8517171	PAB-1003-90-ST-SM	U8503095
i2-0204-R-SU	U8517003	i4-0110-P-SU	U8517086	i8-0016-P-SU	U8517173	PAB-1004-45-AL-RM	U8503096
i2-0204-S-SU	U8517004	i4-0110-R-SU	U8517087	i8-0016-S-SU	U8517174	PAB-1004-45-AL-SM	U8503176
i2-0304-R-SU	U8517007	i4-0110-S-SU	U8517088	i8-0018-P-SU	U8517176	PAB-1004-45-ST-RM	U8503177
i2-0304-S-SU	U8517008	i4-0206-P-SU	U8517090	i8-0018-S-SU	U8517177	PAB-1004-60-AL-RM	U8502039
i2-0504-R-SU	U8517011	i4-0206-R-SU	U8517091	i8-0116-P-SU	U8517179	PAB-1004-70-AL-SM	U8503097
i2-0504-S-SU	U8517012	i4-0206-S-SU	U8517092	i8-0116-R-SU	U8517180	PAB-1004-70-ST-RM	U8503178
i2-1004-R-SU	U8517231	i4-0208-P-SU	U8517094	i8-0116-S-SU	U8517181	RT-0005-16DY	U8528001
i2-1004-S-SU	U8517016	i4-0208-R-SU	U8517095	i8-0118-P-SU	U8517183	RT-0005-16SY	U8528002
i2-1504-R-SU	U8517018	i4-0208-S-SU	U8517096	i8-0118-R-SU	U8517184	RT-0105-16DY	U8528003
i2-1504-S-SU	U8517019	i4-0210-R-SU	U8517098	i8-0118-S-SU	U8517185	RT-0105-16SY	U8528004
i2-2004-R-SU	U8517022	i4-0210-S-SU	U8517099	i8-0216-P-SU	U8517186	RT-16-10T	U8770226
i2-2004-S-SU	U8517023	i4-0306-P-SU	U8517101	i8-0216-R-SU	U8517187		

*List of Part and Item Numbers reflect the most commonly ordered items. If the Item Number required is not listed above please contact a sales representative with the Part Number for ordering information.

OLYMPUS SCIENTIFIC SOLUTIONS AMERICAS CORP.
is certified to ISO 9001, ISO 14001, and OHSAS 18001.

*All specifications are subject to change without notice.
All brands are trademarks or registered trademarks of their respective owners and third party entities.
Copyright © 2015 by Olympus.

www.olympus-ims.com



For enquiries - contact
www.olympus-ims.com/contact-us

OLYMPUS SCIENTIFIC SOLUTIONS AMERICAS CORP.

48 Woerd Avenue, Waltham, MA 02453, USA, Tel.: (1) 781-419-3900
12569 Gulf Freeway, Houston, TX 77034, USA, Tel.: (1) 281-922-9300

OLYMPUS NDT CANADA INC.

505, boul. du Parc-Technologique, Québec (Québec) G1P 4S9, Tel.: (1) 418-872-1155
1109 78 Ave, Edmonton (Alberta) T6P 1L8